TRAFFIC • PARKING • ACOUSTICS

Galilee Coal Project

(Northern Export Facility)

Supplementary EIS

Traffic Engineering Report

Prepared for: Waratah Coal Pty Ltd

Reference: 11BRT0218

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Glossary

The following is a definition of acronyms utilised in the report.

- **AADT – annual average daily traffic**
- **AUL – Auxiliary Left Turn.**
- **AUL(s) – Auxiliary Left turn with Short Lane.**
- **BAL - Basic Left Turn.**
- **BAR – Basic Right Turn**
- **CHL- Channelized Left Turn.**
- **CHPP – coal handling and preparation plant**
- **CHR – Channelized Right Turn.**
- **CHR (s) – Channelized Right Turn with short Lane.**
- **CSG – Coal Seam Gas**
- **DERM – Department of Environment and Resource Management**
- **DIDO – drive in / drive out**
- **DTMR – Department of Transport and Main Road**
- **EIS - Environmental Impact Assessment**
- **ESAs – equivalent standard axles**
- **FIFO – Fly in /Fly out**
- **GBR- Galilee Basin Rail**
- **HV- Heavy Vehicle**
- **IAP – Intelligent Access Program for higher mass limits**
- **MLA – Mining Lease Area**
- **Mtpa – Million Ton per Annum**
- **OD – Over dimensional**
- **RAAG – Road Accident Action Group**
- **RIP – Road Implementation Program**
- **ROM – run of mine**
- **RUMP – Road Use Management Plan**
- **SCR – State Controlled Roads**
- **TOR – Terms of Reference**
- **Vpd-Vehicles Per Day**
- **Vph - Vehicles Per Hour**

Executive Summary

TTM Consulting (Qld) Pty Ltd has been commissioned by Waratah Coal to address the issues related to traffic and transport raised during the public review of the EIS report.

This report has been produced to address directly those concerns related to the Traffic Impact of the development, its construction and its daily operations.

The mine site is located in the Galilee Basin in central Queensland, approximately 40km North West of the township of Alpha. Once operational, this facility is anticipated to produce up to 40 Mtpa export quality coal during the life of the mine. The mine is expected to be operational by the end of 2016 and will have a life expectancy of up to 25 years at least. The mine will be owned and operated by Waratah Coal.

Access to the mine is primarily via the road network which is administered by Transport and Main Roads and Barcladine Regional Council. The scale of the development is also expected to influence transport needs in Isaac Regional Council and Central Highlands Regional Council. During the development of the report, all these authorities have been included in stakeholder meetings.

The site is expected to employ up to 2,500 workers during construction and 2,000 during operation. The mine facility will be largely self contained with on-site accommodation, and a central village. This will result in the mine site being one of the largest settlements in the region.

At present there are ongoing talks in relation to the possibility of upgrading Alpha Airport 5km to the east of the town of Alpha in order to cater for the FIFO element of the Waratah and surrounding mines. Overall it is expected that 95% of staff will be accommodated on site.

It is also expected that the Townships of Jericho and Alpha will expand significantly to provide services associated with the mine and the increased local population. This will significantly increase the demands on the local transport network.

This report differs significantly both in its content and it analysis from the original report prepared by TTM for the proposed development. A significantly updated trip generation rate has been calculated for the development based on an up to date provision of data relating to mining developments.

TTM has also been able to undertake a more representative cumulative impact assessment based on more up to date information for the adjacent developments in the local area.

1. The Proposed Development

1.1 Investigation Process

In addition to information provided by the developer and the independent investigations undertaken by TTM, meetings have also been held with other regional stakeholders (See Appendix 3 for Register of Minutes). These meetings include:

- Transport and Main Roads (TMR), including:
    i. Brisbane based strategic planning
    ii. Regional Officers (Central West and Mackay/Whitsunday Regions)
- Issac Regional Council
- Barcaldine Regional Council
- Whitsunday Regional Council

Input and advice from these meetings has been incorporated into the SEIS for this project.

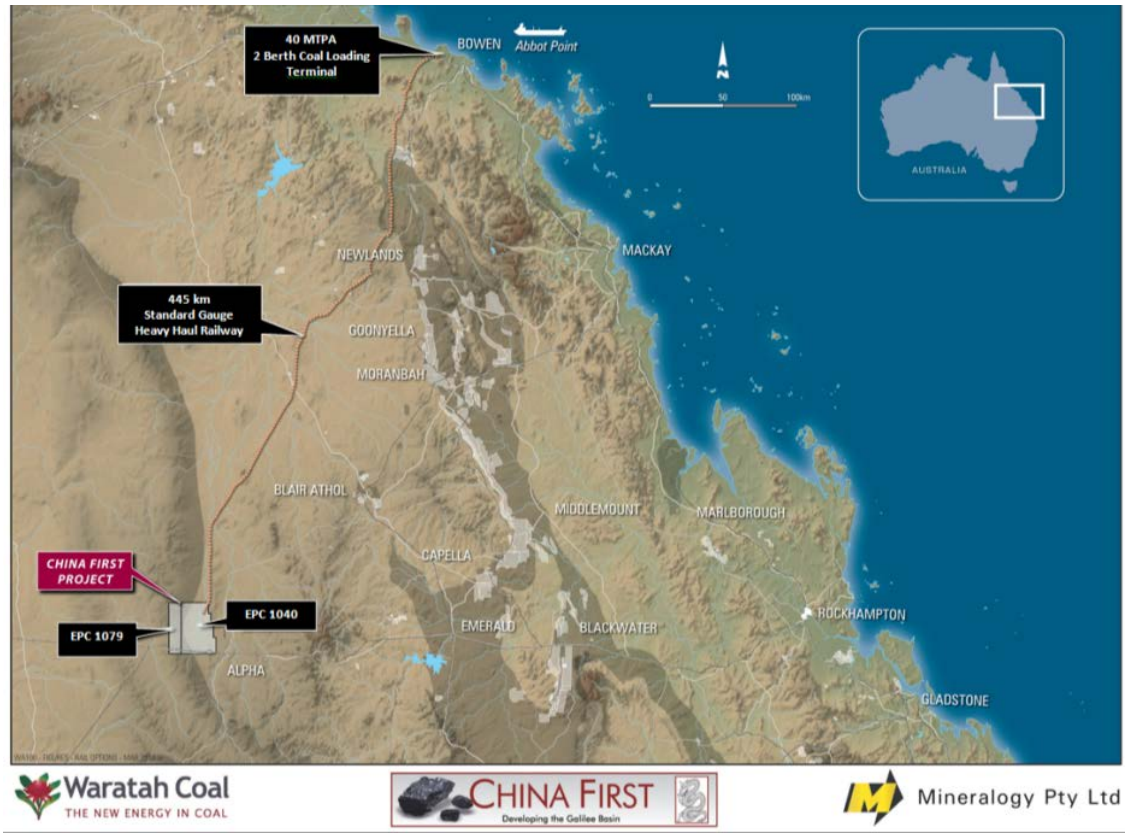

Figure 1.1: Site Location

1.2 Site facilities

The mine operation is proposed to incorporate the highest degree of self-containment achievable at the proposed location. As such, the mine facilities will include (either within the tenement or in adjacent land) the following:

- All mine operations, including:
  - Material stockpile
  - Transport loading
  - Material treatment
- Employee accommodation during both construction and operation
- Self-contained village, including basic retail, entertainment and dining facilities

One of the primary intentions of this self-containment is to limit the impact of the mine operation on existing local facilities. During both construction and operational phases of the development the accommodation camp will be designed to cater for up to 99% of staff, however it is envisaged that up to 5% of staff will live locally and commute in on a daily basis.

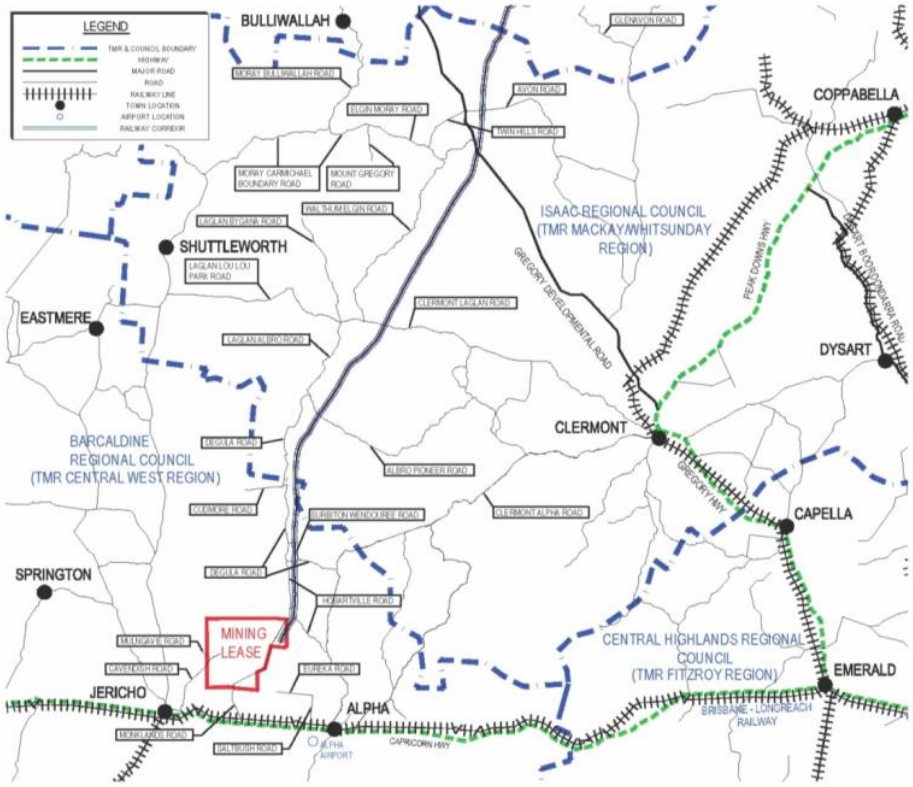

Figure 1.2: Regional Locality

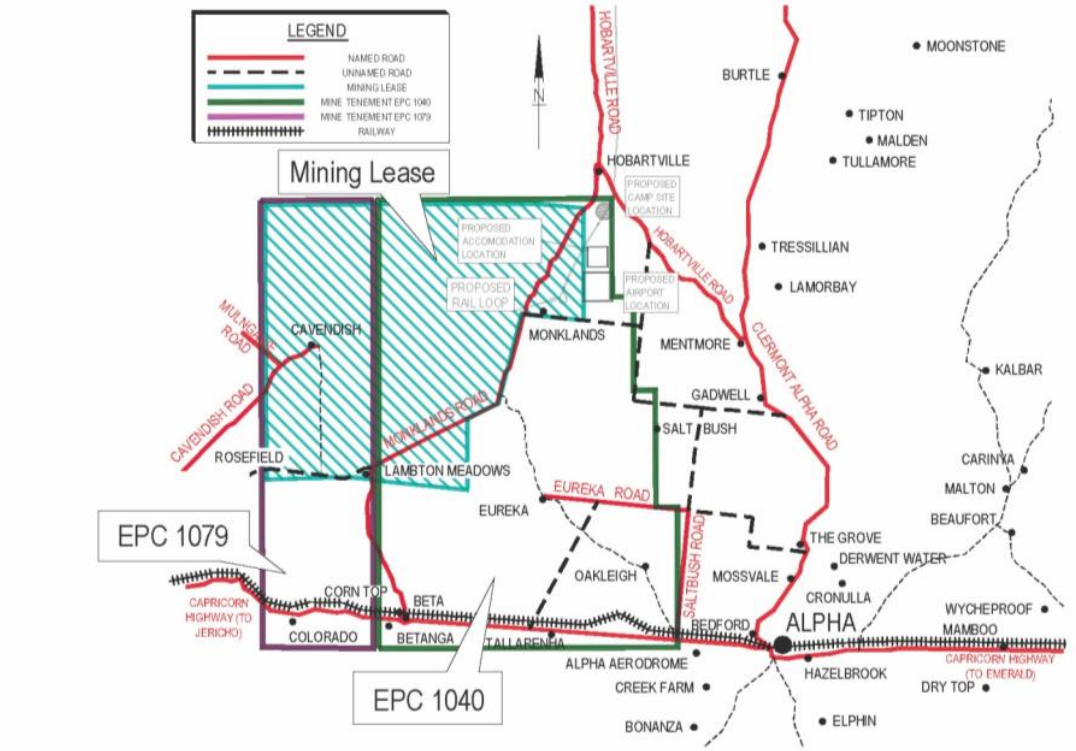

Figure 1.3: Site Surrounds

1.3 Staffing Operation

Works on the site for both construction and operation will be 24 hours a day, 7 days a week. Based on similar mine operations in Queensland, the main workforce will be split into 2 shifts of 12 hours each. The 'day' shift will utilise approximately 70% of staff, with 'night' shift, requiring the remaining 30%.

The workforce will consist primarily of permanent Fly-in/Fly-out (FIFO) staff. These will be employees whose primary residence is near a regional centres on the Queensland coast or out of state who fly in to undertake several days work, before returning home for several days leave. This FIFO rotation is typically a 13/8 (13 days on, 8 days off) or 10/4 roster. However, this can vary significantly based on individual roles and requirements at the site.

It is typical to expect transport between the air strip, the accommodation centre and the mine which are all contained within or in the case of the airfield located 6km to the east of the mining lease via communal transport, namely buses, varying between 16 and 50 seats based on demand.

The remaining work force will be made up of the local population and sub-contractors. The sub-contractors may also participate in FIFO or may drive to Alpha and utilise accommodation in the township. Local residents and sub-contractors would be expected to drive private vehicles to the mine. However depending on the numbers and other factors, consideration can be given for bus operators for these staff.

It is estimated that during the construction phase of the mine site, it will employ up to 2,500 workers. Once the site is operational, the ongoing staff for the site is estimated to be 2000.

1.4 Existing and Proposed State Coal Infrastructure

The proposed site provides the first significant coal mining facility in the Galilee Basin. As such, there has been only minimal historical investment in the region to provide infrastructure to cater for such large scale mining activities. A report was prepared by the Queensland State Government in February 2008, titled Coal Transport Infrastructure in Queensland Future Expansion Overview. Figure 1.4 below has been reproduced from this State Government report, identifying existing coal operations and infrastructure throughout Queensland.

This figure identifies no existing coal haulage is provided within 200km of the mine, with the train line through Barcaldine and Longreach provided a far less class of infrastructure.

1.5 Project Timeframes

Current planning for the site envisages preliminary works to commence on the site in late 2013/early 2014. Construction of the mine and facilities would then require approximately 3 years. This will allow coal exports to commence in early 2016.

Based on coal reserves of 1.4 billion tonnes in EPC 1040 and EPC 1079 and an export rate of 40 Mtpa (equates to 56 Mtpa ROM at full production), this mine will operate for approximately 25 years.

Furthermore, this state government report provides no reference to the Galilee Basin and identifies no future upgrades of the Coal Haulage Network to the west of the existing termination points at Emerald and Blair Athol.

Figure 1.4 Queensland Coal Mines and Infrastructure has been taken from the report and shows the area of detail in the Galilee basin at the time of the reports publishing.

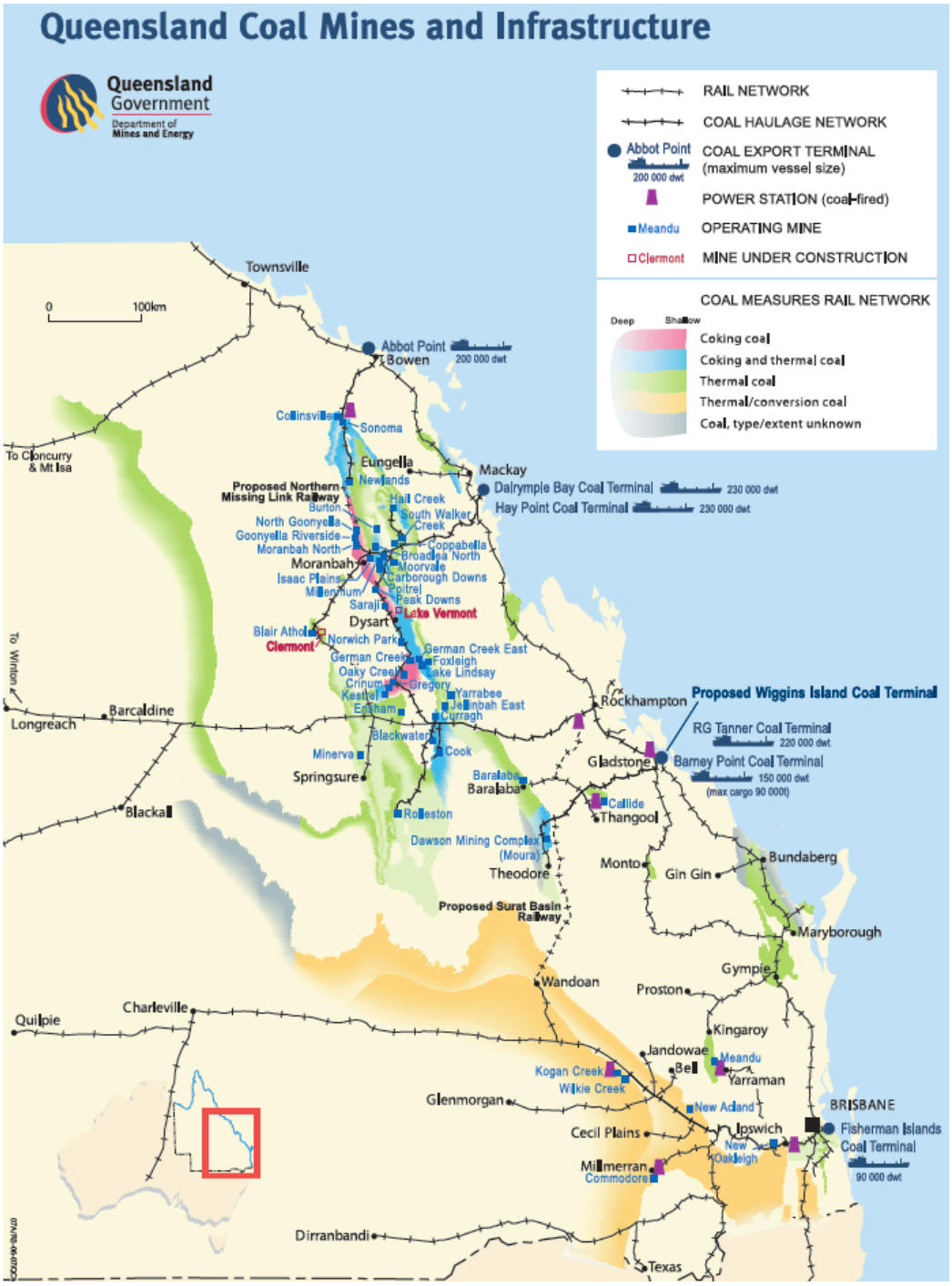

Figure 1.4: Queensland Coal Mines and Infrastructure

1.6 Heavy Vehicle Movements

All coal outputs will be transported from the site to port via rail. Additionally, the majority of any overburden will remain on the site. As such, heavy vehicle access is primarily to supply the site with equipment and resources to undertake mining operations.

1.7 Site Access

Following a review of the existing local road network, it is proposed to upgrade the existing Saltbush Road to provide a direct connection between the mine and the Capricorn Hwy. This road would provide a more direct access route from Alpha than via the Clermont-Alpha Road which follows the Alpha Creek alignment.

Figure 1.5 identifies a potential route for access roads.

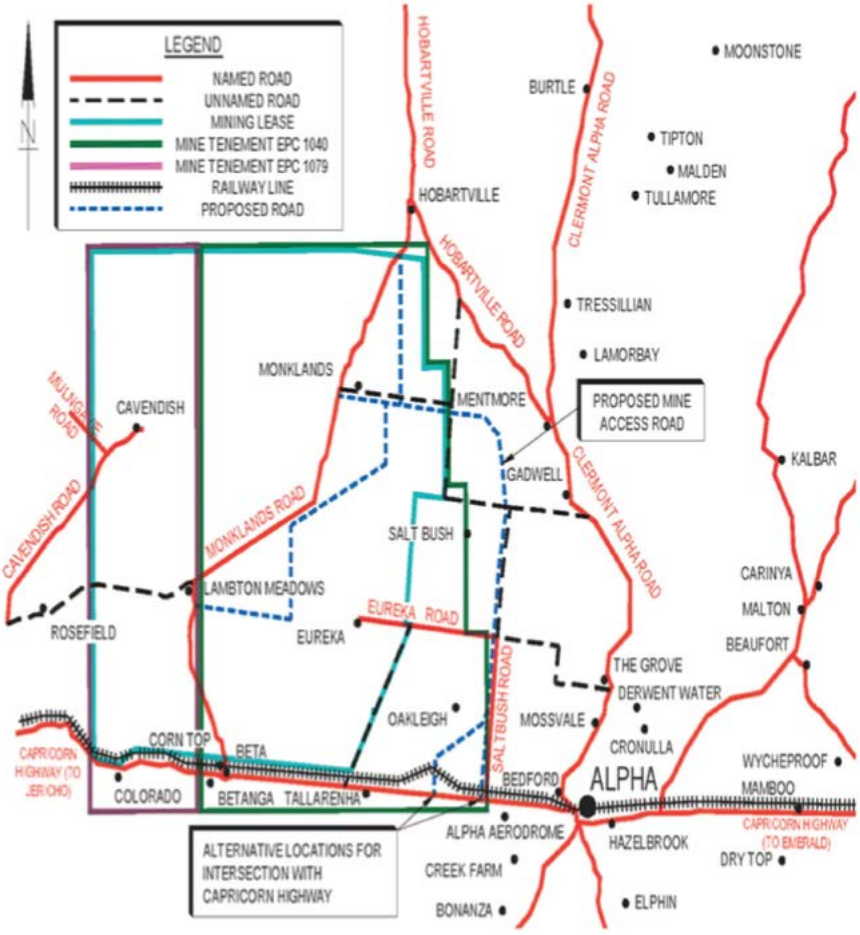

Figure 1.5: Local Road Network

1.8 Description of Proposed Vehicles

The site will be accessed by the full scope of vehicles, from private cars to Type 2 road trains and over dimensional vehicles. This will include buses which transport workers between the mine and accommodation.

2. Existing Transport Infrastructure

2.1 Surrounding Road Network Details

The majority of the roads in the immediate vicinity of the proposed mine are operated by Barcaldine Regional Council (BRC). The exceptions to this are the Capricorn Hwy and Clermont-Alpha Road, which are administered by Transport and Main Roads. The public roads in the vicinity of the site are detailed in Table 2.1.

Table 2.1: Local Road Hierarchy

Road	Speed	Description	Classification
◖ Capricorn Hwy	100/110 Rural 60 Urban	Fully sealed carriageway, 2 lanes, plus shoulders	State Strategic
◖ Clermont-Alpha Road	100	Sealed for 35km north of Alpha, then unsealed	Regional Road
◖ Hobartville Road	100	Unsealed, approximately 17m wide	Local Access
◖ Gregory Highway	100 Rural 60 urbanised	Fully sealed carriageway, 2 lanes, plus shoulders	State Strategic
◖ Monklands Road (Jericho-Degulla Rd)	100	Unsealed, approximately 12m wide	Local Access
◖ Eureka Road	100	Unsealed, approximately 15m wide	Local Access
◖ Saltbush Road	100	Unsealed, approximately 15m wide	Local Access
◖ Cavendish Road	100	Unsealed	Local Access
◖ Mulngavie Road	100	Unsealed	Local Access

2.2 Road Planning

TTM have discussed the planning of the future road network in the vicinity of the subject site with Barcaldine Council and the Department of Transport and Main Roads(DTMR). It is understood that DTMR has plans for realignment of stretches of the Capricorn Highway between Emerald and Barcaldine and paving and sealing.

There are also minor regrade works planed for sections of the Clermont Alpha Road and the replacement of the bridge at companion creek also on the Clermont to Alpha Road.

DTMR Roads Implementation Program 2009-2010 to 2013-2014 identified the following proposed scheduled road improvements shown in Table 2.2

Table 2.2: Local Road Hierarchy

Road	Proposed Works	Scheduled Indicative Timing
Capricorn Highway		
Alpha - Barcaldine	Realignment	2009-2010 - adjacent Barcaldine
Duaringa – Emerald	Improve drainage Seal shoulders	2011-Future 2011-Future
Clermont-Alpha Road		
Native Companion Creek	Minor regrade Construction of bridge and approaches Selected sections	2009-2014 2011-2014
Gregory Highway		
Emerald - Clermont	Install traffic signals – Emerald	2009-2014

2.3 Public Transport and Pedestrian Facilities

There are several public transport routes in the region, consisting primarily of School bus routes, which run along the Capricorn highway, and are further utilised haulage and stock routes, which create some safety concerns.

Long distance bus routes run through the local area connecting major population hubs, but tend to be of a low frequency School bus services operate between the hours 07:00am to 08:30am and 2:30pm and 4:30pm dependent on school hours.

It is assumed that future Road User Management Plans will take these routes into account.

Certain activities have the potential to impact public transport, including:

- major roadworks / road closures; and
- movement of over dimensional vehicles.

As such where practical these arrangements will be limited during school peak hours.

3. Estimated Future Transport Demands

3.1 Trip Distribution and Assignment

Mine generated traffic will consist of several categories including Drive in Drive out (DIDO) state regional and local staff, specialist contractors, servicing of development. These trips will be distributed throughout the road network on a local, regional, state, interstate and over dimensional level. These trips will in some case be assigned to the road network based on standard assignment principles, most notable DIDO trips, however larger and over dimensional vehicles will be assigned to the road network based on road condition and level of maintenance.

TTM have use the following categorisation with which to define distribution and assignment.

Local mine generated trips will generally include staff and support service vehicles based in the towns of Jerico and Alpha. It is fully expected that these trips will be heavily orientated to the Capricorn Highway.

Regional mine generated trips will generally include support service and some DIDO generated trips. These trips will generally be distributed to the east and west on the Capricorn highway and will include the towns of Emerald and Barcaldine.

State mine generated will generally include service and support orientated trips, and will generally be orientated to the east of Emerald and include Rockhampton and Gladstone.

DIDO Drive In/Drive Out mine generated traffic will generally include drive in drive out trips which generally includes staff accommodated on site who will travel from Rockhampton and Gladstone in the east and to lesser extent Mackay. As noted within section 5.1 the average commute time to mine activities is 2.5 hours; in consideration of a standard deviation from the mean this would place these DIDO trips at the far extremities of likely DIDO movements. It would also appear economically beneficial to fly from these points of origin in most cases.

Interstate mine generated trips will be heavily orientated to the main primary road network, routes generally encompassing the Capricorn Highway before using the Bruce Highway the Gregory Highway and the Landsborough Highway.

Over Dimensional mine generated trips will generally commute from Mackay to the north and Rockhampton and Gladstone to the east. Due to the nature and size of the vehicles it is expected that those trips generated by the development from Mackay will not use the Clermont Alpha Road. These vehicles and associated loads will specifically require drivers to use only well maintained and sealed roads.

Figure 3.1 below show the proposed trips distribution and assignment of mine generated trips.

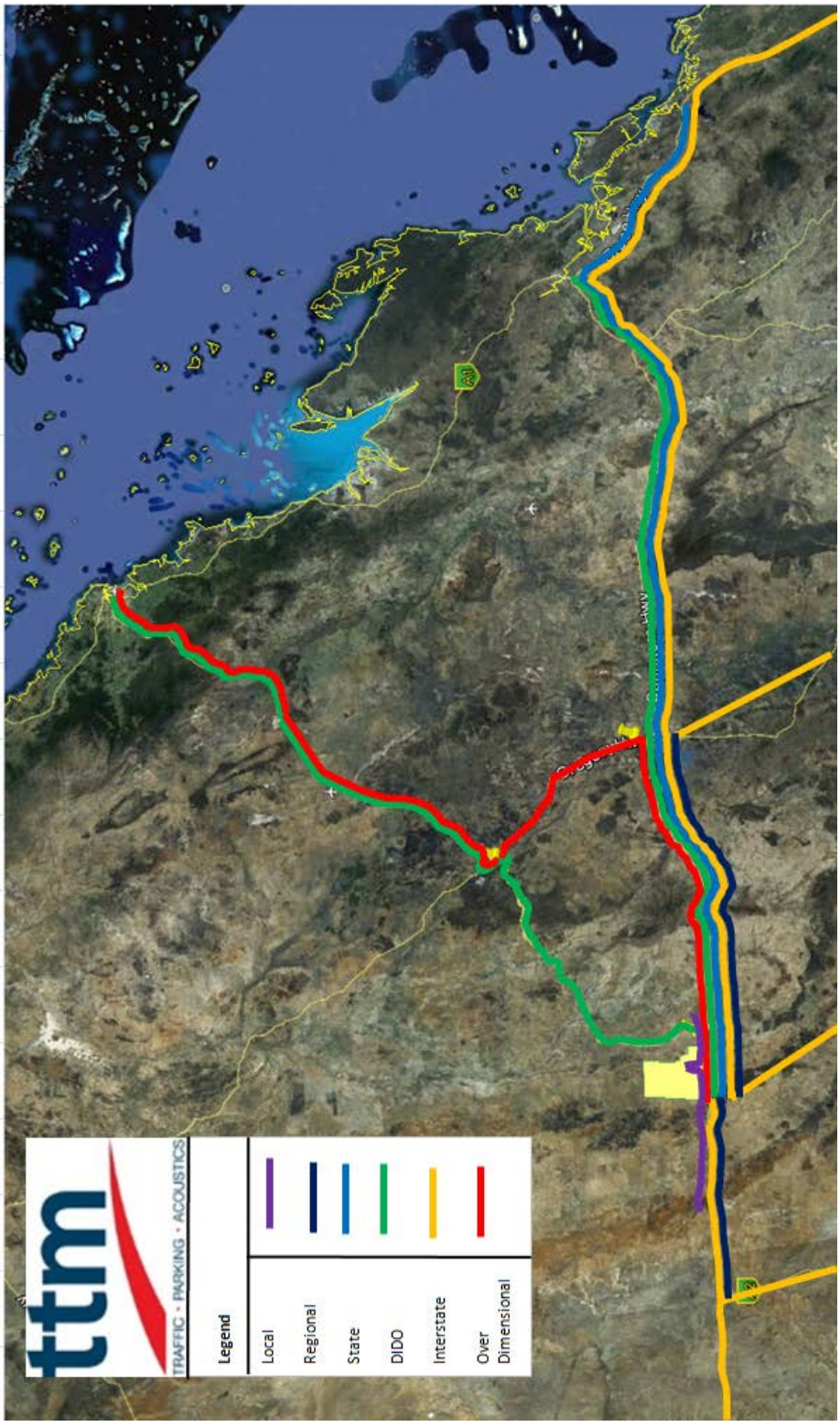

Figure 3.1: Mine Generated Traffic Distribution

3.2 Estimated Development Traffic Generation

The main factor influencing traffic generation is the self-contained nature of the site. The provisions adjacent to the mining lease, of the primary accommodation workers, as well as the airport facilities, will allow the majority of employees on the site to stay within the vicinity of the mine at all times. This will limit traffic generation on the external road network.

The traffic generation external to the mine site has been calculated based on the following assessments regarding peak hour and daily movements:

- 95% of workers remain on-site, including the accommodation area
- Average car occupancy for off-site private vehicles is 2 persons (this includes private vehicle pool cars and potential bus services from Alpha)
- Light vehicle movements are estimated to account for approximately 80% of traffic at peak times
- Peak hour movements account for approximately 15% of daily traffic

The traffic generation also takes account of the expected roster and shift systems which would result in:

- 60% of workers rostered on with 40% rostered off
- 2 shifts of 12 hours each, with 70% of rostered staff on day shift and 30% on night shift.

Fly In/Fly Out

As part of the development it had originally been proposed to provide an airfield on site that will provide for FIFO trips, however due to the close proximity of Alpha airport to the development and to that of the locations of 3 other proposed major mine facilities within the local area, it is now intended to enter into an agreement with a major provider and the Airport Authority to provide flights for FIFO staff at this facility.

The Australasian Institute of Mining and Metallurgy report "SUBMISSION TO THE HOUSE STANDING COMMITTEE ON REGIONAL AUSTRALIA - INQUIRY INTO THE USE OF 'FLY-IN, FLY-OUT' (FIFO) WORKFORCE PRACTICES IN REGIONAL AUSTRALIA" Solomon, Katz & Lovel 2007, identified that on average miners commute time via either FIFO or DIDO was 2.5 hours.

This equates to a 230km drive on average with the potential for up to a 400km drive. TTM would assume that with the current residential population within a 230km of the development and the scale of mining development in the area and within the Bowen Basin to the north in general that the majority of employee trips (95%) are likely to be FIFO and DIDO.

The main factor influencing traffic generation will be the self-contained nature of the site, the proximity of accommodation on site, and the provision within the Mining Lease area (MLA) of internal equipment and facilities. This will allow the majority of employees to stay within the vicinity of the mines at most times which will limit traffic generation on the external road network to the site access from the Capricorn Highway, with a low number of trips dispersing from Alpha when staff drive in or drive out from their rostered period of work.

The traffic generation external to the mine site has been calculated based on a first principles basis, considering both peak hour and daily movements.

TTM has provided an indicative inventory of service and delivery vehicles for the proposed operation of a 56Mtpa ROM coal mine producing 40Mpta of saleable export coal product as shown within Tables 3.1 to 3.4. It is assumed that as part of the mine development, all coal will be transferred off site via the proposed rail line.

This inventory is based on an understanding of general open cut coal and underground mine requirements and the specific terms of reference for the Waratah Coal Mine. It is provided in two sections – construction phase and operational phase. Transport requirements are based on the individual material needs of the proposed development, noting the type and number of vehicles required to meet the needs of each. TTM has also indicated where the proposed deliveries will be orientated as:

- Local – within 50km of the site, includes Jerico and Alpha
- Regional –generally within 300km of the site and defined as existing mining areas, includes local as well as areas such as Emerald, Blackwater, Longreach and Capella.
- State – All areas of Qld
- National – provided from within Australia, but outside Qld
- International – provided from outside Australia, with delivery most likely via port at Abbot Point, Bowen, Gladstone and Townsville.

This assessment makes several assumptions with respect to the scope of works. This is:

- Inclusive of:
    - Supply of all materials and equipment to construct on-site mine facilities, including:
        - Land clearing
        - Construction of internal roads
        - Provision of internal structures
        - Provision of coal processing equipment
- Supply of all materials and equipment to construct off-site mine facilities, including:
    - Conveyor system
    - Rail loading facility - Conveyor and crane
- Materials to undertake external public works, including road upgrades
- Construction of site dedicated infrastructure, including water pipeline and electricity supply
- Supply of all materials and equipment to operate mine at 40Mtpa, including coal excavation equipment (noting it is expected that the majority of excavation equipment from construction stage is to be retained)
- Transportation of workers via bus between Alpha Airport and the development site
- Supply of all materials and replacement equipment to operate mine at 40Mtpa, including coal excavation equipment (noting it is expected that the majority of excavation equipment from construction stage is to be retained, but spare parts and replacement equipment will be required)

It is understood that the transport of many goods which cannot be further divided into smaller components will require transport on over dimensional vehicles, with pilot vehicles and police escorts where required.

The largest vehicles accessible to the site will be type 2 road trains. However, access for these vehicles is limited as many destinations of supplies, including coastal cities and ports, are not accessible by these vehicles. As such, b-doubles are expected to be the largest, standard regular access vehicle to the site.

3.3 Construction Phase

The assessment of traffic generation during the proposed development construction phase is split into two vehicular categories. Staff categorisation which is calculated based on the assumptions below and relates to the movement of staff to and from the site and the number of trips generated by this demand. The second category includes construction/mining operation traffic predominately consisting of Heavy Goods Vehicles and oversized vehicles.

3.3.1 Construction Traffic

It is understood that the construction of the mine will be a three year process. The primary tasks involved will be construction of mine site infrastructure such as the CHPP, offices, workshops, administration buildings, water storage dams, tailings storage facility, overland conveyor, and rail loading facility. Other minor tasks including establishment of on-site worker facilities, construct minor internal roads and securing the site will also be undertaken at this stage. Additional off tenement works will include the construction of services, including water pipeline and electricity transmission line.

Table 3.1 identifies all the heavy vehicle requirements during the construction stage.

Table 3.1: Site Traffic Generation - Construction

Need	Quantity	Transport Arrangements	Delivery Vehicles	Origin	Total During Construction period
Construction Equipment Construction/Transport/Excavation P/V =Per Vehicle					
DL-M8750	4	Brought in via multiple loads	3 p/v	State/Regional	12
P&H 4100XPC	2	Brought in via multiple loads	1	State/Regional	1
EX 5500	1	Brought in via multiple loads	2 p/v	State/Regional	2
EX 5500 Coal	2	Brought in via multiple loads	4 p/v	State/Regional	8
WL992	1	Brought in via multiple loads	2p/v	State/Regional	2
RD797	16	Brought in via multiple loads	2p/v	State/Regional	32
RD793	14	Brought in via multiple loads	2p/v	State/Regional	28
TD D11DL	7		7	State/Regional	7

SCR657	1		1	State/Regional	1
DR-D90KS	3		3	State/Regional	3
DRD45KS	1		1	State/Regional	1
Construction Equipment general	-		Total 3700	State/Regional	3700
Ancillary Equipment					
TD D11	4		2p/v	State/Regional	8
GR 16H	3		2p/v	State/Regional	6
Coal Crusher	2		20p/v	State/Regional	40
WT 785	2		2p/v	State/Regional	4
WD 844	2		2p/v	State/Regional	4
WD 845	2		2p/v	State/Regional	4
Buildings/Structures					
Accommodation Centre	4500 bed	1000@2bed per unit 625@4 bed per unit	1625	State/Regional	1625
Work Shop	100m^2	Constructed from base materials (steel/concrete)	44	Regional	44
Stores	250m^2		11	Regional	11
Admin/Muster	500m^2	Demountable offices (25m^2)	20	State	20
		Footings	10		10
Fuel/oil	6 tanks		1	Regional	6
Water Tanks	4 tanks		1	Local	4
Transmission Line					
Poles	3 per km - 240	20 per truck – distributed along route	12	Regional	12
Substations	3		3	State	3
Pipe Line25km					
Pipe	15m sections	35 per truck – distributed along route	47	Regional	47
Pump Stations	4		4	National	4
Bedding material	25km × 100mm × 50mm (125m^3)	Small tipper trucks	30	Local	30
Conveyor Belt 12.5Km					
Belt section	12.5km, return, plus 5% overlap	Maximum delivery size is 200m role @2.3m diameter, 2 per truck	65	International	65

Structure	12.5km @ 50kg/m	Delivered in average 30 tonne loads	25	International	25
Drive motors	1 per km	3 per truck	5	International	5
Concrete culverts	2 road crossings		6	Regional	6
Large steel bin			1		1
Materials					
Internal Road Material- (fully within the development)	1km × 6m × 400mm (2,400m^3)	33 tonnes per truck and trailer	210	Local	210
External Road Diversion Material- (realigned road to Homestead)	3.6km × 4m × 250mm (4,300m^3)	33 tonnes per truck and trailer	270	Local	270
New Access Road Upgrade	22km × 6.5m × 200mm (28,600m^3)	33 tonnes per truck and trailer	3135	Local	3135
Concrete	For footings, retaining walls	Estimated at 1,000m^3 via standard concrete truck	200-300	Local	300
Coal Handling and Preparation					
Building	8000m^2	Constructed from base materials (steel/concrete)	420	Local	420
Dam (total of 10)	11,200,000m^2				
Poly Liner	11,200,000m^2	6m x 30m rolls @ 22kg, 16rolls / pallet, 26 pallets/truck	152		152
Sewer TP	3	multi	1		3
Water storage Tank delivery	4		4		4
Servicing of tanks	4		4per week	Local	624
Regular Service Vehicles					
Portable Water	Limited Supply	Trucked in	18.66 per week	Local	2920
Fuel	33.2 million l/yr	b-double transport	7 per week	State	1095
General supplies (office, catering and miscellaneous equipment)			15 per week	State	2340
Waste Collection			8 per week	Local	1248
Internal Infrastructure					

Sewerage Pipes	2000m		8	Local	8
Electricity wire/poles	2000m		8	Local	8
Telecom line	2000m		8	Regional	8
Water pipes	2000m		8	Local	8
Telecom to Site					
Telecom to site	8000m		120	Local	120
Total					18654
AADT Total					18

Based on the above assumptions, the total truck requirements will be approximately 18,654 trucks over the three year construction of the site. This equates to an average of 18 trucks per day. It is noted that this equates to 36 vehicle movements per day, with loaded and unloaded vehicle movements per trip. It is assumed that all equipment provided to the site is dedicated to the site for the term of its use. As such, items such as mobile cranes and forklifts will be located on-site and not transported to and from as required.

Approximately 75% of these trips will be from the local area. These will consist of material deliveries from local quarries and suppliers for materials and infrastructure components. The remainder will be distributed from the wider region, state wide (including ports) and national.

As such, 14 vehicles per day are expected to be local, while four heavy vehicle movements per day will continue beyond the local area.

3.3.2 Staff Traffic

During the construction it is estimated that there will be approximately 2500 staff on site. It is assumed that construction will take place under 12 hour shifts. It is further noted that during the later construction period that there will be a total of 4500 staff operating at the site for a short period of time as construction and operation activities overlap. In order to ascertain an approximation of staff generated traffic the following parameters have been assumed:

- It is assumed 95% of staff will be accommodated on site;
- 5% of workers (including subcontractors) to access the site utilising private vehicles, with an average car occupancy for passenger vehicles is two persons;
- on-site accommodated staff will consist of 90% FIFO and 10% DIDO
- Peak hour movements account for approximately 40% of daily traffic

The traffic generation also takes into account the expected roster and shift systems which would result in:

- 60% of workers rostered on
- Two shifts of 12 hours each, with 70% of rostered staff on day shift and 30% on night shift.

As such, the maximum staff accessing the site for a shift on a given day will be 208. This will generate:

- Long distance /shared driving - DIDO trips generally have an occupancy of two persons per vehicle based on TTM observations for DIDO trips on the Peak Downs Highway.
- 208 workers utilising 92 cars and 3 buses, equivalent to 184 vehicular movements.

This is considered a worst case scenario as it assumes that shift workers, admin staff and sub-contractors all arrive and depart the site during the same peak hour, which is unlikely to occur. A strong emphasis will also be placed on maximising multi-use transport such as buses.

3.3.3 Total Traffic Generation - Construction Phase

Based on the above assessment of construction (non site staff) vehicles trips it is estimated that there will be an average of 14 Heavy Goods Vehicles trips per day attracted to the development site during the construction phase. Based on a 70% roster of staff, it is estimated that there will be approximately 3 bus trips and 89 private vehicle trips per day generated by the development site during the construction phase. This equates to 6 bus movements and 178 private vehicle per day movements.

Based on these assumptions the peak hour and daily traffic generated external to the mine facilities is shown in Table 3.2. This is expected to occur at peak construction of the coal mining activities.

Table 3.2: Site Traffic Generation

Shift	Day	Night
Total Work Force	2500	
Total Rostered Staff	60\40	1500
Day Shift Night shift %	70/30	
Shift Staff	1050	450
On Site Accommodated staff	998	426
Off Site Accommodated Staff	52	24
Off Site Based Staff Access: • Off Site Vehicle movement (Occupancy = 2)	52	24
On Site Staff Access		
DIDO Commute	13	
FIFO - Airport Commute	119	
Total Daily Staff Movements	3 Bus trips to the airport - 6 movements 13 DIDO On site Accommodated staff - 26 movements 76 Off site Accommodated Staff - 152 movements	
Total peak hour traffic generation, heavy vehicles	15% HV = 3 (6 movements 3in 3 out)- worst case scenario	
Total peak hour traffic generation, including heavy vehicles	40% staff = 74 staff trips 37 in 37 out	

As shown in Table 3.2, the daily traffic volume generated by the site is expected to equate to 0.01 vehicle movements per day for each member of staff employed at the mine.

These traffic volumes are expected to be distributed as follows:

Construction Traffic and Assignment

- 80% to Alpha the immediate local area (Alpha and surrounds)
- 30% to continue to Emerald and Beyond
- 15% to Jericho, and
- 5% north of the mine site

Of the mine generated traffic, 5% (approximately 5 vehicles per day) are expected to continue through Barcaldine toward Longreach. Additionally, 30% is expected to pass through Emerald to the east, while 5 percent will head north via the Gregory Highway, these are primarily expected to consist of long distance heavy vehicle movements, servicing the site from major regional centres near the coast and interstate. The location of regional centres such as Rockhampton and Gladstone, and to a lesser extent Emerald, Blackwater and Dingo all to the east are likely to see the majority of trips attracted eastward, it is also noted that most northerly trips will also head via emerald before turning north.

3.4 Mine Operation

It is understood that the mine will operate on a 25 year life cycle which is the basis however TTM will assess the trip generation. The primary tasks involved will be excavation and processing of coal to export quality at a rate of 40Mtpa. The primary requirements for service vehicles will be the supply of operating goods (fuel, explosives, etc) and the maintenance of mining equipment.

For the duration of the operational life span of the mine it is expected that the majority of staff will be accommodated on site within the accommodation camp. Staff located offsite it is expected as noted earlier will take the most direct route which will be via The Capricorn Highway when approaching site and dispersing on to the wider network.

3.4.1 Service Vehicle Traffic

Table 3.3 identifies all the heavy vehicle requirements during the Operation stage.

Table 3.3: Site Traffic Generation - Operational

Need	Quantity	Transport Arrangements	Total Delivery Vehicles	Origin	Total
Equipment (inc, replacement at 12 years)					
Waste Haulage Trucks	30 vehicles	Deliver in components (6 loads per truck) - assembled on-site	180	National	180
Coal and Interburden Mining Trucks	26 vehicles	Deliver in components (6 loads per truck) - assembled on-site	156	National	156
Electric Hydraulic Excavator (800 tonne class)	12 vehicles	Deliver in components (30 loads per truck) - assembled on-site	360	National	360
Small Excavators (250 tonne class)	12 vehicles	Deliver in components (10 loads per truck) - assembled on-site	120	National	120

Front End Loaders (Cat 993 size)	6 vehicles	Deliver in components (5 loads per truck) - assembled on-site	30	National	30
Carry Dozers	14 vehicles	Deliver in components (4 loads per truck) - assembled on-site	56	National	56
Other dozers	8 vehicles	Deliver in components (3 loads per truck) - assembled on-site	24	National	24
Ancillary Plant	22 vehicles	Deliver in components (1-2 loads per truck) - assembled on-site	34	State	34
Tyres	66 operating vehicles at 6 month intervals	4 tyres per load	3300	National	3300
Vehicle spare parts	Parts as required		1 per week		1300
Transmission Line 80km					
Poles (replacement 10%)	24	As required	12	Regional	12
Conveyor Belt 12.5km					
Belt section (replacement 10%)			7pa	International	175
Drive motors (replacement after 12 years)	2 per km	3 per truck	8	International	8
82					
Internal Road Material (maintenance 10%)			82	Local	82
Concrete	Shotcrete for mine	Estimated at 4,000m^3 via standard concrete truck	Plant on site- raw materials by rails	Local	0
Regular Service Vehicles					
Potable Water	Limited Supply	Trucked in	7pw	Local	9100
Explosives	50,000t/year		5pd	State	45625
Fuel	28 million l/yr	b-double transport	4 per week	State	5200
General supplies (office, catering and miscellaneous equipment and accommodation centre)		b-double daily	Daily	State	9125

Waste Collection Additional			14 per week	Local	18200
Total					93087

Based on the above assumptions, the total truck requirements will be approximately 93,087 trucks over the first 25 years operation of the site. This equates to an average of 11 trucks per day. It is noted that this results in 22 vehicle movements per day, with loaded and unloaded vehicle movements per trip. It is assumed that all equipment provided to the site is dedicated to the site for the term of its use. As such, items such as excavators and dump trucks will be located on-site and not transported to and from as required.

A larger portion of operational traffic will be from non-local sources, with basic material requirements (such as road base and structural materials) reduced from the construction stage and an increased focus on more specialist requirements, such as fuel and explosives, which are sourced from further destinations. This will result in approximately 3vpd local and 8vpd from non local sources, however, it is anticipated that bulk items such as fuel will be transported via 95,000ltr fuel tanker wagons in the new fuel trains on the new heavy haul train line.

3.4.2 Operational Phase - Staff Traffic

It is expected at least 95% of the 2000 man work-force will be accommodated on site, with up to 5% accommodated off site. Approximately 60% on shift, 40% off and also a 70/30 split between day and night shift. Staff will be transported from the airfield to the accommodation centre and mine site internally via communal transport mainly buses seating between 16 and 50 passengers based on demand.

Of the 95% of staff to be accommodated on site, it is assumed that approximately 10% will commute via a drive in drive out (DIDO) basis. The remaining on site accommodated staff are expected to commute on a FIFO Fly in Fly out basis.

The remaining 5% of staff are expected to stay locally and will commute on a daily basis to the mine. The local based staff are expected to be employed within the administration and servicing of the development. It is expected that off site local resident staff will commute with an average occupancy per vehicle of 2 staff members. It is expected that this will equate to approximately 60 trips per day.

A summary of staff traffic is shown below.

- It is assumed 90% of staff will be accommodated on site;
- 10% of workers (including subcontractors) to access the site utilising private vehicles, with an average car occupancy for passenger vehicles is two persons;
- Peak hour movements account for approximately 40% of daily traffic

The traffic generation also takes into account the expected roster and shift systems which would result in:

- 70% of workers rostered on
- Two shifts of 12 hours each, with 70% of rostered staff on day shift and 30% on night shift.

This is considered a worst case scenario as it assumes that shift workers, admin staff and sub-contractors all arrive and depart the site during the same peak hour, which is unlikely to occur.

Table 3.4: Site Traffic Generation

Shift	Day	Night
Total Work Force	2000	
Total Rostered Staff	60\40	1200
Day Shift Night shift %	70/30	
Shift Staff	840	360
On Site Accommodated staff	798	342
Off Site Accommodated Staff	42	18
Off Site Based Staff Access: • Off Site Vehicle movement (Occupancy = 2)	42	18
On Site Staff Access		
DIDO Commute	11	
FIFO - Airport Commute	95	
Total Daily Staff Movements*	3 Bus trips to the airport - 6 movements 11 DIDO On site Accommodated staff - 22 movements 60 Off site Accommodated Staff - 120 movements	
Total peak hour traffic generation, heavy vehicles	15% HV = 2 = 4 movements 2in 2 out	
Total peak hour traffic generation, including heavy vehicles	40% staff = 60 staff trips 30 in 30 out	

*Note that there will be 6 bus movements as 3 buses will arrive and depart, catering for both shifts. Cars will include 144 movements, with 101 inbound and 39 outbound in the AM and the reverse at the PM shift change.

As shown in Table 3.4, the daily traffic volume generated by the site is expected to equate to 0.26 vehicle movements per day per for each member of staff employed at the mine.

These traffic volumes are expected to be distributed as follows:

3.4.3 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 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

  -30 % will continue eastbound on to Emerald and beyond.

  -10% to travel north primarily via the Gregory Highway
- The Clermont Alpha will not be utilised by Heavy Vehicles, due to the existing conditions and in general the lack of northbound trips. Hauliers and heavy vehicle mining trip providers will be explicitly advised not to utilise this route as part of the mines future road user management plan.

3.5 Impacts of Decommissioning

It is assumed that the mine will have an operational life span of at least 25 years after which it will be decommissioned. As part of the decommissioning process it is expected that there will be some impact on the road network.

Decommissioning of the development will require several operations which will have an impact on the local and state controlled network this will include:

- Removal of Hazardous Material.
- Decommissioning of buildings and structures (including the conveyor built) on site.
- Removal of waste material.
- Environmental actions (including slope stabilisation where necessary) and
- Removal of plant and machinery from site.

It is assumed that during the decommissioning the expected operations mentioned above will produce traffic generation over a period of approximately a year. However it is assumed that these movements may be mitigated against via the use of the Galilee Basin Rail (GBR) rail line as a potential delivery method.

Additionally, the potential traffic impacts of decommissioning with respect to staffing and pavement impacts are significantly lower than at any other stage of operation. Finally, heavy vehicle movements generated for processes such as removal of materials are likely to be catered for within the local area, resulting in minimal movements on the wider state controlled road network.

4. Traffic Operations Assessment

4.1 Increase in Average Annual Daily Traffic (AADT)

The Barcaldine Local Government area economic and demographic data shows that the population of the Barcaldine area as of the 30th of June 2011 to be 3,417. Within Barcaldine local government area the population of the former Jericho Shire, which incorporated Jericho and Alpha as the major population centres, has in recent times had a steadily declining population. The 2006 census data provides a population of this former shire at 920 people, down from approximately 1,250 in 1981. Of this current population, approximately 350 people live in Alpha.

Various sources indicate that the town of Alpha may increase in size from 350 residents to between 500 to over 2000 in the next 10 years.

Background traffic growth on local roads has also been considered. The establishment of the mining and Coal Seam Gas industries in the region are expected to attract significant additional development in the area to provide support services to the projects. It would be expected that Alpha and Jerico will grow moderately, with new short term accommodation, additional industry to service the mining and coal seam gas industries, as well as additional retail and food outlets.

Over the life of the proposed project, a background growth rate of 5% could be expected with the continued development of the mining industry. Based on this growth, the general traffic volumes can be expected to increase by 260% over the next 20 years and up to 340% by year 25.

4.2 Construction Phase

The construction phase of the project will last approximately 3 years and will involve the employment of 2500 staff. It is expected that Staff will be accommodated on site within the accommodation camp.

Table 4.1: AADT Impact on Local Roads during Construction

Road	Section	2013 AADT	Mine Generated Traffic			
			HGV	Staff Access	% Increase	Cumulative Increase
◖ Gregory Highway	Clermont to Capella	1158	3	6	1%	5%
◖ Gregory Highway	Capella to Emerald	1852	3	8	1%	5%
◖ Capricorn Hwy	new road to Jericho	464vpd	6	22	7%	28%
◖ Capricorn Hwy	new road to Alpha	464vpd	30	123	33%	100%
◖ Capricorn Hwy	east of Alpha	486vpd	11	46	11%	33%
◖ Clermont-Apha Road	south of mine	92vpd	-	8	9%	450%+
◖ Clermont-Apha Road	north of mine	19vpd	-	8	42%	250%
◖ Hobartville Road*	south of mine	34vpd	-	-	-	
◖ Monklands Road*	south of mine	18vpd	-	-	-	
◖ New Mine Access Road		NA	36	184	-	
◖ Peak Downs Highway	Clermont to Peak Downs	597	3	8	1%	10%
◖ Peak Downs Highway	Peak Downs - Nebo	3377	3	8	1%	10%
◖ Peak Downs Highway	Nebo-Mackay	3645	3	8	1%	10%

*based on the latest count data available for the surrounding road network The Capricorn highway and a 5% growth rate. The cumulative assessment is based on an estimation of mine trips for the 3 other mines only

Table 4.1 identifies that there will be a minimal growth in traffic volume resulting from the construction of the mine overall.

4.3 Operational Phase

The operation phase of the mine will last at least 25 years from construction completion in 2016.

Table 4.2 identifies the current (2009) traffic volumes, sourced from DTMR, for roads utilised to access the site and wider primary road network.

Table 4.2: AADT Impact on Local Roads - Operational

Road	Section	2014 ADT	Mine Generated Traffic			
			HGV	Staff Access	% Increase	Cumulative Increase
◖ Gregory Highway	Clermont to Capella	1158	1	5	1%	5%
◖ Gregory Highway	Capella to Emerald	1852	1	6	1%	5%
◖ Capricorn Hwy	new road to Jericho	464vpd	4	18	6%	28%
◖ Capricorn Hwy	new road to Alpha	464vpd	19	98	26%	100%
◖ Capricorn Hwy	east of Alpha	486vpd	8	37	8%	33%
◖ Clermont-Apha Road	south of mine	92vpd	-	6	7%	450%+
◖ Clermont-Apha Road	north of mine	19vpd	-	6	32%	250%
◖ Hobartville Road*	south of mine	34vpd	-	-	-	
◖ Monklands Road*	south of mine	18vpd	-	-	-	
◖ New Mine Access Road		NA	22	148	-	
◖ Peak Downs Highway	Clermont to Peak Downs	597	1	5	1%	10%
◖ Peak Downs Highway	Peak Downs - Nebo	3377	1	5	1%	10%
◖ Peak Downs Highway	Nebo-Mackay	3645	1	5	1%	10%

*based on the latest count data sourced from URS Alpha coal mine project EIS - Cumulative assessment is based on an estimation of trips of the 3 other mines only.

Table 4.2 identifies that the minimal traffic impact scenario from the construction stage will be retained through the operation stages of the proposed development, particularly on the state controlled road network.

Overall the site will generate only nominal traffic volumes in the region with respect to existing volumes on major roads.

4.4 Level of Service

During the construction phase all roads in the vicinity of the site are to be retained as one or two lane, two way roads. On these roads, level of service is defined by the time spent following other vehicles. For a 100km/h road, a Level of Service A is achieved where percentage following time is less than 40%.

Figure 4.1 of the Austroads GUIDE TO TRAFFIC MANAGEMENT – PART 3: Traffic Studies and Analysis 1, identifies that where directional traffic volumes up to 300vph are opposed by traffic volumes less than 200vph, the percentage following time will be less than 40% and as such a level of service A is achieved. This equates to a daily traffic volume of approximately 3,500 vehicles.

No road in the local area is expected to carry more than 1,200vpd, inclusive of background traffic growth and direct mine traffic. As such, the provision of adequate two-lane, two-way carriageways will retain a Level of Service A on all roads.

During the operational phase of the development as with the construction phase it is envisaged that no road in the local area is expected to carry more than 1,500vpd, inclusive of background traffic growth and direct mine traffic. As with the construction phase it therefore considered that the provision of adequate two-lane, two-way carriageways will retain a Level of Service A on all roads.

4.5 Intersection Analysis

In relation to all local intersections and the Level of Service they are generally not expected to experience any significant congestion where traffic volumes are less than 3,500vpd in total. As such un-signalised priority controlled intersections will be suitable to cater for future traffic volumes.

Table 13.4 of the Department of Transport and Main Roads: Road Planning and Design Manual, is reproduced below in Table 4.3. The guidelines state that it is unnecessary to flare intersection approaches or carry out an intersection analysis when the combinations of major road and minor road volumes are less than those in the table.

Uninterrupted Flow Conditions

Major Road Types[1]	Major Road Flow (vph)[2]	Minor Road Flow (vph)[3]
Two-Lane	400	250
	500	200
	650	100
Four-Lane	1000	100
	1500	50
	2000	25

Notes
1. Major road is through road i.e. has priority
2. Major road design volumes include through and turning movements
3. Minor road design volumes include through and turning volumes

Table 4.3: Maximum Volumes for Uninterrupted Flow

The minor approach (New Site Access Road) will carry less than 120 vehicles per day. This enables the major road to carry up to 650vph before assessment is necessary. As the highway will carry up to 190vph in year 25, no capacity assessment is considered necessary as free flow conditions are generally expected at the intersection. However TTM has carried out an assessment with regards to safe operation of the intersection.

However, in order to provide the most robust assessment possible the 5% traffic growth rate has been applied to the Capricorn Highway back ground traffic two way flow movement. This produces an ultimate case scenario to the end of the first 25 year operational period of 1900 vpd two way flow at the site intersection.

Traffic volumes on the relative approaches are estimated as follows (based on the above discussed factored growth)

- Two way volume 1900 vpd
- Peak hour Volume 190 vph
- Left Turn Volume - 0 HV + 4 light vehicle and bus = 4
- Right Turn Volume - 2 HV + 26 light vehicle and bus = 28

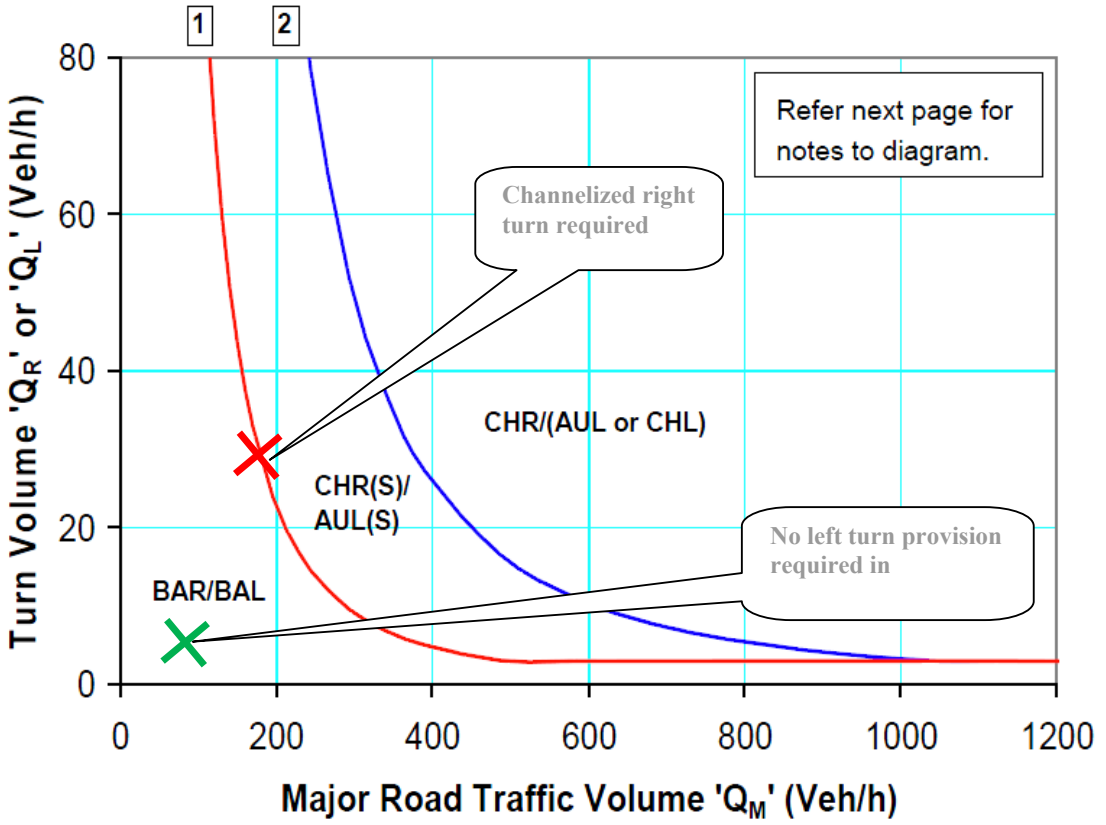

Figure 4.1: Warrants for Turn Treatments on High Speed Roads - Construction

CHR – Channelized Right Turn. AUL – Auxiliary Left Turn. CHL- Channelized Left Turn. CHR (s) Channelized Right Turn with short Lane. AUL(s) Auxiliary Left turn with Short Lane. BAR Basic Right Turn BAL Basic Left Turn.

Therefore, the intersection providing the primary access to the site will be designed as a basic left and right turn intersection. This will require:

- Widening of pavement to include a 2m sealed shoulder on the eastbound lane
- Provision of channelized right turn lane suitable to provide for turns of the largest design vehicle (type 2 road train)

It should be noted that the while the access road will provide access to the development it is assumed that it may also provide access to the proposed mines to the north of the development. This will increase the potential for vehicular conflict though generally it will remain a relatively low number of turning vehicles who will access these mines from the west.

Beyond this intersection the network lane requirements will be based on turn movements as such it will be development which is attached to the minor road network that create this demand.

For example turn warrants to the airport access road are generated by development of the airport and not directly to mining activity.

4.6 Vehicle Safety

Figure 4.2 and Table 4.4 identify the existing road accident profile for the road network in the vicinity of the Mine Lease. The data presented here identifies all crashes on road sections for the 5 year period 2004 to 2008. For major roads with multiple crash events, the vehicle crash rate per 10,000,000 km travelled has been identified.

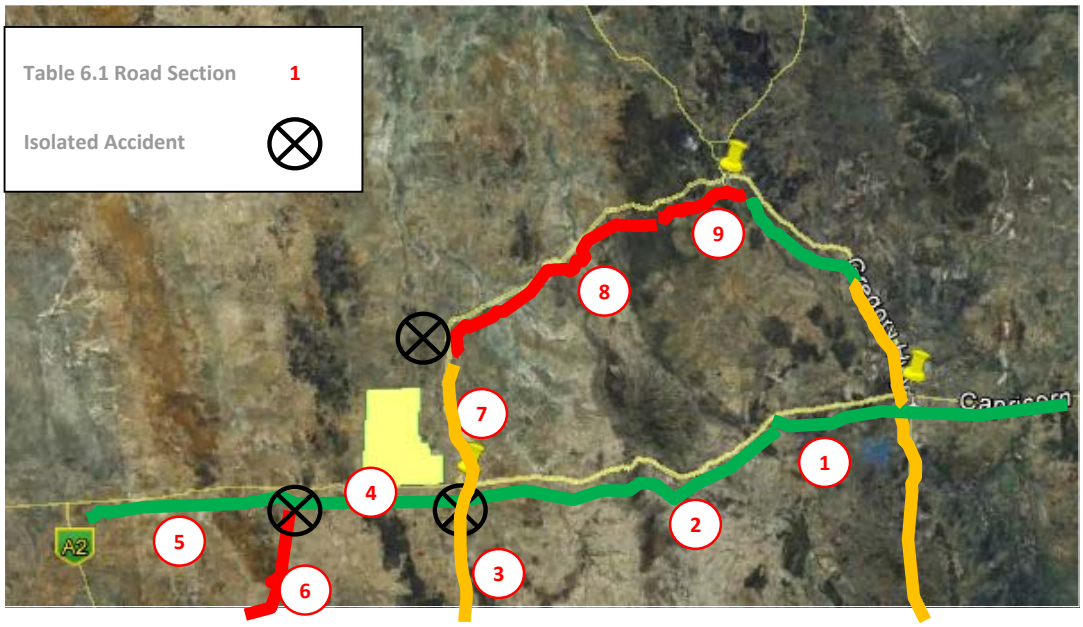

Figure 4.2: Local Area Crash Profile

Figure 4.2 indicates crash rates as:

- Low (under 4 crashes per 10,000,000km) - Green
- Moderate (4 to 10 crashes per 10,000,000km) - Yellow
- High (over 10 crashes per 10,000,000km) - Red

The isolated incidents were recorded at:

- Degula Road, Surbiton

- Moore Street, Alpha
- Faraday Street, Jericho

Table 4.4: Road Section Crash Data (2004-2008)

Road	Section ID (Fig 6.1)	Section	2004-2008 Vehicle Km Travelled*	Reported Crashes	Crashes per 10,000,000km
Capricorn Hwy	1	Anakie to Great Dividing Range	27,960,000	9	3.2
Capricorn Hwy	2	Great Dividing Range to Alpha	73,500,000	21	2.9
Alpha Tambo Rd	3	All	8,760,000	4	4.6
Capricorn Hwy	4	Alpha to Jericho	38,230,000	6	1.6
Capricorn Hwy	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
Gregory Highway	Not shown	Capella to Emerald	75,920,000	55	7.2
Gregory Highway	Not shown	Clermont to Capella	133,620,200	13	1
Total			**390,035,200**	**130**	**3.33**

*Vehicle Kilometres Travelled has been estimated based on road section length and 2009 AADT.

The significant majority of accidents noted above were single vehicle. Only 5 of the accidents in Table 4.3 involved 2 cars, with 4 of those nominating the cause of the crash as “hit animal”. Therefore, only 1 accident in this region occurred during 2004-2008 as a direct result of 2 cars colliding. This reflects the limited conflicts between vehicles due to the low volumes in the region.

The road with the lowest crash rate is clearly the Gregory Highway between Clermont and Capella.

This top level analysis demonstrates how the road condition in the region impacts vehicle safety, with low volume, unsealed roads having significantly higher incident rates. This is further demonstrated by the discrepancy between the sealed section and well formed sections of road to the north and south of Alpha (on both the Clermont-Alpha Road and Alpha-Tambo Road), compared to the remaining Clermont-Alpha Road, where the road condition is generally identified to be of a lower standard.

The impact of this analysis on the mine is to ensure that roads to carry significant traffic volumes to access the mine are adequately formed to provide a safe environment. This will include sufficient width sealed carriageways, with appropriately formed intersections. The proposal for the local road network, which will result in significant diversions of existing traffic from the current Clermont-Alpha Road to the proposed mine access road, would be expected to have a safety benefit to current road users, as well as improving efficiency.

4.7 Cumulative Assessment

In addition to considering the impact of the proposed mine as a standalone operation, further investigation has been undertaken to address the cumulative impact of several major infrastructure and mining developments in the region.

Within this area, the key projects considered as part of the cumulative impact are listed in Table 4.4. The list contains major mining and infrastructure projects which will impact on the road network at approximately the same time as the proposed Waratah Coal Mine Project.

In order to assess each project, various data sources have been interrogated, including existing Road Impact Studies and Environmental Impact Statements. Where no data relevant to the approximation of development generated flows from a direct source related to the individual project general approximation has been made.

Due to the significant differences in trip generation between the development/construction phase and operation phase of the projects listed, where possible, numbers have been calculated based on an analysis of each phase.

Currently there are four projects which will directly impact the local road network in this area, the Kelvins Corner Coal Project, the Alpha Coal Project both Hancock, the South Galilee Coal Project and the Waratah Coal Project. Figure 4.3 shows the DTMR Proposed and Potential Central Galilee Basin Exploration and Mining Projects map. The majority of the projects are still at a stage of appraisal and as such have been removed from the cumulative assessment.

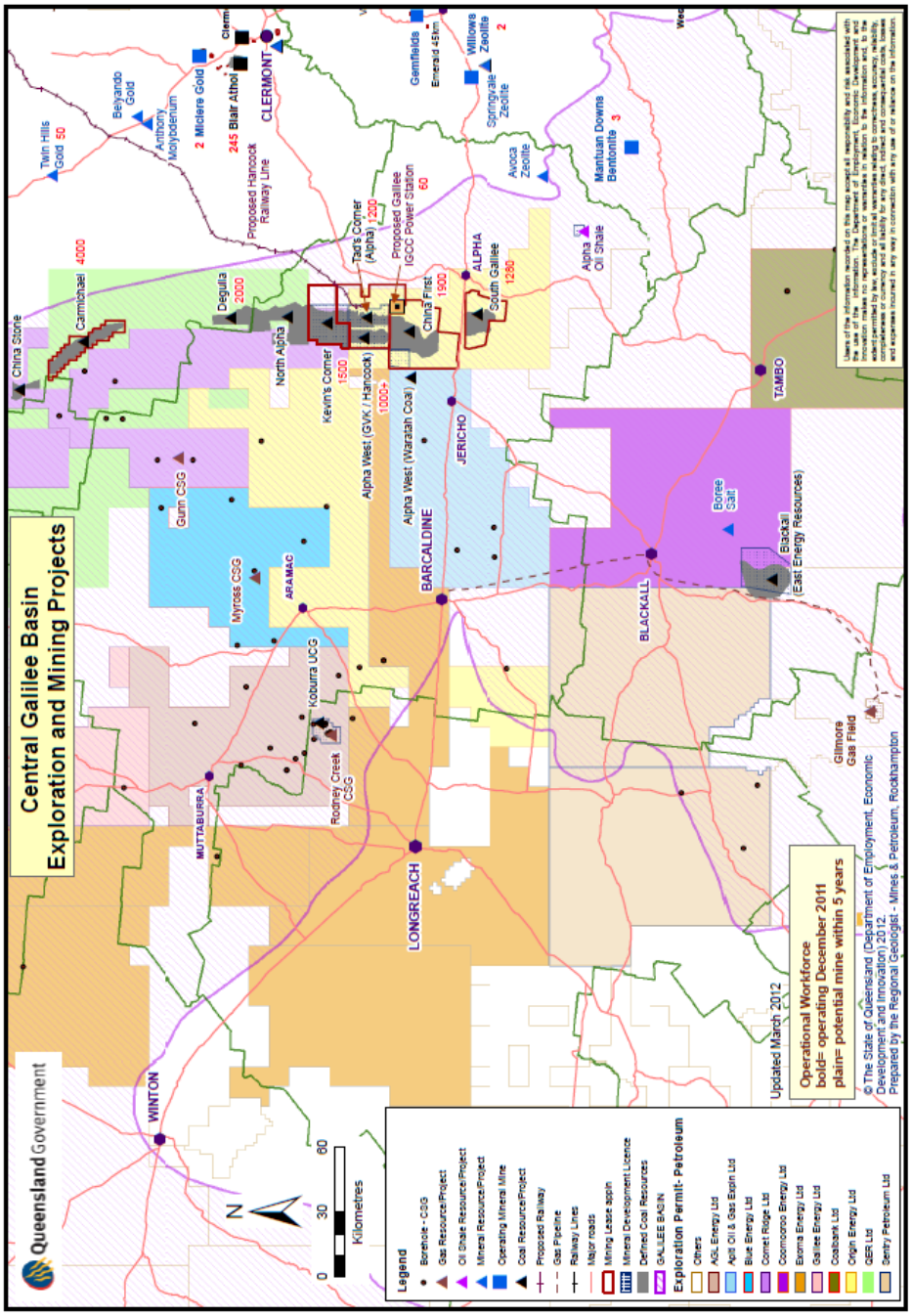

Figure 4.3 DTMR Proposed and Potential Central Galilee Basin Exploration and Mining Projects

Table 4.5: Known Major Projects in the Alpha Galilee Area Region

Project	Compaany	Status	Construction	Period of Operation	Method of Output Delivery (Rail/Road/Pipeline/ Transmission line)	Peak Production	Combined Construction and Operation Movements	Percenrage contribution
Waratah	China First	EIS	2014	2016-2041	Rail	40 Mt/y	1,244,650	31.28%
South Galilee	Bandana Energy	Initial Advice	2015	2017-2042	Rail	20 Mt/y	622,325	15.64%
Kelvins Corner	Hancock	EIS	2016	2018-2038	Rail	30 Mt/y	933,488	23.46%
Alpha North	Hancock	EIS	2014	2016-2036	Rail	30 Mt/y	933,488	23.46%
IGCC Power Plant	Banada Energy	Planning	2014	-	Road and Pipe	-	245,280	6.16%
							3,979,230	100.00%

On the basis that all projects shown within Table 4.5 are progressed it has been shown that overall The Waratah Coal Mine will account for approximately 32% of all impacts on the road network.

However it should be noted as shown Figure 4.3 above that the Galilee Basin is still in a relatively new phase of development and that the potential for additional mines and operations in the area is likely to increase the overall development significantly.

Based on a 28 year development and operation cycle it is assumed that the cumulative increase on the whole network will be in the region of 389 vehicular trips per day. This impact will be distributed across the local road network on a number of routes. This may result in traffic volumes on sections of the Capricorn Highway increasing by up to 290 vehicles per day, particularly in the vicinity of Alpha. This equates to an increase in the order of 65%. This is higher than the moderate growth rate identified in Section 5.1 of this report, indicating that traffic growth over the life of the project would be classified as high.

These local roads should be assessed with respect to the major development directly impacting them. In the case of The Waratah Coal Project, this includes Capricorn Highway, The Gregory Highway and to a lesser extent the Clermont Alpha Road. Generally there are few local roads and lower order roads which will offer a logistical option for trips generated by all 4 key developments.

The cumulative impact therefore should focus on the shared, higher order routes, which in this area is the Capricorn Highway and the Gregory Highway. While these roads have ample spare capacity to cater for these increases in the short term, design horizon planning may need to consider the following:

- Long term provisions for overtaking lanes between Emerald and Alpha
- Increased maintenance budget
- Increased structural capacity for future pavements

Future detailed impact assessment for any major project in the Alpha area needs to consider these cumulative impacts and ultimate transport requirements in their planning

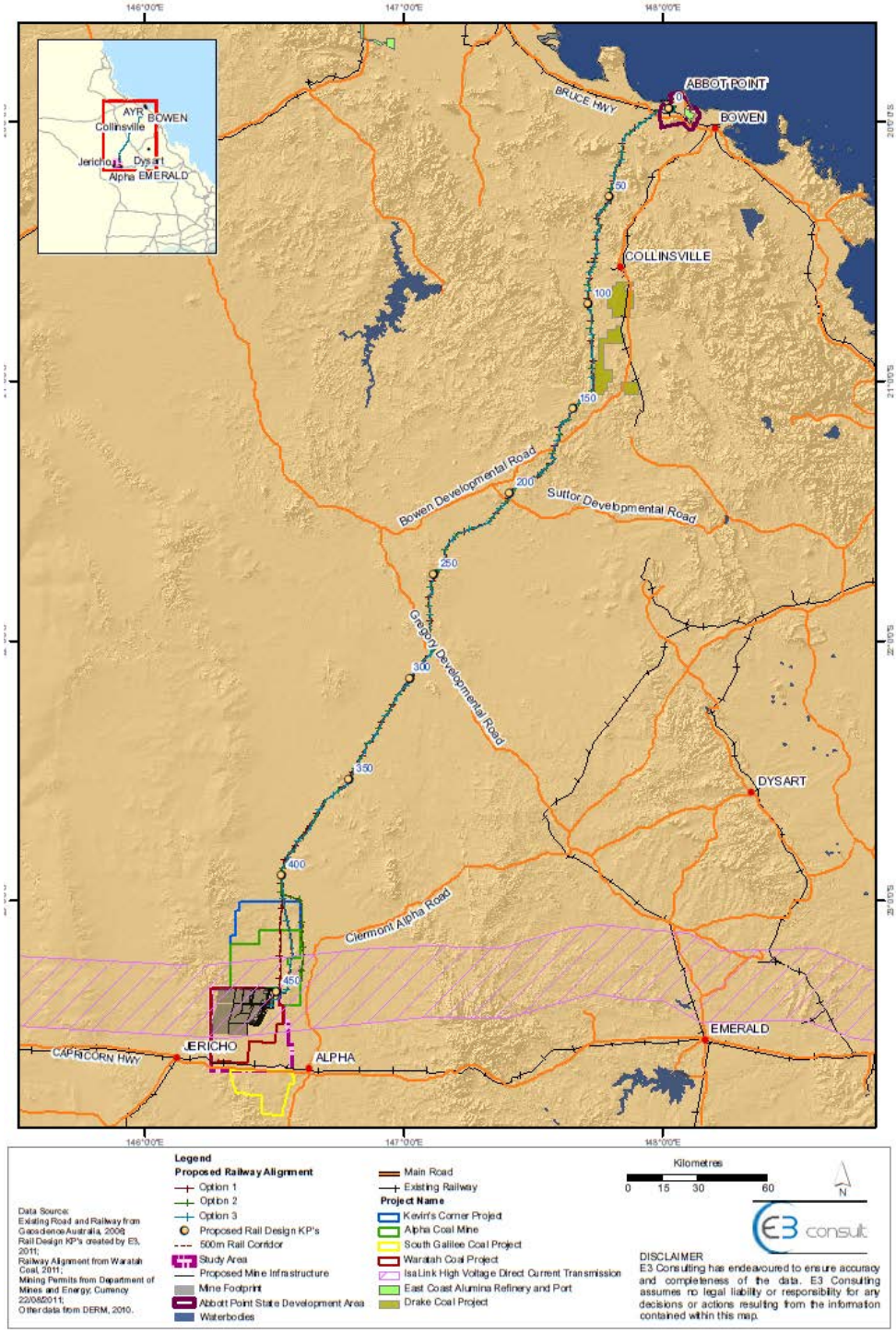

Figure 4.4 Regional Cumulative Impact Infrastructure

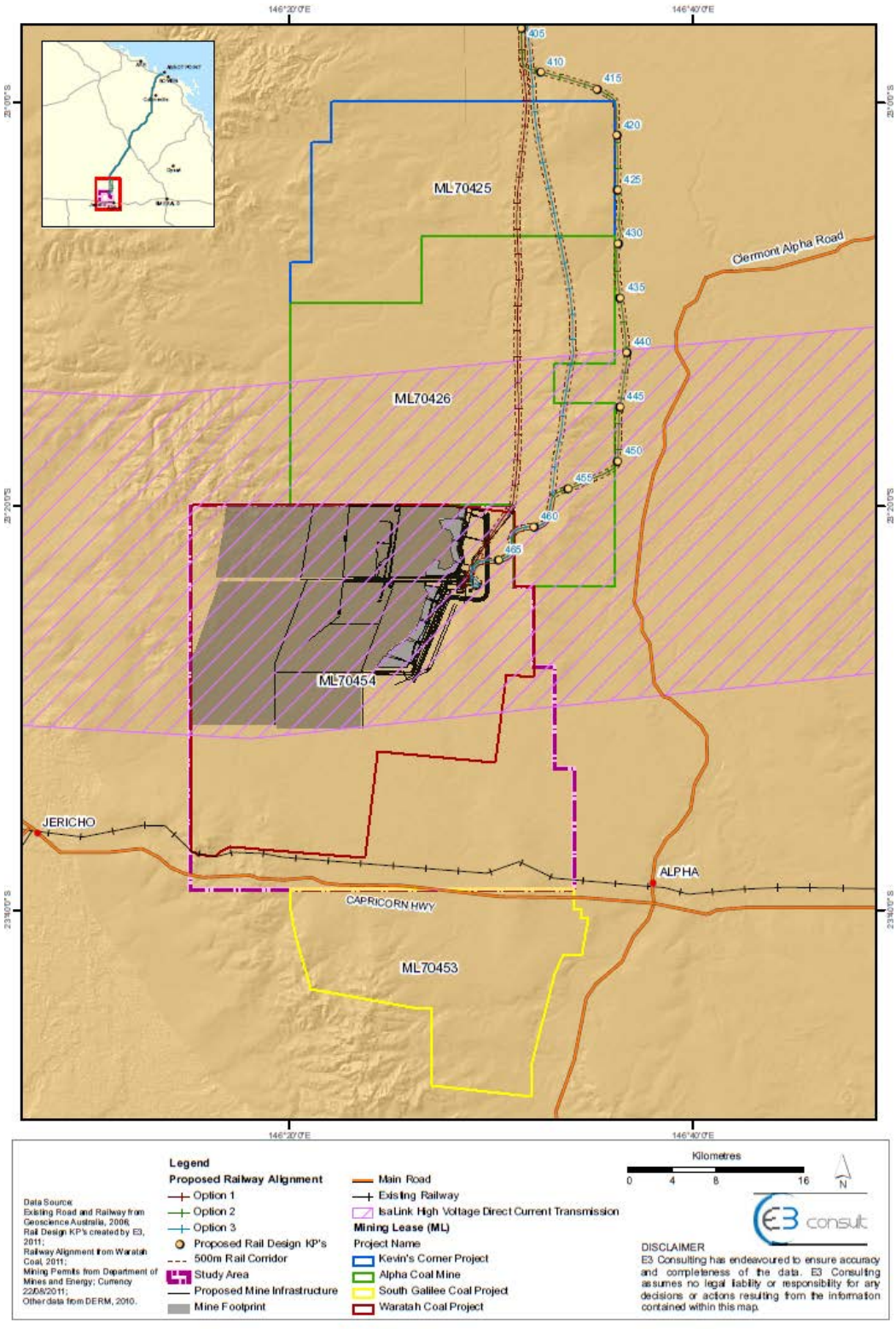

Figure 4.5 Local Cumulative Impact Infrastructure

4.8 Severed Roads

The mining lease, located within mining tenement EPC 1040, is currently traversed by 3 roads (see Figure 1.3), as follows:

- Cavendish Road
- Monklands Road (both in the north east and south east portion of the lease)
- An unnamed road connecting Monklands Road to Cavendish Road in the south west section of the site

Due to the future mining operations potential to cover almost 100% of the lease area, these roads should be relocated outside the mining lease. Roads located through the remainder of the mining tenement (outside the mining lease) can continue to operate in their respective road reserves.

The Cavendish Road reserve terminates at the homestead within the lease boundary. It is the only property which generates traffic along this road. Although the physical road continues through to Monklands Road at Hobartville, the public road reserve does not. As the homestead will be removed to allow mining operation it is not considered necessary to maintain the public road once mining commences. The road reserve should be closed at the mining lease boundary. This may include a service and emergency access facility to the western side of the mine, but not allow for public access.

The remaining roads which are located near the eastern and southern boundaries of the mining lease are to be relocated (see Figure 4.6). Wherever the road is located within the site, it is to be relocated along the mining lease boundary (although this will still be located within mining tenement EPC 1040). Due to the potential increase in traffic demand along Monklands Road to access Jericho from the site, it is recommended that this new road is provided as a sealed pavement to Council standards for a rural access road. This will provide both an improved level of access from the site towards Jericho, and also provide an improved perimeter road for the site.

The new road along the lease perimeter incorporates a section of road near the Monklands homestead which runs along the mining lease boundary. This section of road will also need to be upgraded to a suitable standard, as it currently provides only a single lane of formed surface. A suitable 2 lane gravel pavement is proposed as a minimum, with a central bitumen seal to local rural road standard desirable.

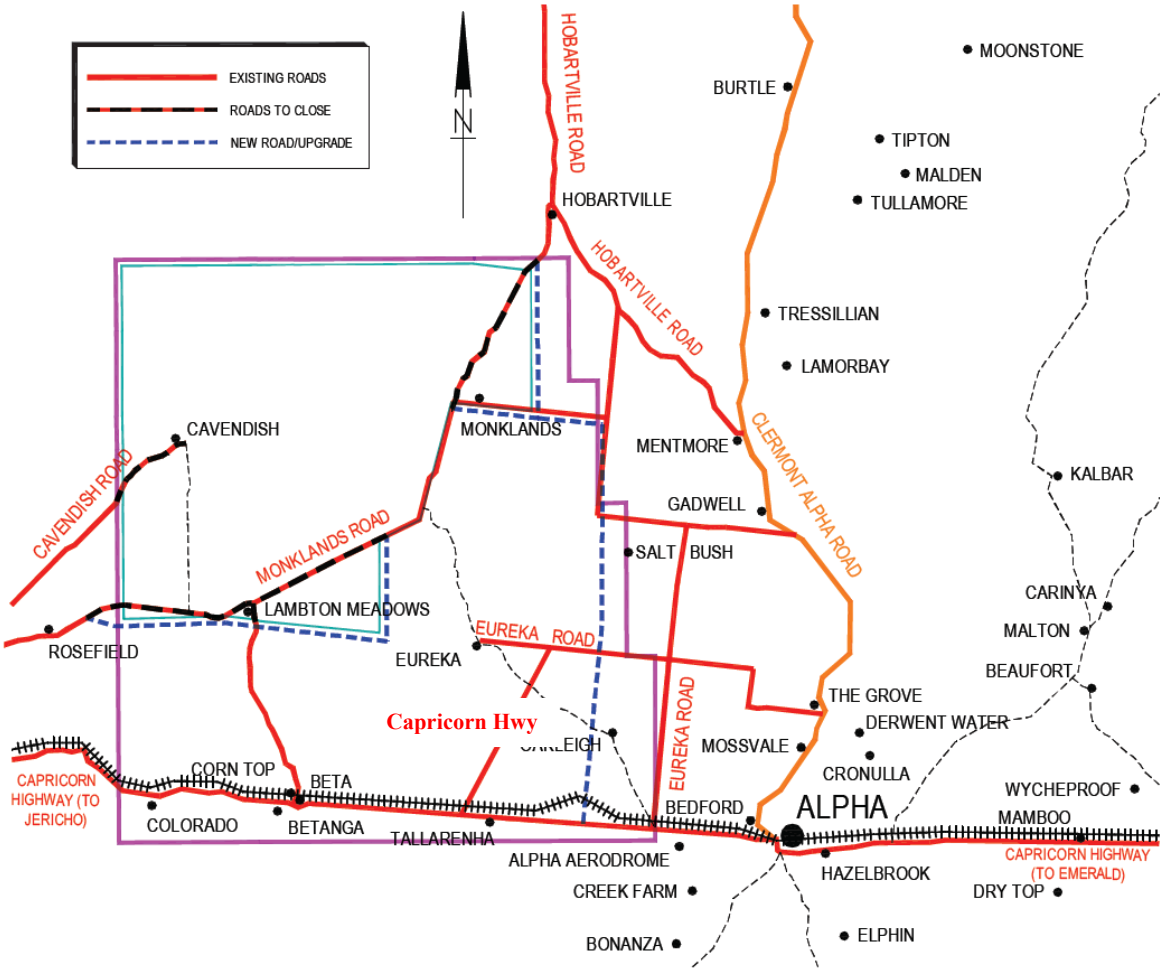

Figure 4.6: Relocated Roads

4.9 Over Dimension Vehicle Management

As part of the construction and operation phases of the development it is necessary that some indivisible components will be delivered by Over Dimensional (OD) vehicles. These are defined in Section 3.1 above.

Where OD access is required it is necessary to provide pilot vehicles and police escorts, dependant on the size of the vehicle. These requirements are shown below in Figure 4.7. DTMR also maintains a "Conditions of Operation Database" for OD operation. This should be reviewed periodically along the full length of OD haulage routes to ensure adequate access is available. Once confirmed, permits for such movements are required from DTMR for the operation of OD vehicles.

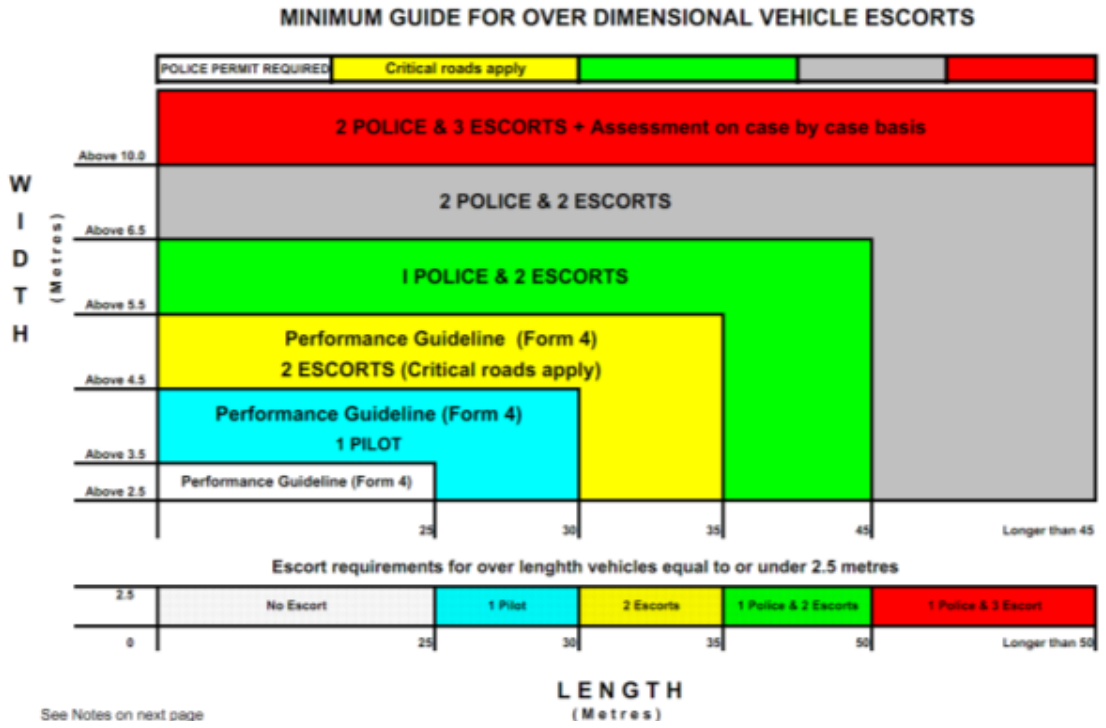

Figure 4.7: OD Vehicle Escort Requirements

4.10 Road Use Management Plan (RUMP)

A Road Use Management Plan (RUMP) will be developed by the Galilee Coal Project Mine management and will be adopted by all contractors delivering goods to or removing goods from the site. The RUMP will provide 3 main objectives:

- To minimise the impact on the efficiency of the State Controlled Roads (SCR).
- To ensure safe operation of vehicles on site and off site.
- To minimise traffic-related complaints and incidents.

In order to meet these objective the plan will clearly layout an understandable and transparent implementation strategy in order to deal with the movement of goods to and from site in a safe and responsible manner in order to reduce the impact on the community.

The plan will provide a monitoring and reporting process and provide a set of criteria for corrective actions when and if required.

As part of this process TTM have acquired from TMR a draft spreadsheet which would provide a measurable basis from which to provide sets of measures dependent on actual traffic generation as opposed to estimated.

These measures may include drive time directives between hauliers and the mine, potential sponsorship of rest area placed appropriately on the highway, and where necessary the appropriate remedial road design measures to mitigate against the impact of the development.

4.11 Traffic Operation Conclusion

While analysis of the proposed Waratah mines traffic impact has shown an overall significant impact, it is generally contained within the existing road configuration.

It is expected that as further developments within the area are assessed that a more in-depth cumulative assessment associated with these developments will show reduced proportional impacts and will allow a better calculative basis for estimating proportional impacts.

TTM is in negotiations with the developer to consider the use and development of a prescriptive RUMP spreadsheet, supplied by DTMR which will provide direct and transparent mitigation in the future based on actual site trip generation as opposed to estimated site trip generation trip levels. However it should be noted that the analysis and generation used within this document is based on a high level of experience in mining sector trip generation, as such actual future trip generation is not expected to differ greatly from the estimated.

5. Pavement Impact Assessment

The existing road sections which will be subject to significant additional heavy vehicle traffic are located on the Capricorn Hwy, between the proposed mine access road and Emerald. Some local trips will terminate at Alpha or distribute to Jericho and Tambo, however the majority of heavy vehicles servicing the mines are expected to continue to Emerald.

Local heavy vehicle movements will not extend past Emerald and inter-regional and inter-state movements will distribute at Emerald.

5.1 Current Pavement Loadings

The Capricorn Hwy has the following vehicle profile for daily traffic between Alpha and Emerald.

Table 5.1: Existing Vehicle Loading

Road	Percentage of Traffic	ESAs 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

* Note: ESA per vehicle value provided as approximately one third of fully loaded ESA's for lower order vehicles (2 axle truck to 4 axle articulate) and half fully loaded ESA's for higher order vehicles. This allows for an average across unloaded, partially loaded and fully loaded vehicles. Fully loaded ESA's provided from Table 5.16, Chapter 5 of Main Roads Road Planning and Design Manual.

The above vehicle class distribution is based on the recorded average over 3 traffic segments on the Capricorn Highway between Alpha and Emerald. Based on this distribution, the average ESA per heavy vehicle is 2.0.

Table 5.2: Capricorn Hwy ESA's

Traffic Type	Highway Section			
	Mine Access Road to Alpha	East of Alpha	West of Anakie-Sapphire Rd	Anakie-Sapphire Rd to Emerald
◖ Traffic	390vpd	420vpd	540vpd	184
◖ 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

5.2 Proposed heavy Vehicle Requirements

It is estimated that the heavy vehicle traffic from the mine will be 10% of the total daily traffic. This will generate:

- 18 heavy vehicles per day during construction
- 11 heavy vehicles per day during operation

Local distribution of these heavy vehicles will be 100% to the highway, with 15% to the west and 85% east. Of the eastbound traffic, 45% is expected to terminate at Alpha with the remaining 40% continuing to Emerald and beyond.

5.3 Proposed Vehicle combinations, axle types and configurations

Heavy vehicle distribution by classification is expected to be similar to the existing traffic on the highway in the vicinity of the site. This will result in an average of approximately 2 ESA's per heavy vehicle.

The vehicles which terminate at Alpha are generally expected to be local service vehicles (generally smaller trucks and buses). The vehicles which continue on to Emerald are expected to be larger configuration (b-double and road train). As such, the average ESA per vehicle for mine traffic east of Alpha is expected to be higher at approximately 2.5 ESA's per heavy vehicle.

5.4 Pavement impact assessment

Table 5.3 provides a comparison of existing ESA's with those generated by the mine operation.

Table 5.3: Capricorn Hwy ESA's, with Development

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	3	18	8	8	4
◖ Average ESA per heavy vehicle	2.5	2.5	2.5	2.5	2.5
◖ Daily ESA's from Mine	8	45	20	20	10
◖ Annual ESA's from Mine	2,920	16,425	7300	7300	3650
◖ Percentage increase from existing	5%	25%	12%	8%	2%

From this assessment, it is necessary to consider the pavement impacts for the mine on the Capricorn Hwy from Emerald to Jericho.

It is proposed that further impact assessments are undertaken through the development stages of the mine, when factors such as ongoing service vehicle requirement and local population/traffic growth can be more suitably defined.

5.5 Conclusion

The Pavement Impact assessment has shown that contributions will be required to rehabilitate and maintain the Capricorn Highway between Jericho and Emerald.

6. Conclusions and Recommendations

From a traffic engineering perspective, the peak traffic impacts associated with The Waratah Coal Mine are expected to commence around 2016 when on completion of the construction period from which it will begin a period of operation for at least 25 years.

A total 12.5km of conveyor systems will be used on site for transporting coal around the mine site for various processes and inevitably for transfer to the proposed rail infrastructure. The conveyor system and proposed rail line will decrease traffic and pavement impacts as well as impacts on neighbours in comparison to a haul road.

The traffic impact assessment undertaken by TTM has considered both the construction and operational phases of the project.

An inventory of the heavy vehicles required during construction has been outlined in section 4.3 of this report. Based on this inventory, the site is expected to generate approximately 18 heavy vehicles per day, which equates to 36 vehicle movements per day (loaded and unloaded). Further, the construction workers and operational staff will be flown into Alpha Airport 6km east of the subject site on The Capricorn Highway. These vehicle trips will generally be catered for by bus and will take the most direct route to the camp site via the Capricorn Highway.

During the peak operational phase (i.e. from end 2016 onwards), the site is expected to generate 11 vehicles per day equating to 22 heavy vehicle movements (loaded and unloaded) each working day.

While there is the opportunity for assignment of traffic onto the Clermont-Alpha Road to the east of the site, the distribution of development traffic to the north is relatively small in comparison with the east. It is also assumed that due to existing condition of the Clermont-Alpha Road that no heavy vehicles will use this road while loaded or unloaded. If in the future it is proposed to upgrade the existing conditions this may allow for site generated heavy vehicle movements though this is likely to be in the order to 1 to 2 trips per day.

To mitigate the traffic impact of the proposed development the following items have been identified:

- Provide adequate design on safety sealed roads to access the site on.
- Construct an appropriate intersection access on the Capricorn Highway which will encompass an appropriately designed channelized right turn facility which will provide storage for heavy vehicles.
- Prepare further detailed traffic count and impact calculations to be determined at time of commencement (i.e. construction) for the Capricorn Highway.
- Establish polices for transport operation, including:
    - Applications for hazardous material transport
    - Applications for access by over dimensional loads
    - Establish a road use management plan, covering heavy vehicle driver behaviour and general vehicle operation external to the site.

As noted previously TTM has also consulted with DTMR in relation to the potential use of the draft spreadsheet for actual Traffic Generation. This will be used potentially for use in future impact assessment of the development based on actual as opposed to estimated development and background traffic rates.