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13.1 INTRODUCTION

This chapter presents the current and potential traffic and transport impacts associated with the construction and operation of the mine. The assessment describes the nature, magnitude and significance of traffic and transport impacts associated with the construction and operation of the mine. It also discusses mitigation measures to alleviate the negative impacts and maximise the positive benefits associated with the traffic and transport impacts. The outcomes summarised in this chapter are part of an overall technical report provided in Volume 5, Appendix 21.

The study area for assessing traffic and transport impacts for the proposed mine, is illustrated in Figure 1.

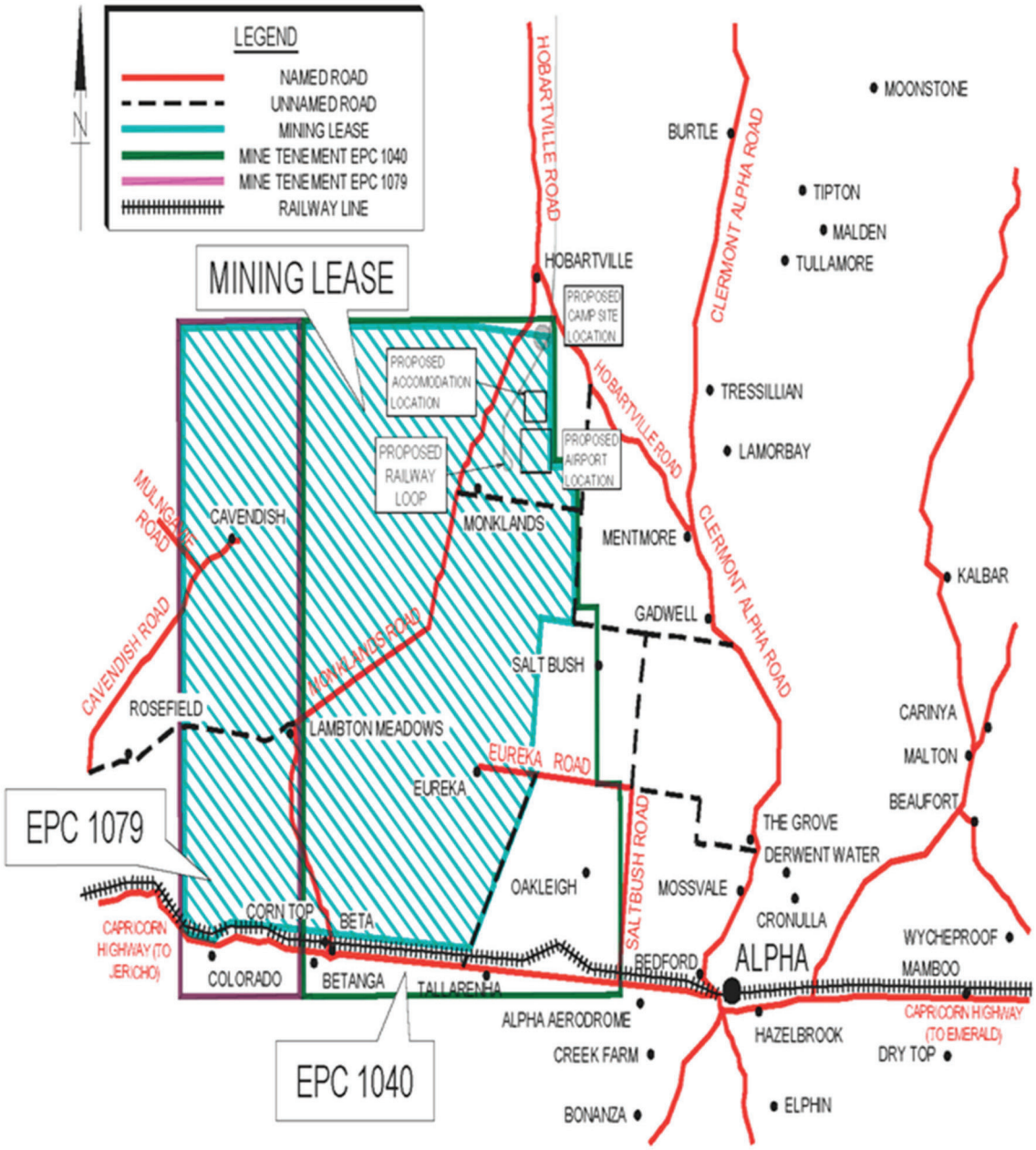
13.2 ASSESSMENT METHOD

This section outlines the approach adopted in assessing the potential impacts from the construction and operation of the mine on the local transport network.

A number of desktop studies supported by field surveys and meetings with relevant councils and key stakeholders were used to establish baseline conditions. Available traffic count information for the local roads was sourced from the Department of Transport and Main Roads (DTMR) and BRC, while historic data was consulted to ascertain future traffic growth in the region.

The analysis of traffic and transport impacts from the development of the mine relates to the maximum

Figure 1. Regional Transport Network at the Mine Site



development scenario. This is based on current projections of material requirements, workforce demands, timing and configuration for the worst-case scenario. Future changes to project projections are not expected to increase traffic or transport impacts beyond those reported in this study.

Where necessary, a number of assumptions related to the development and ongoing operation of the mine site have been made when calculating the degree of impacts on the local transport network. These include:

- the construction and operation workforce will be primarily FIFO staff;
- movement of mine site equipment and materials will be predominately by road transport;
- transport between the air strip, the accommodation centre and the mine, will be via communal transport, namely buses varying between 16 to 50 seats based on demand;
- heavy vehicle movements are estimated to account for approximately 20 % of peak hour traffic;
- sub-contractors may participate in FIFO, or else drive to Alpha or Jericho and use accommodation in the local townships; and
- major distribution centers for the mine will be Alpha, Jericho and Tambo, with inter-regional and inter-state heavy vehicle movements expected to distribute at Emerald.

13.2.1 ROAD NETWORK

In assessing potential road impacts, the DTMR publication *'Guidelines for Assessment of Road Impacts of Development (2006)'*, together with Austroads publication *'Guide to Traffic Management (2009)'*, was utilised in commissioning traffic analysis across the study area.

The following methodology was used in establishing and generating Waratah Coals road impact assessment.

Establish Existing Transport Conditions

- review baseline data and mapping to identify existing transport infrastructure;
- collect traffic flow data for state controlled roads from DTMR and local roads from BRC;
- determine the level of service for traffic flows on the existing road networks according to Austroad's *Guide to Traffic Management Part 3: Traffic Studies and Analysis*;
- assess road accident profiles for the road network in the vicinity of the mine; and
- review existing public transport operating along potential transport routes for mine traffic.

Assess Traffic Impacts from the Construction and Operation of the Mine

- approximate the degree and volume of traffic that will be generated from the movement of goods, services and personnel throughout the construction and operation of the mine;
- estimate the likely haulage routes and distribution of project generated traffic based on assumed origins and destinations;
- determine the level of service on roads impacted from the increases in traffic based on Austroads guidelines; and
- assess the impact of project generated traffic on the safety of roads and intersections according to Austroads assessment guidelines.

The key performance criteria used to assess operating performance on roads and key intersections included Level of Service, Percentage Increase in Average Annual Daily Traffic (ADDT) and Percent Increase in Pavements Equivalent Standard Axles (ESAs).

The safety and efficiency of access to the mine from the adjacent road network was assessed through consideration of frequency of casualty crashes, per kilometer per year, together with an assessment of the road conditions (i.e. seal, sight distance, intersections).

13.2.2 LEVEL OF SERVICE

Level of Service (LOS) is a qualitative measure describing traffic operating conditions in terms of speed, travel time, freedom to maneuver, comfort, convenience, traffic interruptions and safety. Six classifications are used to describe LOS, designated A though to F. A LOS of A represents the best conditions with vehicles operating freely at or above the posted speed limit, while a LOS of F represents heavily congested flow with traffic demand exceeding the road capacity. Generally a LOS of D or worse would be considered intolerable in a rural road context.

All roads in the vicinity of the mine are to be retained as two-lane, two-way roads. The LOS on this class of road can be defined by the time spent following other vehicles. For a 100 km/h speed road, a LOS of A is achieved when the time spent following a vehicle is less than 40 %. According to Austroads guidelines for rural roads, where directional traffic volumes of up to 300 vehicles per hour (vph) is opposed by traffic volumes of less than 200 vph, the following time will be less than 40 % and thus achieves a LOS of A. This equates to a daily traffic volume of approximately 4,000 vehicles.

13.2.3 PERCENTAGE INCREASE IN AADT

Road capacity was assessed by calculating the growth in Average Annual Daily Traffic (AADT) on the existing road network as a result of the construction and operation of the mine. According to DTMR guidelines, it is generally acceptable if ADDT increases are within 5 % on state controlled roads. Should the project generate increases greater than 5 %, then the impacts are considered significant and need to be further addressed.

13.2.4 PERCENT INCREASE IN PAVEMENTS EQUIVALENT STANDARD AXLES

The method for assessing the structural pavement impacts to roads was based on a comparison of the cumulative ESAs with and without the traffic generated by the mine. The ESA is based on a specific axle group configuration, where a standard axle load is comprised of a single axle with two single wheels loaded to 5.4 tonne axle load (or 80 KN for an axel with dual wheel configuration).

ESAs per vehicle were provided as one third of fully loaded ESAs for lower order vehicles (two axle trucks to four axle articulates) and half fully loaded ESAs for higher order vehicles. This allowed an average across unloaded, partially loaded and fully loaded vehicles to be ascertained. The fully loaded ESA's were obtained from DTMR's Road Planning and Design Manual (2002). Generally an increase in ESAs within 5 % is considered acceptable.

The assessment of road pavement capacity was undertaken as follows:

- identify the existing road sections that will be subject to significant additional vehicle traffic;
- assemble traffic data for the road links of concern, including information of vehicle types, axle configuration, volumes and conditions of the existing road surfaces;
- establish the current ESAs on the relevant roads;
- calculate the ESAs resulting from mine site traffic; and
- determine the increase in pavement loading (ESAs) resulting from both the construction and operation stages of the project.

13.2.5 VEHICLE SAFETY

The vehicle safety on the regional road network nearby the mine was assessed by reviewing the existing road accident profiles. Traffic incident history over a five year period from 2004 to 2008 was obtained from DTMR to identify the frequency and locations of major crash events. For major roads with multiple crash events, the vehicle crash rate per 10,000,000 km travelled has been calculated. Those roads associated with the construction and operation of the mine that were identified as being high risk, would need to be considered further.

13.2.6 BRIDGE STRUCTURES

The assessment of major road structures that may be subjected to heavy vehicle movements to and from the mine was based on information provided by DTMR. Any structure identified as not being able to accommodate the potential loads, or have adequate height and widths to support over dimension vehicles, would need to be assessed further.

13.2.7 INTERSECTIONS

Assessment of transport impacts to key intersections included identifying those road junctions that are likely to experience mine related traffic beyond 5% of the existing background traffic. As with LOS, intersections are generally not expected to experience congestion when traffic volumes are less than 3,000 vehicles per day (vpd). In this case, priority controlled intersections would be sufficient to cater for future traffic volumes from the mine. The main consideration with respect to intersection configuration is the need for auxiliary lanes to provide separation of through movements and turn traffic. Typically, intersections providing for fewer than 100 vph could be suitably serviced with basic left and right turn facilities and reduce the requirement for auxiliary lanes.

13.2.8 RAIL NETWORK

The methodology for determining possible impacts to the existing rail network in the vicinity of the mine was through an assessment of current rail infrastructure, capacity, frequency of train movements and existing crossings. Since mine site traffic will need to cross the existing passenger railway line between Alpha and Jericho, the safety characteristics and suitability for level crossings was considered to establish if there would be a requirement to modify the rail line or conflicting infrastructure. Generally a signal and boom gate level crossing is required where:

- vehicular-train exposure at level crossings (veh/day x trains/week) exceeds 50,000;
- where sufficient sight distances are not available; and
- where curved rail lines provide inappropriate approach angles.

13.2.9 AIR SERVICES

The project will use of the existing Alpha aerodrome. As the current airport does not currently accommodate commercial passenger flights, significant expansion would be required. This has been the subject of a number of discussions with BRC on future alteration requirements for the Alpha aerodrome.

13.3 DESCRIPTION OF EXISTING ENVIRONMENT

This section describes the existing transport environment (road, rail and air services) in the vicinity of the proposed coal mine. This formed the baseline data for the qualitative and quantitative impact assessment of the mine on the local transport network.

13.3.1 ROAD NETWORK

13.3.1.1 Existing Roads

The regional transport network in the vicinity of the mine that will be subject to construction and operation traffic is illustrated in Figure 1. The majority of these roads are administered by BRC, the exceptions being the Capricorn Highway and Clermont-Alpha Road, which are state controlled roads managed by DTMR. A brief description of these public roads is as follows:

- Capricorn Highway (DTMR) – a state strategic fully sealed two lane carriageways, with sealed shoulders and overtaking lanes throughout. It is a heavily trafficked highway with 100 km/hr speed limits except through townships. It generally runs east to west from Rockhampton to join the Landsborough Highway at Barcaldine;
- Clermont-Alpha Road (DTMR) – a single lane carriageway that connects the Capricorn Highway at Alpha with the township of Clermont. This road generally heads in a northerly direction and is sealed for the first 35 km from Alpha and within approximately 7 km of Clermont;
- Hobartville Road (BRC) – a 17 m wide formed unsealed route connecting Hobartville Homestead with the Clermont-Alpha Road. This section is approximately 19 km long and generally able to accommodate bi-directional traffic;
- Monklands Road / Jericho-Degulla Rd (BRC) – a local access route connecting Hobartville Homestead and the Capricorn Highway east of Jericho, via Lambton Meadows Station. This 12 m wide unsealed road passes through the middle part of the proposed mining lease;
- Saltbush Road (BRC) – an unsealed local road that connects the Capricorn Highway 7 km west of Alpha with Eureka Road to the north. This 10 km section of road is approximately 15 m wide and generally provides adequate space for passing traffic;
- Eureka Road (BRC) – an east to west running local access route from Saltbush Road to Eureka Station. This 15 m wide unsealed route passes through the proposed mining lease;
- Cavendish Road (BRC) – an unsealed route connecting Cavendish Station with the township of Jericho. A small section of this route passes through the western portion of the proposed mining lease; and
- Mulngavie Road (BRC) – a local access route stemming from Cavendish Road which runs in a northerly direction. Part of this unsealed route traverses the proposed mining lease boundary.

In addition to those roads documented above, a select number of unnamed council roads exists in the vicinity of the proposed mine. These roads, as illustrated in Figure 1, operate within dedicated road reserves and generally exist in both a formed and unformed state.

The nearest major road to the proposed mining lease is the Clermont-Alpha Road. From Alpha the mine site is most effectively accessed via Hobartville Road, then Monklands Road.

13.3.1.2 Traffic Conditions

Traffic volumes for potential roads that will be utilised to access the mine site are presented in Table 1. These have been estimated from DTMR recordings in 2009 and the populations in the region.

13.3.1.3 Pavement Loading

The existing vehicle loading on the Capricorn Highway between Alpha and Emerald over three segments is shown in Table 2. Based on this distribution, the average ESA per heavy vehicle is two.

Based on the vehicular distribution provided in Table 2, the current traffic loads on the Capricorn Highway have been calculated, as shown in Table 3 below.

13.3.1.4 Traffic Accident Profile

The existing road accident profile for the road network in the vicinity of the proposed mining lease is shown in Table 4. This is based on traffic crashes on road sections for the five year period, 2004 to 2008. For major roads with multiple crash events, the vehicle crash rate per 10,000,000 km travelled has been determined.

Table 1. Existing Traffic Volumes

ROAD	ESTIMATED VEHICLES PER DAY (VPD)
Capricorn Highway (Alpha to Jericho)	390 - 400 vpd
Capricorn Highway (east of Alpha)	420 vpd
Clermont-Alpha Road (south of mine)	80 vpd
Clermont-Alpha Road (north of mine)	16 vpd
Monklands Road* (south of mine)	15 vpd

*Note: Traffic Volumes on Local Roads are an estimate only.

Table 2. Existing Vehicle Loading – Capricorn Highway

ROAD	PERCENTAGE OF TRAFFIC	ESA'S PER VEHICLE*
Light Vehicles	77%	Negligible
2 axle truck/bus	10%	1.0
3 axle truck/bus	1%	1.2
4 axle truck/bus	0.5%	1.3
3 axle articulated	1%	1.3
4 axle articulated	2%	1.6
5 axle articulated	0.5%	3.0
6 axle articulated	2%	2.5
B-doubles	2%	3.6
Double Road Trains	4%	4.0
Average ESA (Heavy Vehicles)		2.0

* ESA is an Equivalent Standard Axle.

Table 3. Traffic Loads on Capricorn Highway

TRAFFIC TYPE	HIGHWAY SECTION			
	JERICHO TO ALPHA	EAST OF ALPHA	WEST OF ANAKIE-SAPPHIRE RD	ANAKIE-SAPPHIRE RD TO EMERALD
Traffic	390 vpd	420 vpd	540 vpd	184 vpd
Percent Heavy Vehicles	23%	20%	23%	22%
Daily ESA's	179	168	248	554
Annual ESA's	65,500	61,300	90,500	202,200

Table 4. Road Accident Profile (2004 to 2008)

ROAD	SECTION ID	SECTION	2004-2008 VEHICLE KM TRAVELLED*	REPORTED CRASHES	CRASHES PER 10,000,000 KM
Capricorn Highway	1	Anakie to Great Dividing Range	27,960,000	9	3.2
Capricorn Highway	2	Great Dividing Range to Alpha	73,500,000	21	2.9
Alpha Tambo Rd	3	All	8,760,000	4	4.6
Capricorn Highway	4	Alpha to Jericho	38,230,000	6	1.6
Capricorn Highway	5	West of Jericho	15,745,000	4	2.5
Blackall Jericho Rd	6	Northern Section (85km to 120km)	2,800,000	5	17.9
Clermont Alpha Rd	7	Alpha to Hobartville Rd	4,400,000	2	4.6
Clermont Alpha Rd	8	Hobartville Rd to Pioneer-Clydevale Rd	3,050,000	4	13.1
Clermont Alpha Rd	9	Pioneer-Clydevale Rd to Clermont	6,050,000	7	11.6
Total			180,495,000	62	3.4

* Vehicle Kilometers travelled has been estimated based on road section length and 2009 AADT.

The majority of road accidents specified in Table 4 were single vehicle crashes. Only five of the accidents involved two cars, with four of those attributing the nature of the crash to an "animal" obstruction. Therefore, only one accident in this region occurring between 2004 and 2008 was a direct result of two cars colliding. This reflects the limited conflicts between vehicles due to the low traffic volumes operating on these roads.

13.3.1.5 Bridges

DTMR have identified that access to the mine from the north is generally limited to light vehicles. This is due to load limits applying to several timber bridges along the Clermont-Alpha Road. This is not expected to be a problem with heavy vehicles traveling to the mine from the south (Alpha).

13.3.1.6 Flooding

A number of roads located within the study area cross water courses and / or floodplains and are thus susceptible to flooding.

The Capricorn Highway in and around the town of Alpha regularly floods and becomes impassable during the wet season. The highway west of Alpha rises to a plateau and has no record of flooding of the highway in this region. Water crossing the highway in regular events is provided for at culverts, with major floods typically in excess of the 20 year ARI inundating the highway.

There are no records of the flood immunity of any of the local roads in the vicinity of the mine. BRC have advised; however, that in the dry season the local dirt roads turn into "bull dust", while in the wet season the roads become muddy, boggy and impassable.

13.3.1.7 Public Transport Network

The only existing public transport in the region is the operation of a school bus. This bus operates along the Capricorn Highway between Beaufort and Alpha. All pick-up points are on the highway near individual property accesses or near local road intersections.

13.3.1.8 Stock Routes

Stock routes provide pastoralists with a means of moving livestock (cattle, sheep and native wildlife) along designated reserves of unallocated state land and pastoral leases. This provides and alternative to trucking and other contemporary transport movements. The use of stock routes can present safety concerns for vehicular transport in rural areas. A number of stock routes exist along roads within the vicinity of the mine.

13.3.2 RAIL NETWORK

The closest railway line to the proposed mine lies 25 km to the south, as illustrated in Figure 1. This is a passenger and light freight link between Longreach and Emerald that passes through Alpha and Jericho. It has an estimated traffic volume of less than ten trains per week (west of Alpha). The railway predominately runs adjacent to the Capricorn Highway, except for a small section 8 km west of Alpha where it deviates away from the road due to the steepness of the terrain. Traffic travelling to the mine from the south will need to cross this railway line at some point.

13.3.3 AIR SERVICES

The project will utilise the existing Alpha Aerodrome for the FIFO workforce, this will require the upgrade to a suitable standard to accommodate the proposed use of a DC9 passenger jet.

The existing aerodrome at Alpha is located approximately 5 km west of the main township and 30 km south of the proposed mine site. The airport is situated along the Alpha Aerodrome Access Road, which connects to the Capricorn Highway. The asphalt paved airport is currently not equipped to cater for commercial passenger flights and as such is only used by small private aircrafts. These operate irregularly, with no more than two or three flights per week.

13.4 PROJECT TRAFFIC

This section presents an overview of the proposed mine site facilities, staffing requirements, together with the anticipated traffic volumes resulting from the construction and operation phases of the mine.

13.4.1 DESCRIPTION OF MINE FACILITIES

The mine operation is proposed to incorporate the highest degree of self-containment achievable. This is to limit the impact on existing local facilities and the surrounding transport network. As such, the mine facilities will include either within the proposed mining lease, or on adjacent land, the following:

- material stockpiles and treatment;
- transport loading; and
- employee accommodation including basic retail, entertainment and dining facilities.

13.4.2 STAFFING OPERATION

The construction of the mine will employ up to 2,500 workers over a three year period. Once in steady state operation, the mine will engage an estimated 2,000 permanent employees.

The workforce will be primarily FIFO staff, whose primary residence is near a regional centre that fly in to undertake several days work, before returning home for several days leave. The FIFO roster will be seven days on, seven days off.

The remainder of the workforce will comprise of sub-contractors and local residents. The sub-contractors will participate in the FIFO service, or else drive to Alpha or Jericho and use local accommodation in the townships. Local residents and sub-contractors would be expected to drive private vehicles to the mine.

Work on site will be 24 hours a day, seven days per week, split into two 12 hour shifts. Transport of workers between the air strip, accommodation village and the mine will be via communal transport, namely buses seating between 16 to 50 employees based on demand.

13.4.3 ROAD TRAFFIC

A full range of vehicle types are expected to deliver equipment and consumables to the mine site, from private cars to Type 2 road trains and over dimensional vehicles. This will also include a regular passenger bus service to transport workers between the mine site and internal accommodation camp.

The traffic generated external to the mine site was assessed based on the following parameters of peak hour and daily movements. Note that some of these are likely to be overestimates. For example only 28 mine site employees are expected to be housed in Alpha; and the vast majority of workforce is expected to be FIFO. Nonetheless allowance has been made for 20% drive in drive out in the event of sourcing regional workers

- 80% of workers will remain on-site, including the accommodation area;
- average car occupancy for off-site private vehicles is two persons (this includes private vehicle car pools and potential bus services from Alpha);
- light vehicle movements are estimated to account for approximately 80% of traffic at peak times; and
- peak hour movements will account for approximately 15% of daily traffic.

Since the accommodation village will be located on private lands within the proposed mining lease, road impacts resulting from vehicle movements between it and the mine have not been assessed.

A summary of the estimated traffic generated external to the mine site during both the construction and operational stages of the project is illustrated in Table 5.

The daily traffic volume generated by the mine site is therefore expected to equate to approximately 0.6 vehicle movements per day for each staff member employed at the mine.

Heavy vehicle movements to and from the mine is estimated to account for 20% of the total daily traffic. This will result in approximately 290 heavy vehicles per day during construction and 180 heavy vehicles per day during operation.

Equipment and materials will be supplied to the site during construction including mining equipment, building supplies, fuel, concrete, structural steel and mechanical plant and equipment.

Where necessary some large mining items or coal handling equipment may need to be transferred to site under permit and with safety escorts.

During operation, less frequent heavy vehicle movements will continue to access the mine site, primarily to supply services and equipment for the daily operation of the mine including fuel, explosives, mechanical parts, waste disposal, camp and office consumables, etc.

13.4.4 DISTRIBUTION OF TRAFFIC

The traffic volume generated by the construction and operation of the mine is expected to be distributed as follows:

- 80 % to Alpha;
- 15 % to Jericho; and
- 5 % north of the mine site.

Of the traffic generated by the mine, 30 % is expected to continue through Alpha to Emerald, largely consisting of heavy vehicles and possibly mine workers who may Drive-in / Drive-out (DIDO) between rostered work periods.

All coal outputs will be transported from the mine site to the coal terminal via rail. Additionally, the overburden will remain within the mining lease area. Therefore, heavy vehicles to and from the mine will be primarily to supply the site with equipment, services and resources to undertake the daily mining operations.

The local distribution of heavy vehicles travelling to and from the mine site will be:

- 100 % to the Capricorn Highway, with 15 % to the west and 85 % to the east; and
- Of the eastbound portion of mine site traffic,
  - 45 % will terminate at Alpha; and
  - 40 % will continue on to Emerald.

Table 5. Estimated Mine Site Traffic

CATEGORY	CONSTRUCTION STAGE	OPERATION STAGE
Work Force	2,500	1,500
Rostered On	1,750	1,050
External staff	350	210
External staff traffic	175 vph*	105 vph
Total traffic generation, including heavy vehicles	220 vph	135 vph
Total traffic generation	1,450 vpd**	900 vpd

* Vehicles per hour (vph) and **Vehicles per day (vpd)

13.4.5 MINE ACCESS ROAD

Following a review of the existing local road network, a new access road between the mine site and the Capricorn Highway is proposed. This would provide a more direct access route from Alpha than via the Clermont-Alpha Road, which follows the Alpha Creek alignment. It is expected that once constructed, all vehicular traffic from the south would use this route to access the mine. Two alternate intersections with the Capricorn Highway have been identified and are illustrated in Figure 2. The preferred option would follow Saltbush Road. The impacts, layout and configuration of the mine access road are discussed further in later chapters.

13.5 IMPACT ASSESSMENT

This section describes the potential impacts resulting from the construction and long term operation of the mine on the surrounding road traffic volumes, intersection safety, pavement design life and sensitive receptors.

13.5.1 ROAD CAPACITY ASSESSMENT

The development of the mine capable of employing 2,500 people in the short term and 2,000 people in the long term is expected to have an impact on some of the regional roads. This is illustrated in Table 6, which provides the estimated increases in AADT on local roads resulting from both the construction and operation stages of the mine.

Figure 2. Proposed Mine Access Road

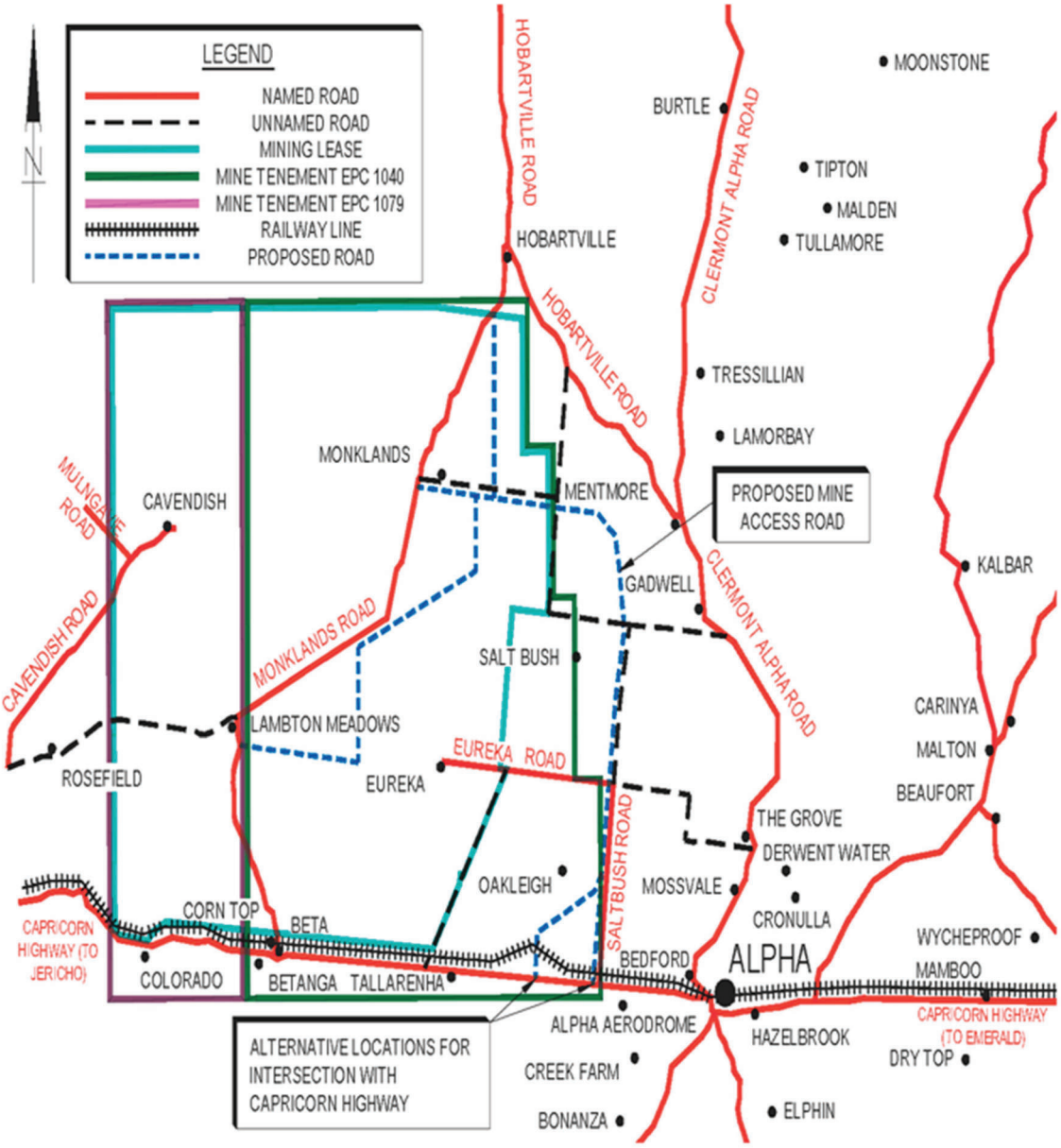


Table 6. AADT Impact on Local Roads

ROAD SECTION	CURRENT TRAFFIC	MINE GENERATED TRAFFIC	
		CONSTRUCTION	OPERATION
Capricorn Highway (new road to Jericho)	400 vpd	220 vpd	135 vpd
Capricorn Highway (new road to Alpha)	390 vpd	1,160 vpd	720 vpd
Capricorn Highway (east of Alpha)	420 vpd	435 vpd	270vpd
Clermont-Alpha Road (south of mine)	80 vpd	0 vpd	0 vpd
Clermont-Alpha Road (north of mine)	16 vpd	73 vpd	45 vpd
Monklands Road* (south of mine)	15 vpd	0 vpd	0 vpd
New Mine Access Road	NA	1,380vpd	855 vpd

* Note: Traffic volumes on local roads are an estimate only.

As shown in Table 6, significant growth in traffic volumes will result from the development of the mine, particularly during construction. This includes increases of several hundred percent on the Capricorn Highway, albeit from a very low base.

Background traffic growth on local roads is also expected to increase as a result of the mine stimulating additional development in the area to provide goods and services to the site. In particular, Alpha is likely to grow significantly, with demand for new accommodation, retail and food outlets, emergency services, and other key industries.

It is estimated that Alpha's permanent residential population in 10 years time, could range from as little as 500 to at least 2,000 (refer to Chapter 16, Volume 2). This would lead to an increase in corresponding traffic volumes, particularly on the Capricorn Highway.

In accordance with DTMR guidelines, the capacity of local roads was assessed through consideration of LOS. For a 100 km/hr two lane rural road, a LOS A is achieved where the percentage following time is less than 40 %. This equates to a maximum daily traffic volume of approximately 4,000 vehicles. As per Table 6, no road in the local area is expected to carry more than 3,000 vpd, inclusive of background traffic growth and direct mine traffic. As such, the provision of adequate two-lane, two-way carriageways will retain a LOS A on all roads used by mine site traffic.

13.5.2 INTERSECTION ASSESSMENT

13.5.2.1 Road Network

As with the LOS, intersections are generally not likely to undergo any significant congestion where traffic volumes are less than 3,000 vpd in total. As such, priority controlled intersections are expected to be suitable to cater for future traffic volumes.

The critical intersection for the mine will be where the proposed mine access road intersects the Capricorn Highway. At peak times, this intersection could carry traffic volumes of up to 1,380 vpd and 855 vpd during construction and operation of the mine site respectively. Vehicles travelling to the mine will mostly be outbound from Alpha and thus require a right turn off the highway onto the access road.

Despite the potential growth in traffic directly associated with the mine, the very low turn volumes on other local road intersections is unlikely to be significant enough to warrant upgrades. Indirectly; however, the existence of the mine may generate further development of the Alpha Township along local streets, thereby necessitating upgrades. These may include Burns Street, Moore Street and the Aerodrome Access Road. The need for these upgrades would be investigated in association with the development of the township, with consideration of mine traffic.

13.5.2.2 Rail Network

The proposed mine access road will need to cross the existing passenger railway service west of Alpha. This road is expected to carry up to 2,300 vpd over a train line with less than ten services per week. Therefore vehicular / train exposure will be less than 23,000 during peak construction times.

Ensuring sufficient spacing for vehicles queuing at the rail intersection will be an important requirement. Where Saltbush Road intersects the highway, the rail line is located only 35 m to the north. This is

considered inappropriate, particularly with road trains being over 50 m long, which would result in a rear trailer overhanging the rail line while giving way at the Capricorn Highway. A similar conflict would occur where a road train waits for a passing train and obstructs the highway.

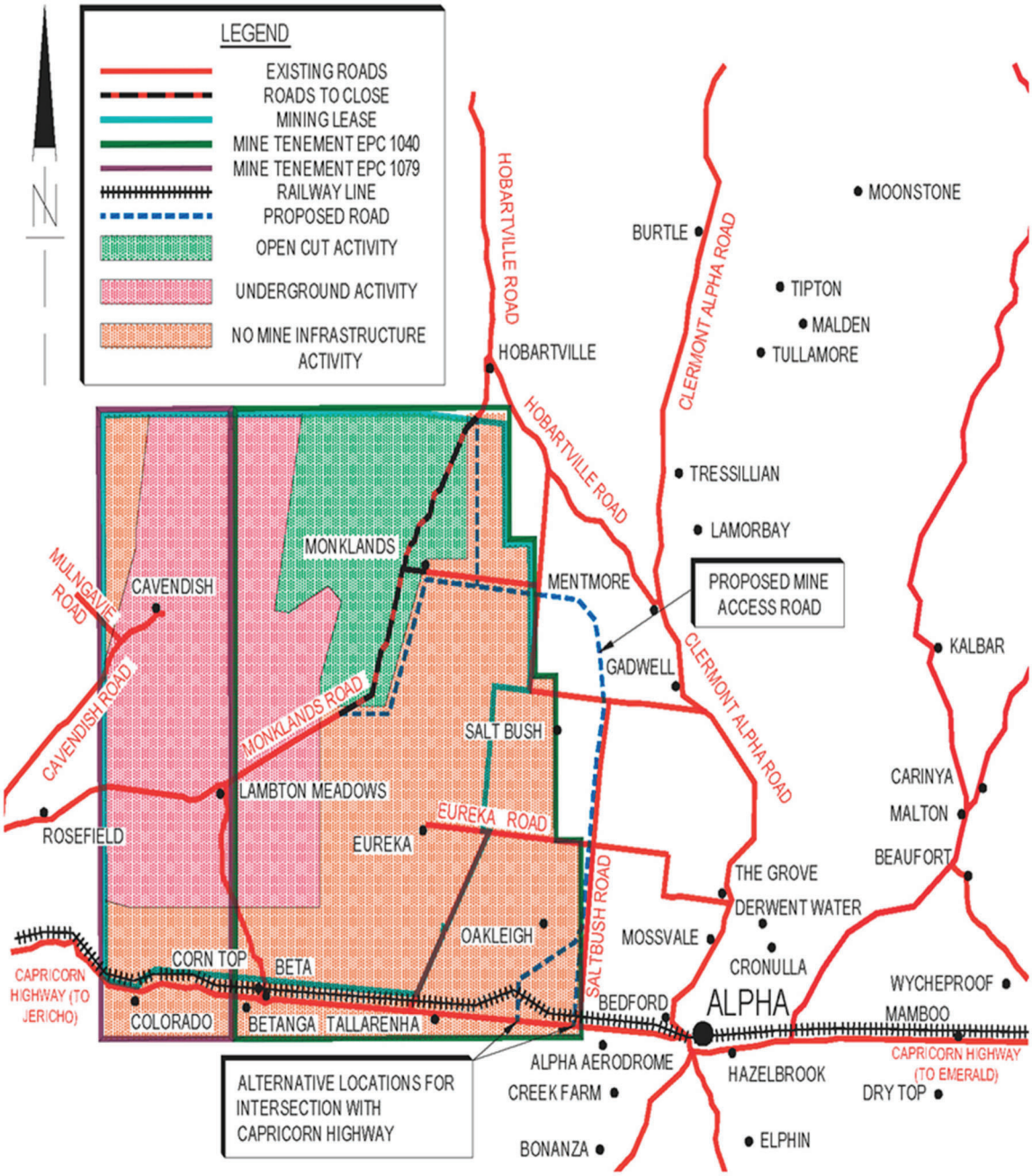
Alternatively, the second proposed option is to have the highway intersection located a further 1.8 km west of Saltbush Road. This will provide for at least 200 m between the highway and railway crossing and therefore ensure sufficient queuing space.

13.5.3 INTERNAL ROAD NETWORK

A number of council roads providing access to homesteads lie within the proposed study area. These include Cavendish Road, Monklands Road, Eureka Road and a number of unnamed roads, as illustrated in Figure 3.

The main impact of future mine operations on these existing roads will be to those directly affected from surface mining. This will include part of Monklands Road in the north east, which will need to be severed and replaced with an alternate route around the open cut areas.

Figure 3. Internal Road Network within Proposed Mining Lease



Where mining activities will be limited to the underground, no major disruption to surface roads over these areas is expected. Roads located outside the mining lease are expected to continue to operate within their respective road reserves.

13.5.4 PAVEMENT ASSESSMENT

The impact to pavement design life along the Capricorn Highway during the operating stage of the mine is shown in Table 7. It can be seen that daily traffic will contribute significant loadings along the existing highway and therefore contribute to the accelerated deterioration of the road pavements. It is proposed that further impact assessments will be undertaken through the development stages of the mine, when factors such as ongoing service vehicle requirements and local population / traffic growth can be more suitably defined.

13.5.5 TRAFFIC SAFETY

The assessment of traffic incidents revealed that between 2004 and 2008 there were limited conflicts between vehicles due to the existing low volumes in the region. It also showed that the Capricorn Highway exhibits the lowest crash rate, despite this being the highest volume road and therefore most potential for conflicts between vehicles. This demonstrates how the road condition in this region impacts vehicle safety, with low volume, unsealed roads of poorer standards having significantly higher incident rates. This is further evident by the increase in traffic incidents along unsealed section of the Clermont-Alpha Road and Alpha-Tambo Road, versus the sealed sections of the same roads which exhibit smaller traffic incidents.

13.5.6 AIR SERVICES

The Alpha Aerodrome is the FIFO destination for the project , however, this will result in minimal impacts to existing roads with mine FIFO staff not having to pass through Alpha but instead transported to the mine site via the Capricorn Highway, Saltbush Road and then onto the new access road to the camp facilities.

It is accepted that two flights in and two flights out will occur six days per week. This will consist of one landing and departure in the morning and one in the afternoon. The proposed aircraft is a DC-9 – capable of carrying 100-125 people (but may be as low as 75 persons). Use of a DC-9 will require an extension of the runway by 1.2 km. Waratah are currently engaging with BRC in this regard.

The development of the mine will result in population growth in Alpha, with a similar scale increase expected in the operation of the Alpha Aerodrome. Despite this; however, there is not expected to be a demand for commercial flights to commence at this location in the future, with Emerald airport the commercial flight destination in the region. However, increases in small plane activity are still anticipated and likely to be irregular with demand increased to one or two flights per day. The addition of several flights per week is not expected to have any significant impact on the operation of the Alpha Aerodrome, nor on the operation of the airport access road.

13.5.7 ENVIRONMENTAL AND OTHER ROAD IMPACTS

Due to the remote nature of the mine site, environmental impacts to nearby sensitive receivers such as houses, stock and roadside vegetation, is expected to

Table 7. Capricorn Highway Esas from Daily Operation of Mine Site

HIGHWAY SECTION	NEW ROAD TO JERICHO	NEW ROAD TO ALPHA	EAST OF ALPHA	WEST OF ANAKIE-SAPPHIRE RD	ANAKIE-SAPPHIRE RD TO EMERALD
Exiting Annual ESA's	65,500	65,500	61,300	90,500	202,200
Heavy Vehicle AADT from Mine	27	153	72	72	72
Average ESA per heavy vehicle	2.0	2.0	2.5	2.5	2.5
Daily ESA's from Mine	54	306	180	180	180
Annual ESA's from Mine	19,710	111,690	65,700	65,700	65,700
Percentage increase from existing	30%	170%	107%	72%	32%

be minimal. Typically, residences along haulages routes are set back significant distances from the roads, thereby limiting the risk of environmental impact. The exception to this may be along designated haul routes through townships such as Jericho and Alpha. The sensitive receivers through each of those towns are illustrated in Figure 4 and Figure 5.

Potential environmental impacts and other roadside issues resulting from mine site traffic may include:

- Dust and Weed Contamination – routes used for construction and operation traffic may contribute to dust contamination, particularly along unsealed roads during the dry season. This may present a health and safety impact to adjoining land uses, stock and roadside vegetation. The movement of vehicles to and from the mine site increases the risk of spreading noxious weeds, plant debris and exotic pests;

Figure 4. Sensitive Receivers – Jericho

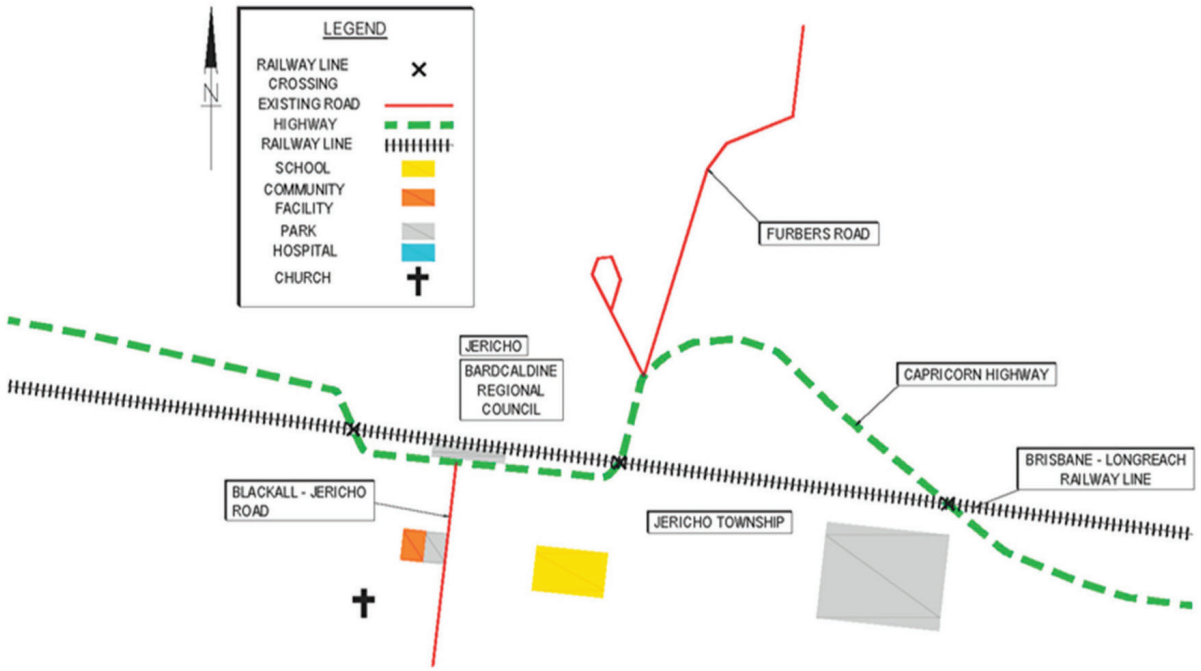
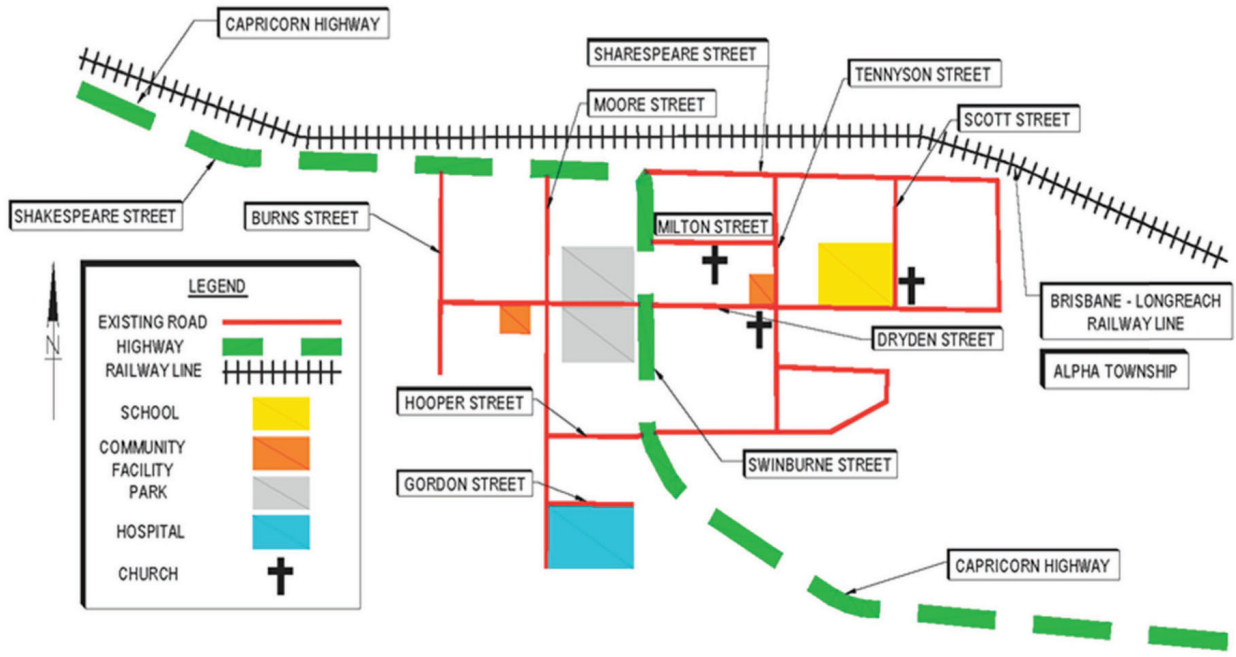


Figure 5. Sensitive receivers – Alpha



- Noise Pollution – the project may generate elevated noise levels on background levels, mainly resulting from heavy vehicle movements, particularly during construction. Excessive environmental noise can be a displeasing annoyance and distraction to the activity and balance of human and stock life. The intensity of roadside noise to nearby sensitive receivers is generally not expected to exceed threshold levels, except possibly through townships on-route;
- Dangerous Good and Hazardous Materials– the development of the mine will require the transport of dangerous goods and hazardous materials to and from the site. This may include fuel and oils, flammable gas, corrosive materials including solvents, explosives and chemical wastes including sewage. The transport of these goods increases the risk of a chemical spill on route;
- Over Dimensional Vehicles–the construction of the mine will require excess dimension and heavy load vehicles to operate between the site and regional townships. These will predominately supply the mine with large prefabricated items, materials and equipment. Currently the only restriction for over-dimension access within the vicinity of the site is through the township of Tambo. There are no excess dimension restrictions for the townships of Alpha, Jericho or Emerald, or for the Capricorn Highway;
- Heavy Mass Vehicles – the project is likely to require the transport of heavy materials and equipment to the mine site. Transport along approved Higher Mass Limit (HML) roads for vehicles with pavement friendly suspension is administered by DTMR. Currently there are no HML approved routes within the vicinity of the mine. The nearest HML route is the Capricorn Highway near Barcaldine, which terminates 40 km east of Barcaldine and 50 km west of Jericho at a floodway (i.e. 100 km west of the mine).
- Access and On Site Parking – the primary access to the mine will be located in the north eastern section of the proposed mining lease. This area is to include the site infrastructure including the air field, accommodation center and administration buildings. It will be security gated and controlled at the entrance. Within the mine site, the following provisions will be made for on-site parking of various vehicle types:
  - 0.35 spaces for each unit in the accommodation centre;
  - private vehicle parking for 10 % of the total workforce;
  - bus set-down facilities at the accommodation centre, airfield and within the mine; and
  - standing and parking for service vehicles separate from the private vehicle area;
- Roadworks in a Road Reserve – the construction of the mine may require roadwork's to be conducted within existing road reserves (e.g. upgrade of Saltbush Road for the new mine access route). This may result in temporary interruptions to residents using these routes.

13.6 MITIGATION AND MANAGEMENT MEASURES

This section outlines the proposed mitigation strategies that will be employed to address the impacts resulting from the development of the mine. Impacts will be mitigated to ensure both a safe and efficient transport environment, as well as to maintain a condition and standard at least equivalent to the existing network if development was not undertaken.

13.6.1 ROAD NETWORK

The development of the mine will initially impact the local road network within the vicinity of the site. However, once the proposed access road is established, vehicle access will generally be limited to the state controlled road network and sealed access route. Therefore, by providing an appropriate standard access road, together with limiting external traffic to established transport routes, the impact from project traffic on council roads is expected to be minimal. The exception to this may be traffic impacts through townships on route. In these circumstances, further qualitative and quantitative assessments will be undertaken to establish those impacts and recommend appropriate mitigation strategies accordingly.

13.6.1.1 Site Access

The proposed mine access road will see the realignment and construction of a select number of existing council roads. It will be aligned where possible to the existing road network to limit acquisitions of new road easements. The reconstructed road will continue north along the existing Monklands Road, past the turn off to the mine site, to connect to Hobartville Road, as illustrated in **Figure 3**. This will ultimately provide a high speed road link between Hobartville and both Alpha and Jericho. As a result, local traffic use along Hobartville Road, Monklands Road and the Clermont-Alpha Road

is expected to be reduced, with surrounding residents instead expected to use the more efficient mine access road.

To ensure a safe operating access road, the following design characteristics are proposed:

- minimum 30 m wide road reserve;
- 10 m wide sealed carriageway, consisting of 3.5 m wide lanes and 1.5 m wide shoulders;
- flood immunity with table drains along each verge, plus culverts at suitable locations;
- level crossing with rail line to incorporate full signals and boom gates; and
- fully fenced to prevent stock from entering road easement.

13.6.1.2 Intersections

The intersection of the mine access road with the Capricorn Highway considers two layout options:

Intersection Option 1: Saltbush Road – to ensure a sufficient queuing distance for road trains between the highway and railway (currently only 35 m), an 'S-shaped' road configuration is proposed. As illustrated in **Figure 6**, this would include a left turn slip and merge lane onto the highway to limit the delay and queuing of vehicles approaching from the north.

Intersection Option 2: 1.8 km west of Saltbush Road – at this point the railway is located a sufficient distance from the highway to provide adequate queuing space (approximately 200 m separation). This is a result of the topography in the area forcing the railway to take a deviation along a more grade friendly path. A proposed intersection layout is illustrated in **Figure 7**, which may require minor adjustments subject to further detailed investigations.

Figure 6. Indicative Intersection Layout – Option 1

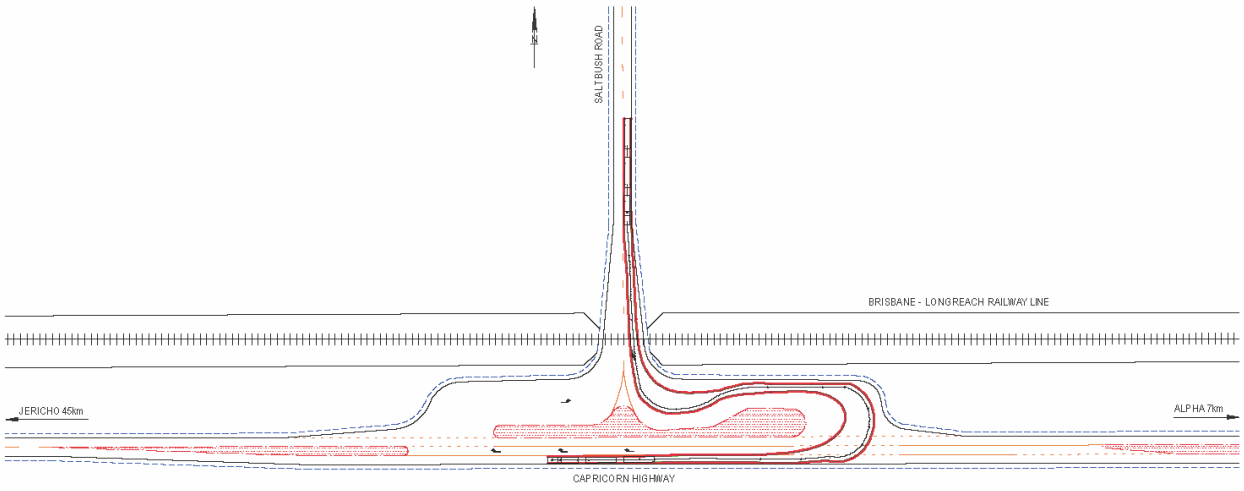
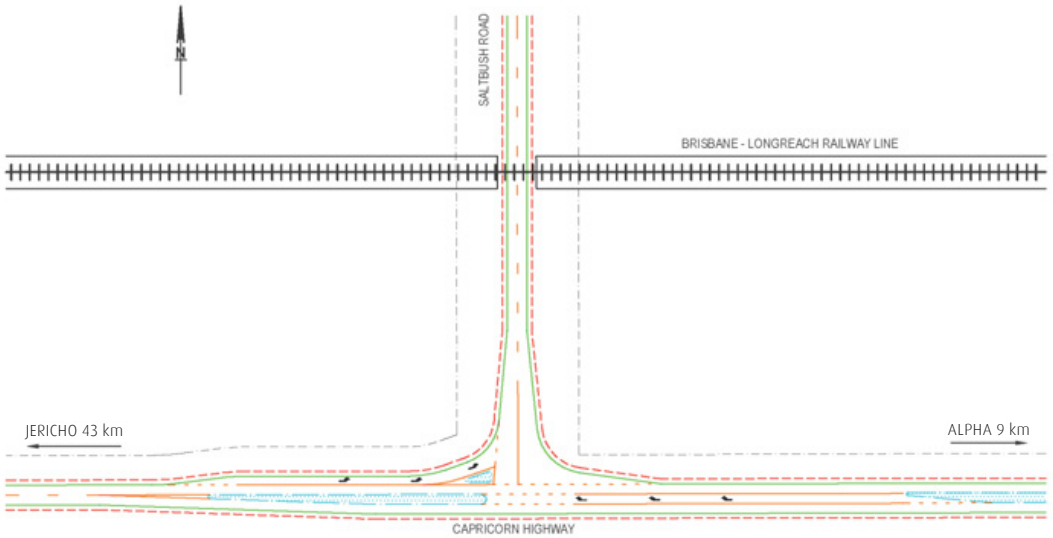


Figure 7. Indicative Intersection Layout – Option 2



13.6.1.3 Flooding

The construction of the mine during the wet season may result in some routes becoming impassable during periods of flooding. This will result in limited traffic movements and at worse, could see construction activities temporarily suspended and demobilised. If available, alternate routes that are practical and safe may be used for construction traffic during this period.

The proposed access road from the Capricorn Highway to the mine site will include the provision of stormwater drainage to provide a minimum 1 in 50 year ARI flood immunity. The merits of providing 1 in 100 year ARI flood immunity will be considered at detailed design following more detailed hydraulic assessment.

13.6.1.4 Roadworks and Closures

All construction activities within road and rail reserves will be undertaken in accordance with the Main Roads *Manual of Uniform Traffic Control Devices (2007)* and relevant local requirements. This will include provision of appropriate barriers, signage and traffic controllers as necessary.

Prior to commencement of any works, Operational Works approvals will be attained from the relevant authorities and infrastructure agreements entered into. These agreements will define the required scope of works, responsibilities of all parties and timing for completion.

Where possible, roads will allow a suitable level of access and only be temporarily closed after sufficient consultation with affected residents. Residents will be advised in advance of these closures and sufficient warning signs will be erected for through traffic. If road sections are to be closed longer than acceptable periods, a side track or suitable detour route will be provided.

Other road features including property fences, access locations and stock crossing points which are impacted by the proposed mine access road, will be replaced with similar standard facilities where appropriate.

The section of Monklands Road to be severed will be replaced with a new section established along the eastern and southern boundaries of the open cut areas. This road will be dedicated as public road space within a road reserve of at least 40 m. Carriageways are to be provided to a similar standard to those removed, generally a 12 m wide gravel pavement.

13.6.1.5 Road Pavement Maintenance

Project traffic that is likely to significantly impact pavement capacity will be addressed as part of the Traffic Management Plan (TMP) and in consultation with DTMR and BRC. Such impacts are expected to be at their greatest during the early construction stage, prior to the establishment of the sealed mine access road. Any road maintenance agreements entered into, including contributions to ongoing maintenance costs, will be based on further impact assessments to be undertaken through the development stages of the mine, when factors such as ongoing service vehicle requirements and local population / traffic growth can be more suitably defined.

13.6.1.6 Traffic Safety

Historically, traffic incidents on local roads nearby the mine have been minimal, with higher crash rates generally observed along unsealed sections of roads. Therefore, by providing a sufficiently sealed access road with adequate sight distance and appropriately formed intersections, a safe driving environment for mine traffic will be provided. In addition to this, local residents currently using the Clermont-Alpha Road will also benefit from having a more efficient and safer route.

To limit driver fatigue, communal transport for workers will be provided for FIFO staff, while fatigue management strategies will be developed for external mine traffic in accordance to the TMP and relevant transport regulations. This will include measure for long haul of goods and services to the mine to adhere to required rest periods and safe driving practices.

13.6.1.7 Public Transport

The unformed casual pick-up areas used by the local bus service are considered suitable due to the existing low traffic environment. If highway traffic volumes were to increase significantly as a result of other infrastructure projects being developed, provisions for more formalised bus facilities, including shelters, traffic signage and sealed bus stopping areas clear of the highway will be considered. Heavy vehicle movements to and from the mine site during school bus operating times will be strictly controlled.

13.6.1.8 Environmental Management

- Road Noise – it is proposed that further acoustic assessments will be provided for the townships of Alpha and Jericho at the development stages of the project. This will include an assessment of residents fronting the haulage routes who are likely to be most impacted. Operationally, truck drivers will be expected to conduct themselves with appropriate care towards local residents. This will include limiting the use of air brakes near residences, restricting the movements of heavy vehicles to within standard business hours when possible, and driving in a safe and responsible manner to limit vehicle noise in general.
- Dust Suppression and Weed Control – Externally, new and relocated roads constructed in association with the mine development are to be provided with a sealed pavement. This is primarily to provide suitable capacity and level of service for roads, but will also aid in dust suppression. It is proposed that further environmental assessments will be provided for residents likely to be affected by dust from increased traffic on existing unsealed roads. Internally, all heavy vehicles leaving the site will be subject to a wash-down of tyres to limit loose material and noxious weeds being transported onto sealed access roads.
- Over-dimension and Excess Mass Vehicles – since there are no HML routes within the vicinity of the mine, all vehicles will be subject to standard legal load limits. As suppliers for materials and equipment which require Over-dimension transport to the site are identified, further route assessment and application for appropriate permits will be undertaken. This will include assessment and applications for any vehicle requiring a pilot escort. Suitable mitigation measures will be developed subject to refinement of freight requirements including haul paths, size, weight and frequency of Over-dimension vehicles.
- Dangerous and Hazardous Goods Movements – All transportation of dangerous and hazardous goods by road will be carried out in accordance with the licensing and vehicles requirements set out by DTMR. This includes operational policies that all drivers transporting dangerous goods are adequately trained, hold valid licenses and that all vehicles are adequate for transport of these materials.
- Stock Routes – impacts to stock routes will be mitigated in accordance with DERM and council requirements, together with consultation with affected pastoralists, drovers and graziers. Any stock routes to be realigned or severed will be re-established to meet the surrounding conditions.

13.6.2 RAIL NETWORK

Although the vehicular-train exposure of the mine access road and existing railway is less than 50,000 vpd, for additional safety, full signals and boom gates will be installed. This is of particularly relevance for the preferred intersection with Saltbush Road, to prevent vehicles from queuing on the tracks.

13.6.3 AIR SERVICES

The current airfield will require significant expansion to accommodate the increased services for the mine. Such works will be coordinated with BRC and other relevant authorities and will require increased runway length and width and improved terminal facilities. Traffic access would also need to be improved with vehicle parking and set-down areas to be provided for both cars and buses. The airport access road would also need upgrading to a suitable sealed standard, while the highway intersection would require short auxiliary left and right turn treatments with improved lighting and signage. Funding and access agreements with the relevant administrative bodies have not been entered into at this time.

13.7 CONCLUSIONS

The greatest potential for impacts to the traffic and transport environment will occur during the three year construction period of the mine. These impacts will be temporary and managed through the implementation of appropriate mitigation works.

The ongoing traffic impacts resulting from the operation of the mine site will also be addressed through the provision of appropriate monitoring and maintenance plans. These will be established in consultation with DTMR, local councils, police and other administrative authorities.

During the detailed design stage of the project, transport and traffic management issues arising from any impacts associated with the construction and operational stages of the mine will be addressed in the following documents to be developed by Waratah Coal:

- Road Impact Assessment Report;
- Road Use Management Plan;
- Traffic Management Plans; and
- Traffic Control Plans.

These plans will cover issues such as:

- signage and traffic control requirements, including requirements for bypasses if necessary;
- development of temporary access routes and intersections to DTMR standards, including decommissioning of these facilities if required;
- heavy vehicle movements and operating requirements, including appropriate routes, hours of operation, vehicle wash-down and operational restriction;
- mitigation works and monetary contributions to be made to road authorities to provide a safe and efficient road network;
- relevant contacts within the project;
- issue identification and responses;
- planning and permit requirements including those needed for over-dimensional vehicles; and
- processes for community information and responses.

With transport impacts to be generally limited to well defined corridors such as the mine access road and Capricorn Highway, this will enable possible impacts to be limited through appropriate design (such as providing a sealed environment). Where impacts cannot be limited to a suitable standard, further mitigation measures will then be investigated.

The actual mitigation measures will be implemented based on the final approved development plan and may change due to the cumulative impacts of other proposed projects in the Galilee Basin.

13.8 COMMITMENTS

Further to the EIS and subsequent more detailed transport and traffic assessments, Waratah Coal makes the following commitments to develop the following documents:

- Road Impact Assessment Report;
- Road Use Management Plan;
- Traffic Management Plans; and
- Traffic Control Plans.

These plans will cover key safety and logistical issues such as:

- signage and traffic control requirements, including requirements for bypasses if necessary;
- development of temporary access routes and intersections to DTMR standards;
- heavy vehicle movements and operating requirements, including appropriate routes, hours of operation, vehicle wash-down and operational restriction;
- mitigation works and monetary contributions to be made to road authorities to provide a safe and efficient road network;
- relevant contacts within the project;
- issue identification and responses;
- planning and permit requirements including those needed for over-dimensional vehicles and transport of dangerous goods; and
- processes for community information and responses.