



Taroborah Coal Project

Appendix 11 – Transport Impact Assessment





Taroborah Coal Project

Transport Impact Assessment

Prepared for:
Shenhua International Group Pty Ltd

November 2014



Document History and Status

Issue	Rev.	Issued To	Qty	Date	Reviewed	Approved
1	0	Shenhua	1	6/11/13	AGP	ABP
2	1	Shenhua	1	5/12/13	AGP	ABP
3	2	Shenhua	1	6/12/13	AGP	ABP
4	3	Shenhua	1	10/12/13	AGP	ABP
5	4	Shenhua	1	20/11/14	AGP	ABP

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Name of Client :	Shenhua International Group Pty Ltd
Name of Project:	Taraborah Coal Project
Title of Document:	Transport Impact Assessment
Document Version:	Final

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APPENDICES

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LIST OF ABBREVIATIONS

AADT	-	annual average daily traffic
AARC	-	AustralAsian Resource Consultants Pty Ltd
ALA	-	Aeroplane Landing Area
ALCAM	-	Australian Level Crossing Assessment Model
ANFO	-	ammonium nitrate/fuel oil
AS	-	Australian Standard
BIBO	-	bus-in bus-out
CHPP	-	Coal Handling and Preparation Plant
CHRC	-	Central Highlands Regional Council
CY	-	calendar year
dBA	-	'A' weighted decibels
DIDO	-	drive-in drive-out
DTMR	-	Department of Transport Main Roads
dwt	-	deadweight tonnes
EIS	-	Environmental Impact Statement
EPC	-	Exploration Permit for Coal
ESA	-	equivalent standard axles
FIFO	-	fly-in fly-out
GARID	-	<i>Guidelines for Assessment of Road Impacts of Development 2006</i>
ha	-	hectares
HML	-	higher mass limits
HV	-	heavy vehicle
HVNL Act	-	<i>Heavy Vehicle National Law Act 2012</i>
kL	-	kilolitre(s)
km	-	kilometre(s)

km/hr	-	kilometres per hour
kg/m	-	kilograms per metre
Land Act	-	<i>Land Act 1994</i>
m	-	metre(s)
MDL	-	Mineral Development Licence
MIA	-	Mine Infrastructure Area
MSDS	-	Material Safety Data Sheet
Mt	-	million tonnes
Mtpa	-	million tonnes per annum
NHVR	-	National Heavy Vehicle Regulator
PBPL	-	Port of Brisbane Pty Ltd
QR	-	Queensland Rail
QRL	-	Queensland Rail Limited
RIA	-	Road Impact Assessment
ROM	-	run of mine
SCR	-	state controlled road
Shenhua	-	Shenhua International Group Pty Ltd
SRN	-	stock route network
TAL	-	tonne axle load
TI Act	-	<i>Transport Infrastructure Act 1994</i>
ToR	-	Terms of Reference
t	-	tonne(s)
TLO	-	train load-out
tpa	-	tonnes per annum
tph	-	tonnes per hour
TSP	-	total suspended particles
WICET	-	Wiggins Island Coal Export Terminal
WIRP	-	Wiggins Island Rail Project

1.0 INTRODUCTION

AustralAsian Resource Consultants (AARC) was commissioned by Shenhua International Group Pty Ltd (Shenhua) to undertake a Transport Impact Assessment for the proposed Taraborah Coal Project (the Project). This assessment was required under the Terms of Reference (ToR) for the Taraborah Coal Project Environmental Impact Statement (EIS).

1.1 PROJECT DESCRIPTION

The Project proposes to develop a thermal coal deposit which is located in the Bowen Basin, Queensland, Australia, approximately 22 kilometres (km) west of the town of Emerald (Figure 1). The coal resource in the open-cut and underground areas of this deposit has been estimated at 188.2 million tonnes (Mt). The Project is located entirely within the Central Highlands Regional Council (CHRC) local authority area.

The combined open-cut and underground mining operations are expected to produce up to 5.75 million tonnes per annum (Mtpa) of run of mine (ROM) coal and 5.73 Mtpa of product coal for export. The mine life is estimated at approximately 22 years, including a 9-month initial construction period and a 15-month decommissioning period.

The Project area comprises approximately 5,230 hectares (ha) and is contained wholly within Mineral Development Licence (MDL) 467.

The key features and major infrastructure associated with the Project include:

- The development of a mine for the extraction and export of thermal coal, utilising both underground and open-cut methods;
- ROM and product stockpiles;
- ROM hoppers and sizers;
- Conveyors to transport ROM and product coal on site;
- Coal Preparation Plant (CPP) and refuse bin;
- Train load-out facility and rail loop to transport export quality coal;
- Spoil dumps;
- Haul roads and site access corridors;
- Workshops for maintenance of equipment, heavy vehicles and machinery;
- Offices for mine site management and employees;
- Fuel stores and washdown bays;
- Site drainage features, including sediment dams
- Mine waste water and CPP recycle water dams;
- Potable water, mine water and sewage treatment plants; and



- Power and telecommunications infrastructure.

Figure 2 illustrates the proposed Mine Infrastructure Area (MIA) layout.

Due to variations in coal seam depth, a combination of open-cut and underground longwall mining operations has been planned. Coal processing will involve ROM crushing, screening and washing in order to separate product coal from waste materials. Rejects produced by the CPP will be managed via a co-disposal system whereby fine rejects will be partially dewatered and combined with coarse rejects prior to being hauled and disposed of in spoil dumps.

Access to the Project site will be via the Capricorn Highway, which laterally dissects MDL 467. A suitable turning and deceleration lane will be developed to connect the Capricorn Highway with the Project's site-access road.

The Queensland Rail (QR) Central West system also runs through the centre of the Project site, adjacent to the Capricorn Highway. A train load-out (TLO) facility and rail loop will be constructed on the Project site and connected to the Central West rail system in order to facilitate the transport of product coal.

Feasibility studies have indicated there is sufficient capacity available from the Emerald sub-station to supply the estimated 25 megawatt per annum power requirement for the Project. It is anticipated that the construction of an approximately 22km long, 66kV power line from the Emerald sub-station to the mine site and a 66kV/11kV substation in the MIA, would deliver the necessary electrical supply infrastructure for the Project.

Mining activities will be conducted 24 hours a day, seven days a week. A workforce of up to approximately 375 mining staff will be employed on the Project site over the life of the operations. It is assumed the workforce will consist of 25% locally based residents, 50% Mackay/Rockhampton/Gladstone based residents on a drive-in drive-out (DIDO) basis and 25% Brisbane based residents on a fly-in fly-out (FIFO) basis. All DIDO and FIFO employees will reside in Emerald during their rostered on periods, with the large majority of employees being transported to the mine site from Emerald by bus.

Product coal will be transported via the QR Central West rail system via Nogoa Junction, where it joins the Aurizon Blackwater rail system to the Port of Gladstone (at the Wiggins Island Coal Export Terminal (WICET)). A rail transport study has been conducted in order to determine the best rail transport option (in terms of train and wagon configurations) and has identified certain modifications that will be required to the rail system between Taraborah and Burngrove, in order to accommodate the additional rail traffic that arises due to the transport of product coal to port.

The following major infrastructure modifications are required for this Project:

- Capricorn Highway – construction of a highway deceleration lane in order to connect the mine site to the highway;
- QR Central West rail system – connection of the rail spur line and balloon loop to the Central West rail system, upgrade of the railway line west of Burngrove, upgrade of the Nogoa River bridge, level crossing protection; and
- Electrical power – construction of a 22km long, 66 kilovolt power supply line from Emerald to the mine infrastructure area.





Figure 1 Taraborah Regional Location

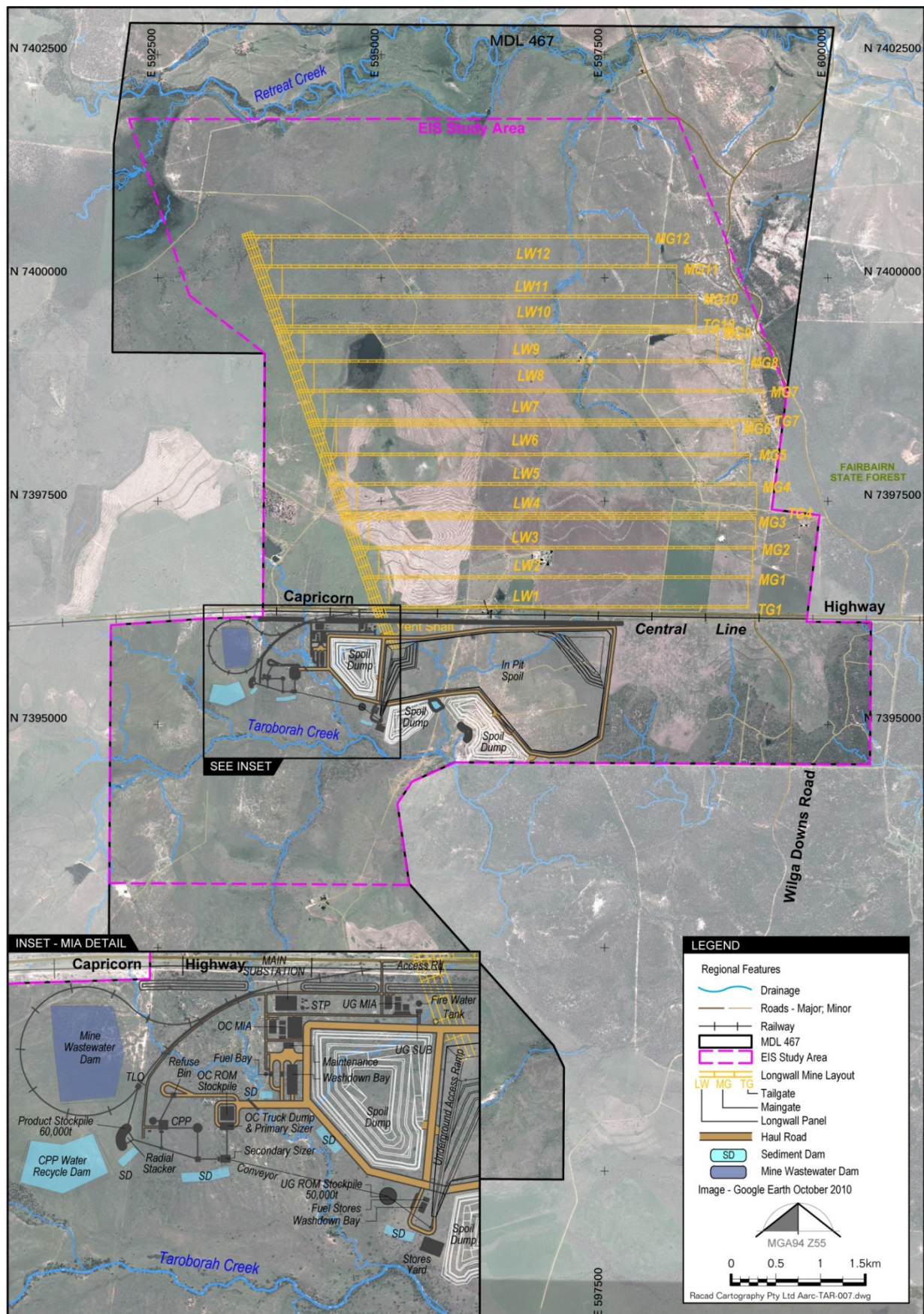


Figure 2 Proposed Project Layout



The study area for the Transport Impact Assessment considers the following (shown in Figure 3):

State Controlled Roads (SCR)

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

Local Road

- Anakie – Sapphire Road.

Rail Networks

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

Airport

- Emerald Airport

Port Facilities

- Wiggins Island Coal Export Terminal (WICET).

The numbering of the SCR network provided above is in accordance with the system of road identification used by the Queensland Department of Transport and Main Roads (DTMR). The network numbers shown in Figure 3 pertain to the National AustLink Road Network.

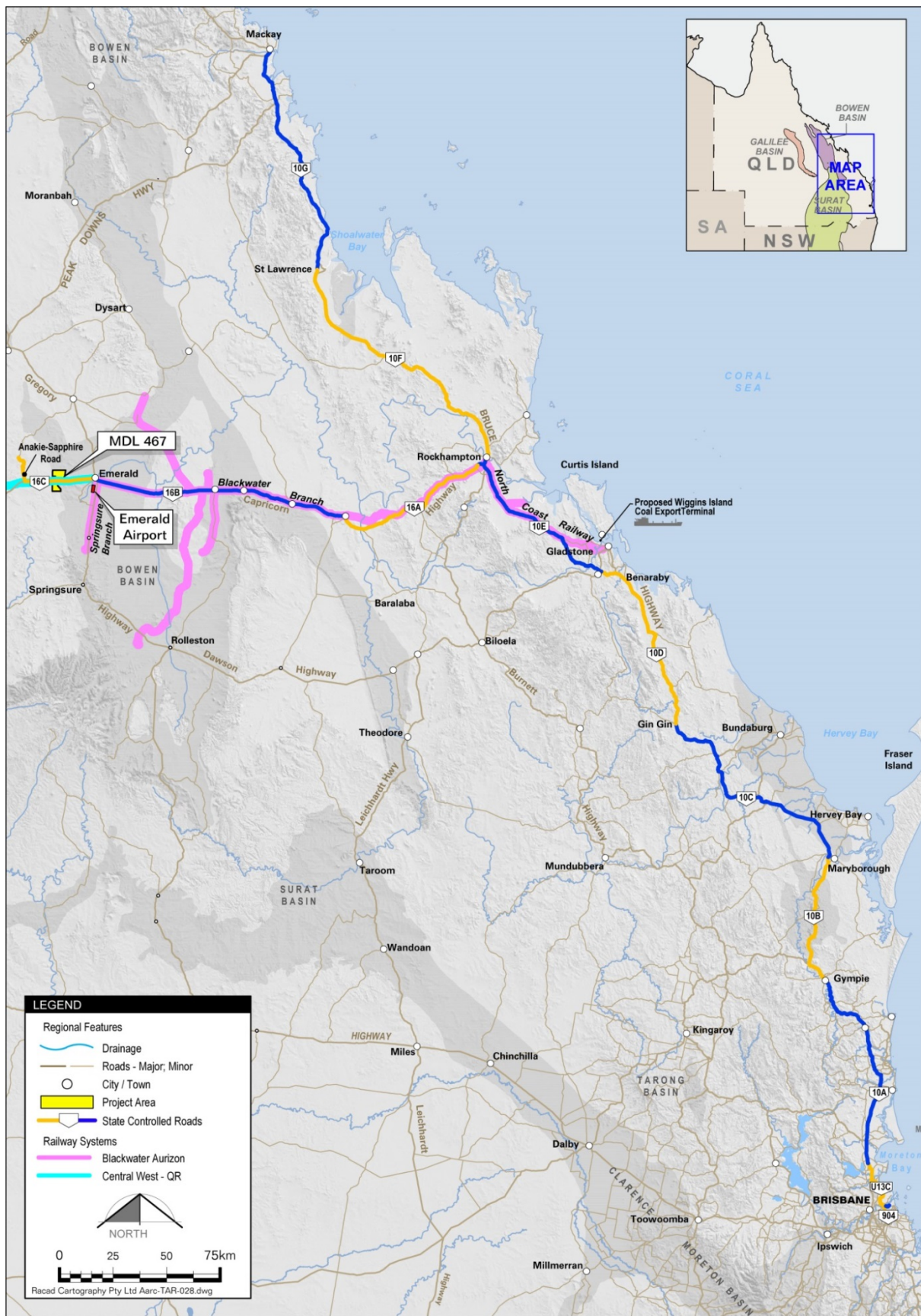


Figure 3 Proposed Transport Network

2.0 METHODOLOGY OF ASSESSMENT

2.1 RELEVANT LEGISLATION AND GUIDELINES

2.1.1 Transport Infrastructure Act 1994

The Queensland *Transport Infrastructure Act 1994* (TI Act) was established to allow for and encourage effective integrated planning and efficient transport infrastructure management. The TI Act provides for the planning and management of road, rail and air infrastructure (amongst others).

SCR are defined under Part 2 of the TI Act. DTMR manages the SCR network within Queensland. A number of SCRs, as described in Section 3.1.1 in this report, fall within the study area and may be subject to laws and regulations as stated within the TI Act.

2.1.2 Guidelines for Assessment of Road Impacts of Development

As required by the Taraborah Coal Project ToR, the *Guidelines for Assessment of Road Impacts of Development* (DMR 2006) (GARID) have been used as a point of reference in the development of this Transport Impact Study. The GARID provide information about the steps involved in assessing the impacts on road networks of proposed developments and identifying mitigating measures to reduce impacts the development may have. Unless specifically adopted by a regional government authority, the GARID only apply to the SCR network.

Under the GARID, “the process of compiling and analysing information on the road impacts of specific development proposals is termed Road Impact Assessment (RIA)” (DMR 2006, p1). A Road Impact Assessment (RIA), as defined by the Guideline, is only required where a development proposal is referred to DTMR as part of the development approvals process of governments and road impacts are likely to be significant. In general, the Guidelines state that DTMR considers the road impacts of a development to be significant if the development generates an increase in traffic on SCRs exceeding 5% of existing levels, either measured in terms of annual average daily traffic (AADT) or equivalent standard axles (ESA).

2.1.3 Mineral Resources Act 1989 (Qld)

Under the *Mineral Resources Act 1989*, a notifiable road use, for a mining tenement, is:

‘...the use of a road to haul loads at more than the following rate if the haulage relates to the transport of minerals mined in the area of the mining tenement’ -

- a) *For a State-controlled road – 50,000 tonnes (t) a year; and*
- b) *For another road – 10,000 t a year.*

The Project will not trigger this criterion, as the transport of coal will be via trains and will not be hauled on any state controlled or other type of road. The assessment of Notifiable Road Uses under the *Minerals Resources Act 1989* is complete for this report.

2.1.4 Land Act 1994 (QLD)

The *Land Act 1994* (Land Act) provides a framework for the allocation of State land as leasehold, freehold or other tenure and their subsequent management. Under Chapter 4, part 4 of the Land Act, Permits to Occupy are required for the occupation of a reserve, road or unallocated State land. In



reference to the Project, where electricity, water, or other infrastructure is to be developed on unallocated State land, reserves or roads, a Permit to Occupy will be required. Provisions for the temporary closure of SCRs are also dealt with under Chapter 3, Part 2, Division 2 of the Land Act.

2.1.5 State Planning Policy 1/02

State Planning Policy 1/02 identifies the State's interest regarding development in the vicinity of airports considered essential for the State's transport infrastructure or the national defence system. The policy states that these types of development should avoid:

- *Adversely affecting the safety and operational efficiency of those airports and aviation facilities;*
- *Large increases in the numbers of people adversely affected by significant aircraft noise; and*
- *Increasing the risk to public safety near the ends of airport runways.*

2.1.6 Local Laws

The CHRC formed upon the Queensland local government amalgamations in 2008 and consists of the former local government areas of Bauhinia, Duaringa, Emerald and Peak Downs Shires in 2008.

The CHRC does not currently have its own planning scheme but operates under the planning schemes of each of the former shire councils. The Project lies within the former Emerald Shire.

2.2 SCOPE

This study has been prepared in accordance with the Project ToR. The scope of works includes:

- Assessment of the types and grade of transport required by the Project;
- Assessment of current modes of transport and local routes available to the Project;
- Description of existing infrastructure and values, including:
 - proposed use of existing infrastructure and networks; and
 - any airports or ports that would be used by the Project;
- Identify potential Project impacts and mitigation measures, including:
 - the proposed construction, realignment or alteration of any access roads, haul roads, rail loops and load-out facilities;
 - expected volumes and weights of materials, products, fuels, hazardous goods or wastes;
 - potential destinations and sources of material to be transported;
 - quantity and types of materials to be transported for accommodation facilities;
 - types of vehicles, containerisation methods, rolling stock, vessels and craft to be used; and



- likely number and timing of trips on the basis of daily, weekly, monthly and annual trip numbers.

2.2.1 Specific Requirements

2.2.1.1 Road Impact Assessment

As required by the GARID, this Transport Impact Assessment includes a detailed assessment of the existing road network and models the potential for impacts based on the additional traffic that will be utilising the affected roads during the life of the Project. The extent and scope of the RIA, depends on the location, type, staging and size of a development. The aim of the RIA is to identify and address the implications of the proposed development on the existing SCR network. As required by the ToR for the Taroborah Coal Project, the assessment of road impacts will be conducted in accordance with the information provided in the GARID.

2.2.2 Summary of Datasets

Datasets provided by the DTMR have been used during the RIA process. AADT Segment Reports were provided by the Fitzroy Regional Office of DTMR. This information included AADT counts, yearly growth rates and percentage of heavy vehicle traffic on the various SCR segments potentially impacted by the Project.

In addition to the above, input was obtained from the various specialists involved with the planning and design of the Project. This information pertained specifically to the various elements of the mine infrastructure and equipment and the staging with which it would be transported to site.

2.2.3 Limitations

In the process of conducting this transport impact study, a number of conservative assumptions have been made based on the available information and previous projects of a similar nature. The construction workforce numbers, and subsequent associated transport movements, are considered an over-estimation of workers required. Material quantities supplied to the site during the construction period are totals required for the entire Project. These totals have been averaged over the full extent of the construction periods (18 months) in order to compare the developments traffic impacts with existing equivalent data.

Within the local Project area, transport routes used during the development and operations of the Project include roads under the jurisdiction of both the DTMR and CHRC. Average daily traffic counts are typically not available for the local road network under the jurisdiction of the CHRC and, as such, quantitative impact assessments are less comprehensive than for the SCR Network.

The assessment of transport impacts associated with the Project has been conducted under current advice with an estimated construction commencement date of Quarter 4 of 2017. This date is subject to change. Due to the timeframes associated with the approval and development of the Project, construction will commence no earlier than 2017. An extension of this date will see the projected traffic impacts delayed accordingly. Any delay is not expected to alter the magnitude of impacts determined during this assessment and this assessment represents the worst case scenario.



3.0 EXISTING AND FUTURE TRANSPORT ENVIRONMENT

3.1 ROAD

3.1.1 Existing Road Network

3.1.1.1 Port of Brisbane Road and Gateway Arterial Road

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

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

3.1.1.2 Bruce Highway

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

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

3.1.1.3 Capricorn Highway

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

The Capricorn Highway will be the arterial road connecting the Project site and Emerald. It laterally dissects the Project site (refer to Proposed Project Layout Figure 2). The Capricorn Highway will be utilised for both transport of materials and workers throughout the life of the Project. SCR segments potentially impacted by the Project include #16A – 16C.

3.1.1.4 Stock Route Networks

Approximately 72,000 km of Queensland's roads are declared as stock routes. Together with dedicated reserves for travelling stock, they make up the 2.6 million ha Queensland stock route network (SRN). The SRN is primarily used by the pastoral industry as an alternative to transporting stock by rail or road, and for pasture for emergency agistment or watering and long-term grazing. It is used by utility companies to provide powerlines, pipelines and telecommunications and by the community generally for road transport and recreational purposes. 'Stock routes' are corridors on



roads, reserves, pastoral leases and unallocated state lands along which stock are driven on foot. A stock route may be either a road that is declared to be a stock route under the *Land Protection (Pest and Stock Route) Regulation 2003*, or it may simply be any route that has customarily been used for walking stock. Stock routes have no separate title or tenure from the underlying road reserve, and the same roads are used for walking and agisting stock, and vehicular transport. Stock routes are owned by the State, with the CHRC caretaking for the route network in the Central Highlands region.

A network of stock routes traverses the Project site. A stock route runs east – west along the Capricorn Highway, one in the north of the Project site running east – west following a local track which directly links Sapphire to Emerald and a third tending north – south from Wills Road to Lake Maraboon. Figure 4 provides the locations of Queensland Stock Route Network within and adjacent to the Project site. These routes are not utilised currently or in the foreseeable future.



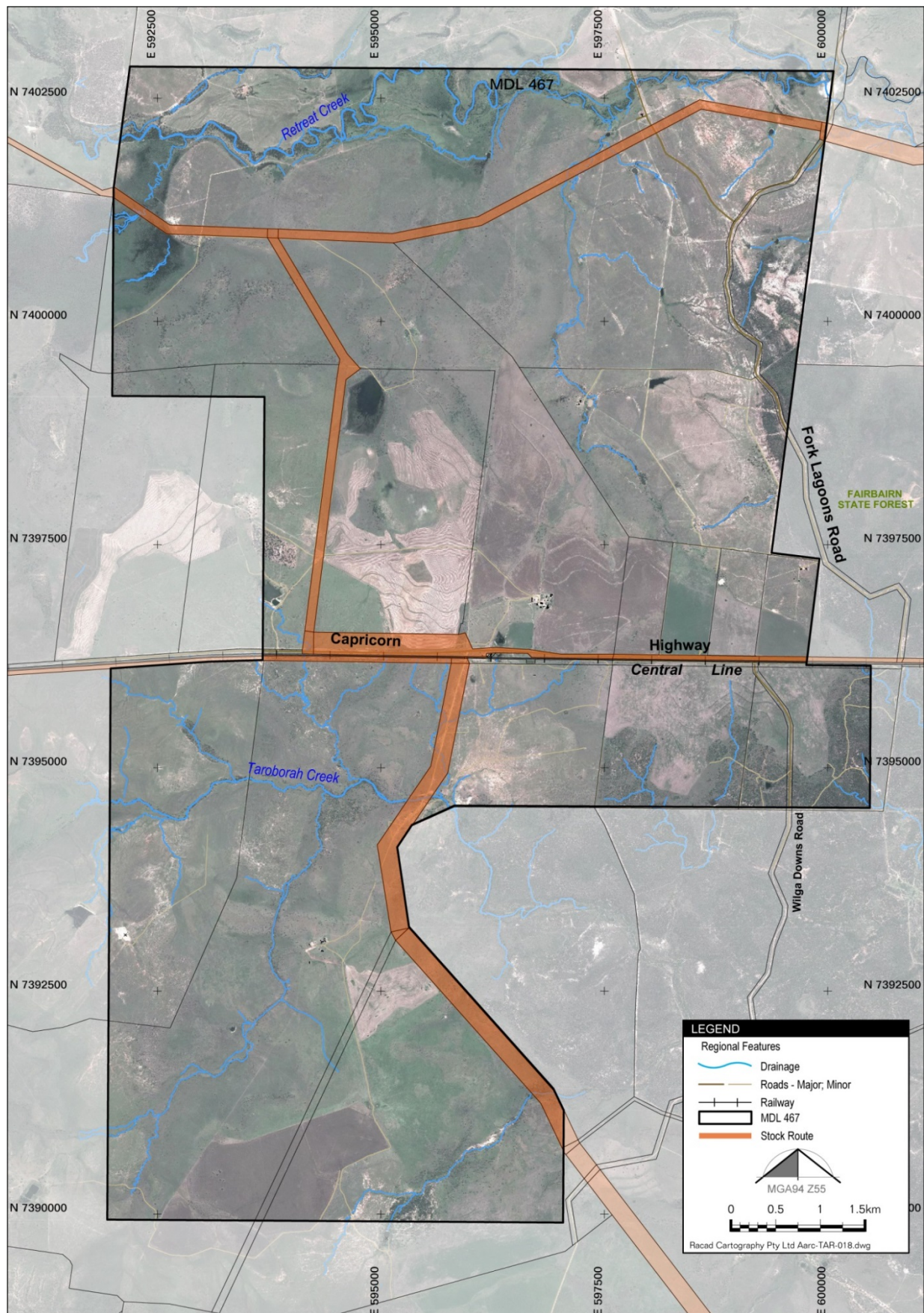


Figure 4 Queensland Stock Route Network



3.1.2 Baseline Traffic

Baseline traffic data for the potentially impacted SCR segments was supplied by DTMR and is contained in full in Appendix A. This data includes the AADT volumes and volume of heavy vehicles (HV) for each SCR road segment. As a small portion of the Brisbane Gateway Arterial Road is not classed as a SCR, there is no AADT data available for this segment. The second segment of the Brisbane Gateway Arterial Road (segment #U13C), as well as the Port of Brisbane Road (segment #904), has been assessed and report large volumes of daily traffic. Data for the two sections of the Port of Brisbane Road were 19,448 and 12,916 vehicle movements per day, while the Gateway Arterial Road segment was 62,149 vehicles per day. Additional impact analysis on these roads was not undertaken as the AADT percentage increase by the Project are considered negligible.

The Anakie – Sapphire Road will be used during the open-cut and underground construction phases. This is not a SCR, but rather managed by the CHRC. The potential impacts on this segment of road network are addressed in Section 5.1.3.

Figure 3 shows the road segments that are utilised by transport associated with the Project and analysed for traffic increases.

The baseline traffic data for road segments potentially impacted upon by the development of the Project are presented in Table 1. The AADT values are for the combined traffic flow in both directions.

It should be noted that ESAs are only relevant to the HV component of total traffic movements. Light vehicles contribute to the AADT count data only. The DTMR Fitzroy Region's *The Assessment of Road Impacts of Development Proposals Notes for Contribution Calculations* guideline was utilised for calculation of ESAs. A factor of 2.9 ESAs per HV was used for the Bruce Highway road segments, while 3.2 ESAs per HV was used for all other road segments, as per the DTMR Fitzroy Guidelines.

The AADT represents a common measure of traffic volume equivalent to the total volume of traffic passing a roadside observation point over the period of one year, divided by the number of days in the year. ESAs are a measure defining the cumulative damaging effect to the pavement of the design traffic. It is expressed in terms of the equivalent number of 80 kilonewton axles passing over the pavement up to the design horizon. The lower ESA values along the Bruce Highway are based on previous weight in motion sites data collected by DTMR.

Table 1 Background Traffic

SCR Section	Road/Segment	Data Year	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
904	Port of Brisbane Road					
	Bulimba Creek	2012	19458	7174	3.2	22957
	150 m north of Freight Trade Street	2010	12916	4721	3.2	15107
U13C	Gateway Arterial Road					
	At Bracken Ridge Rd (St John Fisher Cge)	2012	62149	-	-	-
16A	Capricorn Highway (Rockhampton to Duaringa)					
	Capricorn Hwy 1.5 km west Bruce Hwy	2012	16968	2058	3.2	6586
	Capricorn Hwy 3 km west Gracemere	2012	5428	1264	3.2	4045
	Capricorn Hwy WiM Site at Kabra	2012	4954	1338	3.2	4282
	Capricorn Hwy 1 km east of Westwood	2012	3968	1009	3.2	3229
	Capricorn Hwy at 41 Mile Ck	2012	3988	826	3.2	2643
	Capricorn Hwy 300 m east of Int 16A/462	2012	3784	779	3.2	2493
16B	Capricorn Highway (Duaringa - Emerald)					
	1.5 km East of Dingo	2012	3414	795	3.2	2544
	Capricorn Highway 10 km E of Blackwater	2012	3275	584	3.2	1869
	200 m West of Int 16B/469	2012	4910	727	3.2	2326
	1 km W of Blackwater Mine CHPP T/O	2012	2986	517	3.2	1654
	W of Comet River on Cap Hwy	2012	2595	523	3.2	1674
	400 m west of Foley Rd on 16B	2012	3426	704	3.2	2253
	Capricorn Hwy 200 m W of Codenwarra Rd	2012	12141	2021	3.2	6467
	Clermont St 70 m W of Borilla St	2012	15430	2178	3.2	6970
16C	Capricorn Highway (Emerald to Alpha)					
	200 m east of int. 16C/Selma Rd	2012	8725	1285	3.2	4112
	250 m west of int. 16C/Selma Rd	2012	3442	656	3.2	2099
	Capricorn Hwy 500 m west of Marshall Road	2012	1492	290	3.2	928
	500 m west inter 16C/5501 on 16C	2012	545	119	3.2	381

SCR Section	Road/Segment	Data Year	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
	Capricorn Highway 8 km east of Alpha	2012	433	111	3.2	355
10A	<i>Bruce Highway (Brisbane to Gympie)</i>					
	South of Dohles Rocks Road	2012	113071	-	-	-
	1 km north of Dohles Rocks Road	2012	113071	-	-	-
	South of Boundary Rd overpass	2012	99810	-	-	-
	500 m north of D.I.D. Bridge	2012	93466	-	-	-
	10A - 1 km south of Station Rd int	2012	95186	-	-	-
	South of Buchanan Road	2012	89961	-	-	-
	Abut a Caboolture River	2012	89040	-	-	-
	10A - North Rd 40A/126	2012	57191	-	-	-
	10A - 1 km north of Pumicestone Road PTC	2012	54731	5602	2.9	16246
	At crossover nrth of Moby Vics	2012	48777	5595	2.9	16226
	Mooloolah River overflow	2012	57371	6485	2.9	18807
	Just south Sunshine Motorway On/Off ramp	2012	58704	6381	2.9	18505
	At crossover opp old Deer Sanctuary	2012	38367	5588	2.9	16205
	Southern on/off ramps Maroochy Int	2012	73867	5800	2.9	16820
	10A - 500 m north of Diddillibah Road Bridge	2012	29330	5593	2.9	16220
	North of Rd 10A/130 int	2012	29341	4205	2.9	12195
	Wim Site Yandina Bypass	2012	28348	3326	2.9	9645
	At North Arm VMS	2012	26636	4053	2.9	11754
	At Eumundi help phone	2012	18573	3233	2.9	9376
	10A - Abut "B" North Maroochy River PTC	2012	20408	3209	2.9	9306
	At northern Cooroy off ramp	2012	16035	3157	2.9	9155
	At northern Cooroy off ramp	2012	17284	3275	2.9	9498
	600 m North Andrews Rd	2012	14101	1842	2.9	5342
	At Coles Creek - Bruce Hwy (Motorway)	2012	15050	3163	2.9	9173
	0.5 km south of Six Mile Creek, Gympie	2012	15618	2959	2.9	8581
	Abut A Deep Creek (10A)	2012	16494	2943	2.9	8535

SCR Section	Road/Segment	Data Year	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
	At overhead Gantry - sth Centro Way	2012	17087	2868	2.9	8317
	Between Centro Way and Excelsior Rd	2012	20041	-	2.9	-
	20 m south of Rd 10B/4806	2012	19634	-	2.9	-
10B	<i>Bruce Highway (Gympie to Maryborough)</i>					
	50 m North of Rd 4806	2012	21603	-	-	-
	Between Jane St & Pine St	2012	21329	-	-	-
	North of Pine St	2012	16282	2897	2.9	8401
	South of Fraser Rd	2012	13862	2529	2.9	7334
	Abut A Spring Valley Creek Bridge	2012	13027	2683	2.9	7781
	1.1 km north of Wide Bay Highway	2012	10756	2315	2.9	6714
	North of Aitkinsen Road	2012	9716	1883	2.9	5461
	South of Sheehans Road	2012	8870	1728	2.9	5011
	At Black Swamp Creek	2012	9655	1738	2.9	5040
	North side Tiara Township	2012	9363	1924	2.9	5580
	South side of Glenorchy Straight	2012	9647	1901	2.9	5513
	South of Three Mile Rd	2012	10824	1793	2.9	5200
	South of Mary River Bridge	2012	7923	1504	2.9	4362
10C	<i>Bruce Highway (Maryborough to Gin Gin)</i>					
	North/Showgrounds Rd (M'boro)	2012	9549	1907	2.9	5530
	Independent Fuel (M'boro)	2012	8298	1685	2.9	4887
	North of Lenthals Dam t/off	2012	7165	1629	2.9	4724
	North of Aerodome Rd int	2012	7260	1739	2.9	5043
	Snake Gully Sth/Childers	2012	6512	1498	2.9	4344
	Childers Rail Xing	2012	8680	1679	2.9	4869
	Adjacent Apple Tree Ck RA	2012	7147	1674	2.9	4855
	West side/Sandy Creek Bridge	2012	3446	983	2.9	2851
	At Booyal School	2012	3831	995	2.9	2886
	South of Phillipi Road	2012	4721	1080	2.9	3132
10D	<i>Bruce Highway (Gin Gin to Benaraby)</i>					
	South of Roadtek Depot Gin Gin	2012	5454	1287	2.9	3732
	North of Jensens Road	2012	3678	916	2.9	2656
	North of Kalpowar T/off	2012	3914	1115	2.9	3234
	Bruce Hwy at Colosseum Creek	2012	3841	1094	2.9	3173
	Bruce Hwy 100 m Nth Rodds Ck	2012	5930	1462	2.9	4240
	Bruce Hwy southern Abut Machine Ck	2012	8987	2308	2.9	6693

SCR Section	Road/Segment	Data Year	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
10E	<i>Bruce Highway (Benaraby to Rockhampton)</i>					
	Bruce Hwy 500 m S Dawson Hwy	2012	6040	1712	2.9	4965
	Bruce Calliope 25 m S Calliope River Bdg	2012	3721	1224	2.9	3550
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	2012	6565	2130	2.9	6177
	Bruce Hwy Mikros WiM Site (Bobs Ck)	2012	6207	1784	2.9	5174
	Bruce Hwy 100 m North Gavlal Ck	2012	5415	1575	2.9	4568
	Bruce Hwy 1 km North Scrubby Ck	2012	8844	1608	2.9	4663
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	2012	23595	1946	2.9	5643
	Bruce Hwy (Gladstone Rd) @ Derby St	2012	26146	3044	2.9	8828
10F	<i>Bruce Highway (Rockhampton to St Lawrence)</i>					
	Bruce Hwy @ Archer St (Lights)	2012	25145	1775	2.9	5148
	Bruce Hwy 100 m Sth Knight St	2012	34018	2754	2.9	7987
	Bruce Hwy at Boland St	2012	23881	2215	2.9	6424
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	2012	16447	1842	2.9	5342
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	2012	10776	-	-	-
	Bruce Hwy 150 m North Terra Nova Dr	2012	8236	1430	2.9	4147
	Bruce Hwy 200 m North 14 Mile Ck Rd	2012	4740	975	2.9	2828
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	2012	2804	745	2.9	2161
	Bruce Hwy South of Deep Creek	2012	2701	666	2.9	1931
	1 km south of Montrose Creek on Bruce Hwy	2012	2492	718	2.9	2082
	South of Waverly Creek	2012	2332	672	2.9	1949
10G	<i>Bruce Highway (St Lawrence to Mackay)</i>					
	North of Claireview	2012	2450	703	2.9	2039
	WiM Site Koumala	2012	3556	813	2.9	2358
	South of Armstrong's Beach Turnoff	2012	4296	905	2.9	2625
	Sichter Street - Broad Street	2012	10563	1156	2.9	3352

SCR Section	Road/Segment	Data Year	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
	Between Sarina and Sarina - Homebush TO	2012	8987	1052	2.9	3051
	Sarina - Homebush Road to Hay Point TO	2012	7950	1073	2.9	3112
	North of Macks Truck Stop	2012	12378	1401	2.9	4063
	Broadsound Road Permanent Counter	2012	15148	1909	2.9	5536
	City Gates to Lagoon Street	2012	25154	2192	2.9	6357
	Lagoon Street to Bridge Rd	2012	21915	1932	2.9	5603
	George Street Pedestrian Crossing	2012	29828	2125	2.9	6163

Note: Road segments have been reported and abbreviated as per the AADT data.

3.1.3 Future Traffic Environment – Without Development

The development of the Project is anticipated to commence with open-cut construction activities for a 12 month period, commencing in October 2017. Mining will commence in July 2018, overlapping construction by three months. The underground construction period will be for six months, from January to June 2022. Open-cut mining will occur from 2018 to 2024, while underground mining will be undertaken from 2022 – 2038.

The phases of the Project are best represented by the following notation:

- Open-cut Construction Period “Year 0” (12 month period) – commencing October 2017;
- Production Period “Year 1” (open-cut mining only) – commencing July 2018;
- Underground Construction Period “Year 5” (six month period) – commencing January 2022, with open-cut mining occurring simultaneously; and
- Production Period “Year 13” (underground mining - highest production rate) – commencing January 2030.

Table 2 provides a summary of Project phases.

Table 2 Taroborah Project Phases

Project Year	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
Calendar Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Open-cut Construction Period																						
Open-cut Production Period																						
Underground Construction Period																						
Underground Mining Production Period																						

Indicates the highest production year

Projected future traffic volumes were calculated using annual growth rates supplied by DTMR. Unless otherwise indicated, the annual growth rate was based on 10 years of historical data. These growth rates were applied as compounding annually for each segment of road. As the data year varies for each road segment (see Table 1), the growth rates were applied from the year the data was collected.

The baseline traffic data for road segments potentially impacted upon by the development of the Taraborah Project will be assessed from this point onwards. Although road segments #904 (Port of Brisbane Road), #U13C (Gateway Arterial Road), #10A (Bruce Highway Brisbane – Gympie) and #10B (Bruce Highway – Gympie to Maryborough) will be utilised throughout the life of the Project, AADT data shows daily movements are high and the Project will not be near the 5% increase in traffic threshold. AADT data along the abovementioned road segments ranges from approximately 8,000 to 113,000 vehicle movements per day.

Ten year average annual growth rates along each AADT segment are summarised below. In the instance where ten year averages were not available, the one or five year averages are presented.

- **#16A Capricorn Highway (Rockhampton – Duarina)**
 - Capricorn Hwy 1.5km west Bruce Hwy – 4.68%
 - Capricorn Hwy 3km west Gracemere – 4.39%
 - Capricorn Hwy WiM Site at Kabra – 3% (5.04%)*
 - Capricorn Hwy 1km east of Westwood – 3% (6.06%)*
 - Capricorn Hwy at 41 Mile Ck – 3% (9.61%)*
 - Capricorn Hwy 300m E of Int 16A/462 – 3% (8.95%)*
- **#16B Capricorn Highway (Duarina - Emerald)**
 - 1.5km East of Dingo – 3% (7.87%)*
 - Capricorn Highway 10km E of Blackwater – 3% (6.9%)*
 - 200m West of Int 16B/469 – 3% (13.2%)*
 - 1km W of Blackwater Mine CHPP T/O – 3% (8.73%)*
 - W of Comet River on Cap Hwy – 4.66%
 - 400m west of Foley Rd on 16B – 3% (5.07%)*
 - Cap Hwy 200m W of Codenwarra Rd – 3% (25.5%)*
 - Clermont St 70m W of Borilla St – 3% (29.81%)*

- **#16C Capricorn Highway (Emerald - Alpha)**
 - 200 m east of int. 16C/Selma Rd – 3% (32.77%)*
 - 250 m west of int. 16C/Selma Rd – 3% (17.17%)*
 - Capricorn Hwy 500 m west of Marshall Road – 4.59%
 - 500 m west inter 16C/5501 on 16C – 3% (0.98%)*
 - Capricorn Highway 8 km east of Alpha – 3% (1.98%)*
- **#10C Bruce Highway (Maryborough to Gin Gin)**
 - North/Showgrounds Rd (M'boro) – 3% (1.89%)*
 - Independent Fuel (M'boro) – 3% (2.98%)*
 - North of Lenthals Dam t/off – 3% (2.61%)*
 - North of Aerodome Rd int – 3% (2.12%)*
 - Snake Gully Sth/Childers – 3% (1.60%)*
 - Childers Rail Xing – 3% (2.91%)*
 - Adjacent Apple Tree Ck RA – 3% (2.46%)*
 - West side/Sandy Creek Bridge – 3% (2.30%)*
 - At Booyal School – 3.69%
 - South of Phillippi Road – 3.62%
- **#10D Bruce Highway (Gin Gin to Benaraby)**
 - South of Roadtek Depot Gin Gin – 3.1%
 - North of Jensens Road – 3% (1.04%)*
 - North of Kalpowar T/off – 4.55%
 - Bruce Hwy at Colosseum Creek – 4.06%
 - Bruce Hwy 100 m Nth Rodds Ck – 4.23%
 - Bruce Hwy southern Abut Machine Ck – 3% (10.29%)*
- **#10E Bruce Highway (Benaraby to Rockhampton)**
 - Bruce Hwy 500 m S Dawson Hwy – 3% (5.81%)*
 - Bruce Calliope 25 m S Calliope River Bdg – 3% (2.62%)*

- Bruce Hwy 1 km south Hut Ck (North Ambrose) – 3% (5.26%)*
- Bruce Hwy Mikros WiM Site (Bobs Ck) – 3.76%
- Bruce Hwy 100 m North Gavlal Ck – 3% (1.64%)*
- Bruce Hwy 1 km North Scrubby Ck – 3.36%
- Bruce Hwy 100 m N Oswald St (Lower Dawson R) – 3.03% (based on 5 years' data)
- Bruce Hwy (Gladstone Rd) @ Derby St – 3% (2.44%)*
- **#10F Bruce Highway (Rockhampton to St Lawrence)**
 - Bruce Hwy @ Archer St (Lights) – 3% (8.29%)* (based on 1 years' data)
 - Bruce Hwy 100 m Sth Knight St – 3% (1.26%)*
 - Bruce Hwy at Boland St – 3% (0.33%)*
 - Bruce Hwy 800 m Sth Rton - Yeppoon Rd – 3% (1.76%)*
 - Bruce Hwy 200 m Sth Mason Ave (Parkhurst) – 3% (1.96%)*
 - Bruce Hwy 150 m North Terra Nova Dr – 3.42%
 - Bruce Hwy 200 m North 14 Mile Ck Rd – 3.69%
 - Bruce Hwy 40 m Sth Mountain Ck (Kunwarara) – 3.14%
 - Bruce Hwy South of Deep Creek – 4.04%
 - 1 km south of Montrose Creek on Bruce Hwy – 3% (2.85%)*
 - South of Waverly Creek – 3% (2.05 %)*
- **#10G Bruce Highway (St Lawrence to Mackay)**
 - North of Claireview – 3% (2.42%)*
 - WiM Site Koumala – 3% (2.48%)*
 - South of Armstrong's Beach Turnoff – 3% (2.41%)*
 - Sichter Street - Broad Street – 3% (0.18%)*
 - Between Sarina and Sarina - Homebush TO – 3.50%
 - Sarina - Homebush Road to Hay Point TO – 3.61%
 - North of Macks Truck Stop – 4.40%
 - Broadsound Road Permanent Counter – 3% (1.83%)*

- City Gates to Lagoon Street – 3% (8.56%)*
- Lagoon Street to Bridge Rd – 3% (6.70%)*
- George Street Pedestrian Crossing – 3% (0.01%)*

* As per the DTMR's *Assessment of Road Impacts of Development Proposals Notes for Contribution Calculations Main Roads Fitzroy Region (Rockhampton & Emerald Districts)* Guidelines, any values fewer than 3% and over 5% were predicted as 3%.

To provide a basis for the assessment of impacts attributed to the open-cut mine construction traffic generated as a result of the Project, predicted traffic volumes for year 0 (calendar year (CY) 2017) without the development are summarised in Table 3. This data is used as a baseline for comparison during the construction impact analysis in Section 5.0.

Table 3 Predicted Traffic Without the Project – Year 0

Year 0, CY 2017					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	21328	2587	3.2	8278
	Capricorn Hwy 3 km west Gracemere	6729	1567	3.2	5014
	Capricorn Hwy WiM Site at Kabra	6335	1711	3.2	4964
	Capricorn Hwy 1 km east of Westwood	5325	1354	3.2	3743
	Capricorn Hwy at 41 Mile Ck	6310	1307	3.2	3064
	Capricorn Hwy 300 m E of Int 16A/462	5809	1196	3.2	2890
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	4986	1161	3.2	2949
	Capricorn Highway 10 km E of Blackwater	4572	815	3.2	2166
	200 m West of Int 16B/469	9127	1351	3.2	2697
	1 km W of Blackwater Mine CHPP T/O	4538	786	3.2	1918
	W of Comet River on Cap Hwy	3259	657	3.2	2102
	400 m west of Foley Rd on 16B	4387	902	3.2	2612
	Capricorn Hwy 200 m W of Codenwarra Rd	37874	6304	3.2	7497
	Clermont St 70 m W of Borilla St	56873	8028	3.2	8080
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	35997	5302	3.2	4767
	250 m west of int. 16C/Selma Rd	7601	1449	3.2	2434
	Capricorn Hwy 500 m west of Marshall Road	1867	363	3.2	1161
	500 m west inter 16C/5501 on 16C	632	138	3.2	441
	Capricorn Highway 8 km east of Alpha	502	129	3.2	412



Year 0, CY 2017					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	11070	2211	2.9	6411
	Independent Fuel (M'boro)	9620	1953	2.9	5665
	North of Lenthals Dam t/off	8306	1888	2.9	5477
	North of Aerodome Rd int	8416	2016	2.9	5846
	Snake Gully Sth/Childers	7549	1737	2.9	5036
	Childers Rail Xing	10062	1946	2.9	5645
	Adjacent Apple Tree Ck RA	8285	1941	2.9	5628
	West side/Sandy Creek Bridge	3995	1140	2.9	3305
	At Booyal School	4592	1193	2.9	3459
	South of Phillipi Road	5640	1290	2.9	3741
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	6353	1499	2.9	4348
	North of Jensens Road	4264	1062	2.9	3079
	North of Kalpowar T/off	4889	1393	2.9	4039
	Bruce Hwy at Colosseum Creek	4687	1335	2.9	3871
	Bruce Hwy 100 m Nth Rodds Ck	7295	1799	2.9	5216
	Bruce Hwy southern Abut Machine Ck	14665	3766	2.9	7759
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	8011	2271	2.9	5756
	Bruce Calliope 25 m S Calliope River Bdg	4314	1419	2.9	4115
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	8483	2752	2.9	7161
	Bruce Hwy Mikros WiM Site (Bobs Ck)	7465	2146	2.9	6222
	Bruce Hwy 100 m North Gavlal Ck	6277	1826	2.9	5295
	Bruce Hwy 1 km North Scrubby Ck	10433	1897	2.9	5501
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	27393	2259	2.9	6552
	Bruce Hwy (Gladstone Rd) @ Derby St	30310	3529	2.9	10234
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	37445	2643	2.9	5967
	Bruce Hwy 100 m Sth Knight St	39436	3193	2.9	9259
	Bruce Hwy at Boland St	27685	2568	2.9	7447
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	19067	2135	2.9	6193
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	12492	-	-	-
	Bruce Hwy 150 m North Terra Nova Dr	9744	1692	2.9	4906
	Bruce Hwy 200 m North 14 Mile Ck Rd	5681	1169	2.9	3389
	Bruce Hwy 40 m Sth Mountain Ck	3273	870	2.9	2522

Year 0, CY 2017					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
	(Kunwarara)				
	Bruce Hwy South of Deep Creek	3293	812	2.9	2354
	1 km south of Montrose Creek on Bruce Hwy	2889	832	2.9	2414
	South of Waverly Creek	2703	779	2.9	2259
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	2840	815	2.9	2363
	WiM Site Koumala	4122	942	2.9	2733
	South of Armstrong's Beach Turnoff	4980	1049	2.9	3043
	Sichter Street - Broad Street	12245	1340	2.9	3886
	Between Sarina and Sarina - Homebush TO	10674	1249	2.9	3623
	Sarina - Homebush Road to Hay Point TO	9492	1281	2.9	3715
	North of Macks Truck Stop	15352	1738	2.9	5039
	Broadsound Road Permanent Counter	17561	2213	2.9	6418
	City Gates to Lagoon Street	37928	3305	2.9	7369
	Lagoon Street to Bridge Rd	30308	2672	2.9	6495
	George Street Pedestrian Crossing	34579	2463	2.9	7144

Traffic volumes for year 1 (CY 2018) and year 5 (CY 2022) are employed as representative years for this traffic assessment during the earlier years of the Project. Year 1 represents the initial open-cut production period. Year 5 represents open-cut mining and underground construction simultaneously occurring. Table 4 and Table 5 present the predicted traffic volume without the Project for CYs 2018 and 2022.

Table 4 Predicted Traffic Without the Project – Year 1

Year 1, CY 2018					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	22326	2708	3.2	8665
	Capricorn Hwy 3 km west Gracemere	7024	1636	3.2	5234
	Capricorn Hwy WiM Site at Kabra	5915	1598	3.2	5112
	Capricorn Hwy 1 km east of Westwood	4738	1205	3.2	3855
	Capricorn Hwy at 41 Mile Ck	4762	986	3.2	3156
	Capricorn Hwy 300 m E of Int 16A/462	4518	930	3.2	2977
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	4076	949	3.2	3038
	Capricorn Highway 10 km E of Blackwater	3911	697	3.2	2231
	200 m West of Int 16B/469	5863	868	3.2	2778
	1 km W of Blackwater Mine CHPP T/O	3565	617	3.2	1975
	W of Comet River on Cap Hwy	3411	687	3.2	2200
	400 m west of Foley Rd on 16B	4091	841	3.2	2690
	Capricorn Hwy 200 m W of Codenwarra Rd	14497	2413	3.2	7722
	Clermont St 70 m W of Borilla St	18424	2601	3.2	8322
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	10418	1534	3.2	4910
	250 m west of int. 16C/Selma Rd	4110	783	3.2	2507
	Capricorn Hwy 500 m west of Marshall Road	1953	380	3.2	1215
	500 m west inter 16C/5501 on 16C	651	142	3.2	455
	Capricorn Highway 8 km east of Alpha	517	133	3.2	424
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	11402	2277	2.9	6603
	Independent Fuel (M'boro)	9908	2012	2.9	5835
	North of Lenthals Dam t/off	8555	1945	2.9	5641
	North of Aerodome Rd int	8669	2076	2.9	6022
	Snake Gully Sth/Childers	7776	1789	2.9	5187
	Childers Rail Xing	10364	2005	2.9	5814
	Adjacent Apple Tree Ck RA	8534	1999	2.9	5797
	West side/Sandy Creek Bridge	4115	1174	2.9	3404
	At Booyal School	4761	1237	2.9	3586
	South of Phillipi Road	5844	1337	2.9	3877
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	6550	1546	2.9	4483
	North of Jensens Road	4392	1094	2.9	3172
	North of Kalpowar T/off	5112	1456	2.9	4223
	Bruce Hwy at Colosseum Creek	4877	1389	2.9	4028
	Bruce Hwy 100 m Nth Rodds Ck	7603	1875	2.9	5436

Year 1, CY 2018					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
	Bruce Hwy southern Abut Machine Ck	10731	2756	2.9	7992
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	7212	2044	2.9	5928
	Bruce Calliope 25 m S Calliope River Bdg	4443	1462	2.9	4238
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	7839	2543	2.9	7376
	Bruce Hwy Mikros WiM Site (Bobs Ck)	7746	2226	2.9	6456
	Bruce Hwy 100 m North Gavial Ck	6466	1881	2.9	5454
	Bruce Hwy 1 km North Scrubby Ck	10784	1961	2.9	5686
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	28223	2328	2.9	6750
	Bruce Hwy (Gladstone Rd) @ Derby St	31220	3635	2.9	10541
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	30024	2119	2.9	6146
	Bruce Hwy 100 m Sth Knight St	40619	3288	2.9	9536
	Bruce Hwy at Boland St	28515	2645	2.9	7670
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	19639	2199	2.9	6378
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	12867	-	-	-
	Bruce Hwy 150 m North Terra Nova Dr	10077	1750	2.9	5074
	Bruce Hwy 200 m North 14 Mile Ck Rd	5891	1212	2.9	3514
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	3376	897	2.9	2601
	Bruce Hwy South of Deep Creek	3426	845	2.9	2449
	1 km south of Montrose Creek on Bruce Hwy	2976	857	2.9	2486
	South of Waverly Creek	2785	802	2.9	2327
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	2925	839	2.9	2434
	WiM Site Koumala	4246	971	2.9	2815
	South of Armstrong's Beach Turnoff	5130	1081	2.9	3134
	Sichter Street - Broad Street	12613	1380	2.9	4003
	Between Sarina and Sarina - Homebush TO	11047	1293	2.9	3750
	Sarina - Homebush Road to Hay Point TO	9835	1327	2.9	3850
	North of Macks Truck Stop	16027	1814	2.9	5261
	Broadsound Road Permanent Counter	18088	2279	2.9	6610
	City Gates to Lagoon Street	30035	2617	2.9	7590
	Lagoon Street to Bridge Rd	26168	2307	2.9	6690
	George Street Pedestrian Crossing	35616	2537	2.9	7358

Table 5 Predicted Traffic Without the Project – Year 5

Year 5, CY 2022					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	26808	3251	3.2	10405
	Capricorn Hwy 3 km west Gracemere	8341	1942	3.2	6216
	Capricorn Hwy WiM Site at Kabra	6658	1798	3.2	5754
	Capricorn Hwy 1 km east of Westwood	5333	1356	3.2	4339
	Capricorn Hwy at 41 Mile Ck	5360	1110	3.2	3552
	Capricorn Hwy 300 m E of Int 16A/462	5085	1047	3.2	3350
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	4588	1068	3.2	3419
	Capricorn Highway 10 km E of Blackwater	4401	785	3.2	2512
	200 m West of Int 16B/469	6599	977	3.2	3126
	1 km W of Blackwater Mine CHPP T/O	4013	695	3.2	2223
	W of Comet River on Cap Hwy	4092	825	3.2	2639
	400 m west of Foley Rd on 16B	4604	946	3.2	3028
	Capricorn Hwy 200 m W of Codenwarra Rd	16316	2716	3.2	8691
	Clermont St 70 m W of Borilla St	20737	2927	3.2	9367
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	11726	1727	3.2	5526
	250 m west of int. 16C/Selma Rd	4626	882	3.2	2821
	Capricorn Hwy 500 m west of Marshall Road	2337	454	3.2	1454
	500 m west inter 16C/5501 on 16C	732	160	3.2	512
	Capricorn Highway 8 km east of Alpha	582	149	3.2	477
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	12833	2563	2.9	7432
	Independent Fuel (M'boro)	11152	2264	2.9	6567
	North of Lenthals Dam t/off	9629	2189	2.9	6349
	North of Aerodome Rd int	9757	2337	2.9	6778
	Snake Gully Sth/Childers	8752	2013	2.9	5838
	Childers Rail Xing	11665	2256	2.9	6544
	Adjacent Apple Tree Ck RA	9605	2250	2.9	6524
	West side/Sandy Creek Bridge	4631	1321	2.9	3831
	At Booyal School	5504	1430	2.9	4146
	South of Phillipi Road	6737	1541	2.9	4469
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	7401	1746	2.9	5065
	North of Jensens Road	4943	1231	2.9	3570
	North of Kalpowar T/off	6107	1740	2.9	5046
	Bruce Hwy at Colosseum Creek	5719	1629	2.9	4723
	Bruce Hwy 100 m Nth Rodds Ck	8974	2212	2.9	6416

Year 5, CY 2022					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
	Bruce Hwy southern Abut Machine Ck	12078	3102	2.9	8995
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	8117	2301	2.9	6672
	Bruce Calliope 25 m S Calliope River Bdg	5001	1645	2.9	4770
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	8823	2863	2.9	8301
	Bruce Hwy Mikros WiM Site (Bobs Ck)	8978	2580	2.9	7483
	Bruce Hwy 100 m North Gavial Ck	7277	2117	2.9	6138
	Bruce Hwy 1 km North Scrubby Ck	12308	2238	2.9	6489
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	31802	2623	2.9	7606
	Bruce Hwy (Gladstone Rd) @ Derby St	35138	4091	2.9	11864
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	33793	2385	2.9	6918
	Bruce Hwy 100 m Sth Knight St	45717	3701	2.9	10733
	Bruce Hwy at Boland St	32094	2977	2.9	8633
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	22103	2475	2.9	7179
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	14482	-	-	-
	Bruce Hwy 150 m North Terra Nova Dr	11528	2002	2.9	5805
	Bruce Hwy 200 m North 14 Mile Ck Rd	6810	1401	2.9	4062
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	3820	1015	2.9	2943
	Bruce Hwy South of Deep Creek	4014	990	2.9	2870
	1 km south of Montrose Creek on Bruce Hwy	3349	965	2.9	2798
	South of Waverly Creek	3134	903	2.9	2619
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	3293	945	2.9	2740
	WiM Site Koumala	4779	1093	2.9	3169
	South of Armstrong's Beach Turnoff	5773	1216	2.9	3527
	Sichter Street - Broad Street	14196	1554	2.9	4505
	Between Sarina and Sarina - Homebush TO	12677	1484	2.9	4303
	Sarina - Homebush Road to Hay Point TO	11334	1530	2.9	4436
	North of Macks Truck Stop	19039	2155	2.9	6249
	Broadsound Road Permanent Counter	20358	2566	2.9	7440
	City Gates to Lagoon Street	33805	2946	2.9	8543
	Lagoon Street to Bridge Rd	29452	2596	2.9	7530
	George Street Pedestrian Crossing	40086	2856	2.9	8282

As per the Guidelines, there is also a requirement to consider traffic impacts to a ten year horizon after the “opening of the final stage of the development”. By year 8 underground mining operations are at full production and continue at a fairly consistent level for the next 10 years. In the mid-point year 13 (2030), maximum annual production is reached and operational deliveries will be representative of a majority of the full production period. The projected future traffic volumes for 2030, without the development of the Project, are presented in Table 6. This data is used as the basis for the assessment of production period traffic impacts in Section 5.0.

Table 6 Predicted Traffic Without the Project – Year 13

Year 13, CY 2030					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	38652	4688	3.2	15002
	Capricorn Hwy 3 km west Gracemere	11763	2739	3.2	8765
	Capricorn Hwy WiM Site at Kabra	8434	2278	3.2	7289
	Capricorn Hwy 1 km east of Westwood	6755	1718	3.2	5497
	Capricorn Hwy at 41 Mile Ck	6789	1406	3.2	4500
	Capricorn Hwy 300 m E of Int 16A/462	6442	1326	3.2	4244
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	5812	1353	3.2	4331
	Capricorn Highway 10 km E of Blackwater	5575	994	3.2	3182
	200 m West of Int 16B/469	8359	1238	3.2	3961
	1 km W of Blackwater Mine CHPP T/O	5083	880	3.2	2817
	W of Comet River on Cap Hwy	5891	1187	3.2	3799
	400 m west of Foley Rd on 16B	5833	1199	3.2	3835
	Capricorn Hwy 200 m W of Codenwarra Rd	20669	3441	3.2	11010
	Clermont St 70 m W of Borilla St	26269	3708	3.2	11865
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	14854	2188	3.2	7000
	250 m west of int. 16C/Selma Rd	5860	1117	3.2	3574
	Capricorn Hwy 500 m west of Marshall Road	3347	650	3.2	2081
	500 m west inter 16C/5501 on 16C	928	203	3.2	648
	Capricorn Highway 8 km east of Alpha	737	189	3.2	605
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	16257	3247	2.9	9415
	Independent Fuel (M'boro)	14127	2869	2.9	8319
	North of Lenthals Dam t/off	12198	2773	2.9	8042
	North of Aerodome Rd int	12360	2961	2.9	8586
	Snake Gully Sth/Childers	11086	2550	2.9	7396
	Childers Rail Xing	14777	2858	2.9	8289
	Adjacent Apple Tree Ck RA	12167	2850	2.9	8265
	West side/Sandy Creek Bridge	5867	1673	2.9	4853
	At Booyal School	7355	1910	2.9	5540



Year 13, CY 2030					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
	South of Phillipi Road	8954	2048	2.9	5940
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	9449	2230	2.9	6466
	North of Jensens Road	6262	1559	2.9	4522
	North of Kalpowar T/off	8719	2484	2.9	7203
	Bruce Hwy at Colosseum Creek	7862	2239	2.9	6494
	Bruce Hwy 100 m Nth Rodds Ck	12500	3082	2.9	8937
	Bruce Hwy southern Abut Machine Ck	15300	3929	2.9	11395
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	10283	2915	2.9	8452
	Bruce Calliope 25 m S Calliope River Bdg	6335	2084	2.9	6043
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	11176	3626	2.9	10516
	Bruce Hwy Mikros WiM Site (Bobs Ck)	12062	3467	2.9	10054
	Bruce Hwy 100 m North Gavial Ck	9219	2681	2.9	7776
	Bruce Hwy 1 km North Scrubby Ck	16032	2915	2.9	8453
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	40380	3330	2.9	9658
	Bruce Hwy (Gladstone Rd) @ Derby St	44512	5182	2.9	15028
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	42808	3022	2.9	8763
	Bruce Hwy 100 m Sth Knight St	57913	4689	2.9	13597
	Bruce Hwy at Boland St	40656	3771	2.9	10936
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	28000	3136	2.9	9094
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	18345	-	-	-
	Bruce Hwy 150 m North Terra Nova Dr	15087	2619	2.9	7597
	Bruce Hwy 200 m North 14 Mile Ck Rd	9100	1872	2.9	5428
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	4892	1300	2.9	3769
	Bruce Hwy South of Deep Creek	5510	1359	2.9	3940
	1 km south of Montrose Creek on Bruce Hwy	4242	1222	2.9	3545
	South of Waverly Creek	3970	1144	2.9	3318
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	4171	1197	2.9	3471
	WiM Site Koumala	6054	1384	2.9	4014
	South of Armstrong's Beach Turnoff	7314	1541	2.9	4468
	Sichter Street - Broad Street	17983	1968	2.9	5707
	Between Sarina and Sarina - Homebush TO	16693	1954	2.9	5667
	Sarina - Homebush Road to Hay Point	15052	2032	2.9	5892

Year 13, CY 2030					
SCR Section #	Road/Segment	Total AADT	HV AADT	HV ESA Factor	Daily HV ESA
	TO				
	North of Macks Truck Stop	26869	3041	2.9	8820
	Broadsound Road Permanent Counter	25788	3250	2.9	9425
	City Gates to Lagoon Street	42823	3732	2.9	10822
	Lagoon Street to Bridge Rd	37309	3289	2.9	9538
	George Street Pedestrian Crossing	50780	3618	2.9	10491

3.2 RAIL

3.2.1 Existing Rail Network

3.2.1.1 Blackwater System

The Blackwater System services the Bowen Basin Coal region and forms part of the privatised Queensland Rail National (now Aurizon). It is the largest of the four coal systems overseen by Aurizon, carrying the second highest tonnage, after the Goonyella system. The Blackwater system covers 985 km of bi-directional track and provides links to the two export terminals at the Port of Gladstone (RG Tanna and Barney Point) and a number of domestic terminals. The Blackwater system runs from Gladstone to Nogoa Junction, with spurs servicing mining operations to the north and south of the main trunk line. The section from Gladstone to Burngrove (approximately 13km west of Blackwater) allows up to 8,300 t payload of 100X106 t wagons (26.6 t axle load) at a maximum speed of 80 km/hr. The section from Burngrove to Nogoa Junction currently has a 20 t axle load.

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

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

3.2.1.2 Central West System

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

The track between Emerald and Longreach consists of a single track with 18 passing loops. The passing loops on this section include Taraborah, Anakie, Withersfield, Willows, Bogantungan, Drummond, Pine Hill, Mamboo, Alpha, Beta, Jericho, Alice, Lochnagar, Barcaldine, Saltern, Deroora, Ilfracombe and Longreach. Track structure is a mix of 20, 30, 41 and 53 kilograms per metre (kg/m) rail on timber, steel and concrete sleepers with some steel interspersed at a rate of one in four on various sections. Total allowable gross per annum as recorded in the 2008 Information Pack, was 1



Mtpa. The maximum speed is 80 km/hr and the maximum allowable axle load is 15.75 tonne axle load (TAL).

3.2.2 Future Rail Network

3.2.2.1 Wiggins Island Rail Project

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

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

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

3.2.2.2 Nogoa Junction to Burngrove Rail Upgrade

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

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

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



3.2.2.3 Taraborah to Nogo Junction Rail Upgrade

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

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

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

QRL will seek to recover the full upgrade costs and take a conservative, minimum-risk position given they are a government owned corporation entity. High charges will be justified by arguments regarding minimum safety standards.

3.2.2.4 Taraborah Train Load Out and Rail Loop Facility

In order to transport product coal from the Project site to the Port of Gladstone via rail, a TLO station and rail loop will be constructed in the southern sector of the Project site adjacent to the CHPP (Figure 5). The rail infrastructure will be fully signalled and have boom gates. The spur line and balloon loop are mine specific infrastructure and will be directly funded by Shenhua. Aurizon is expected to be prepared to undertake function of “Rail Manager” (covering train operating control and infrastructure maintenance) on a fully commercial basis on behalf of Shenhua. The direct traffic control signalling system will be used on the Shenhua spur line and balloon loop and continue to be used west of Burngrove.



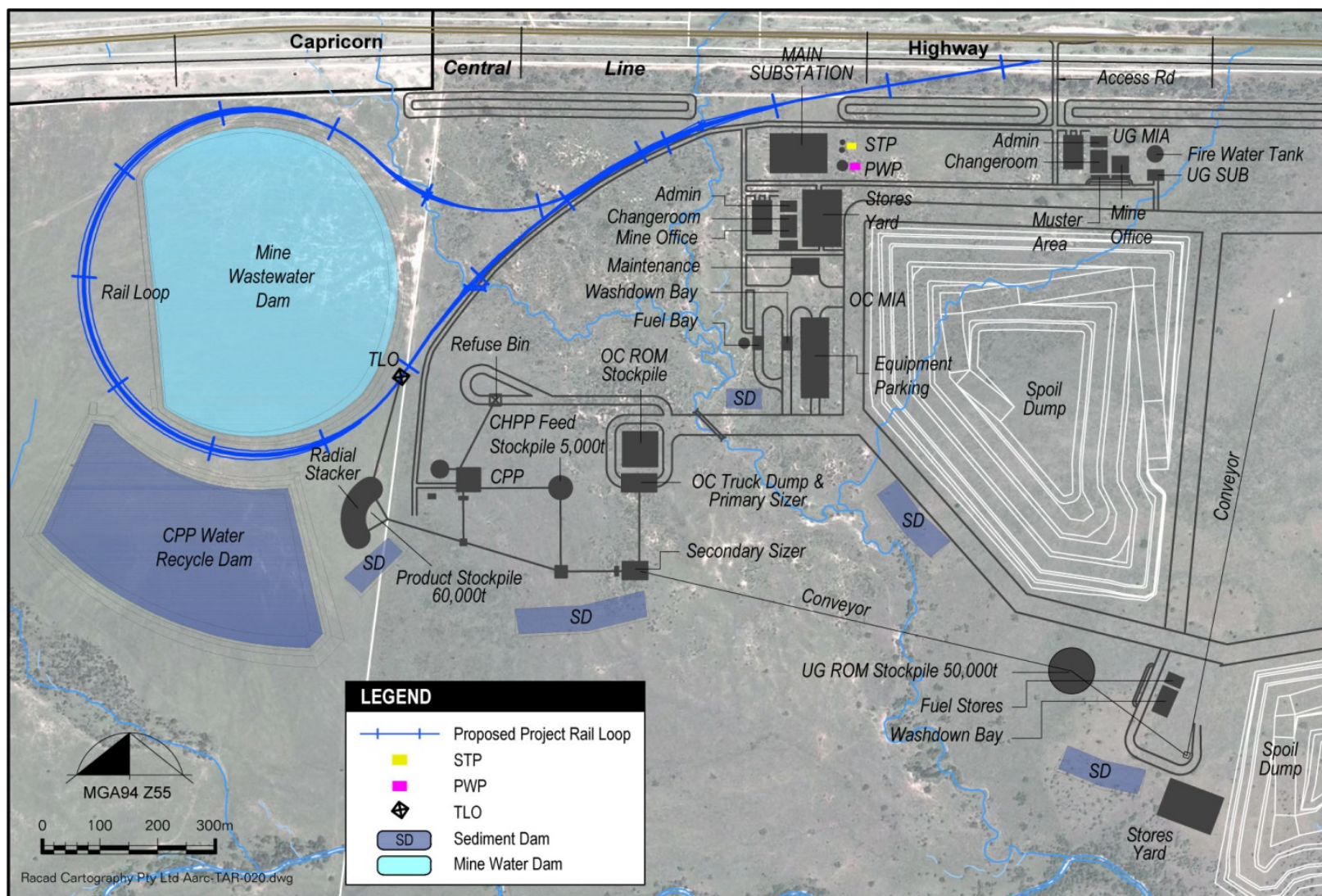


Figure 5 Proposed Project Rail Loop

3.3 PORT

3.3.1 Background

The WICET is being developed in Gladstone by a consortium of existing and potential coal exporters located in Queensland to provide increased long term export coal capacity. The project is being led by WICET Holdings Pty Ltd and its subsidiary, Wiggins Island Coal Export Terminal Pty Ltd, collectively referred to as the WICET Group. The WICET Group was formed by industry participants to advance the proposal. The terminal will be operated by the Gladstone Ports Corporation Limited.

3.3.2 Description

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

The terminal is to be built by WICET in stages with each stage matched to users' requirements for capacity which are backed up by contractual commitments to WICET for that capacity. Once it is fully commissioned from Stage 1, it will provide rail unloading, stockpiling and ship loading facilities and also over 80 Mtpa in additional export coal capacity through the Port of Gladstone. Three stages of development are envisaged as shown in Table 7. The specifics of Stage 2 and 3 will be confirmed in the future as demand for capacity increases.

Table 7 Wiggins Island Coal Terminal Capacity Stages

Stage	Capacity Increment (Mtpa)	Capital Cost (\$M)	Completion Date
Stage 1	27	\$1,360	2014
Stage 2	25	\$1,450	2018
Stage 3	TBC	\$1,050	TBC

TBC - To be confirmed

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

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



3.4 EMERALD AIRPORT

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

The Emerald Airport services approximately 166,000 passengers annually, with a total of 3,126 aircraft movements (BITRE, 2012). The airport has two runways, a primary asphalt runway of 1,900 metres (m) in length and a secondary gravel runway of 926 m in length. The airport supports regular public transport and closed charter services by Fokker F- 100, Dash 8-400 and ATR-72 aircraft to and from Brisbane operated by Alliance, Qantas Link and Virgin Australia respectively, other closed charters services operated by a number of smaller operators as well as air freight services, general aviation, private and aeromedical operations.

Additional infrastructure at Emerald Airport includes:

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

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

There are also a number of airstrips in the region that CHRC also operates for light aircraft landings which are located in the following towns:

- Capella - The Capella airstrip is located approximately 2 km west-southwest from the town centre and is classified as an Aeroplane Landing Area (ALA);
- Dingo - The Dingo airstrip is located 1.0 km south-southeast from the township and is officially classified as an ALA;
- Duaringa - The Duaringa airstrip is located 1 km south of the township and is officially classified as an ALA;
- Rolleston - The Rolleston aerodrome is located approximately 0.5 km southwest from the town centre and is officially classified as an ALA; and
- Springsure - The Springsure aerodrome is located approximately 1 km south from the town centre and is officially classified as an ALA.



4.0 PROJECT TRANSPORT LOGISTICS

Access to the Taroborah Project area will be maintained via a newly constructed access road which will intersect the Capricorn Highway. Minor upgrades to this highway will include an acceleration / deceleration lane to allow for turning into the Project site.

4.1 CONSTRUCTION PERIOD

Construction and mine development activities required to enable the commencement of the open-cut mining operation are planned to occur over a twelve month period, from October 2017 to September 2018. This timing is subject to the successful approval and granting of the Mining Leases and Environmental Authority for the Project.

All mine and transport infrastructure will be developed and commissioned prior to the commencement of coal mining operations, although initial overburden stripping will commence in July 2018. Initial construction works are expected to focus on the civil and earthworks component of the development. Following this, buildings will be erected and plant installed to support the mining and processing of ROM ore.

A second construction phase will occur over a six month period, from January to June 2022. Infrastructure associated with the underground mine will be constructed.

The calendar years 2017 and 2018 will be the busiest in terms of traffic associated with the site preparation and construction activities. For the ease of the assessment of construction transport impact, the construction transport determined in the development profile is spread over a 12 month construction period.

4.1.1 Transport Corridors

Road Materials

Road materials (such as aggregate and gravel) locally sourced 100% from Sapphire (west-northwest of the Project site), will be transported to site via the local road and SCR networks. The route between the Sapphire quarry and the Taroborah Project site is as follows:

- Quarry access road, onto Sapphire – Anakie Road, right onto the Capricorn Highway. Of this route only the Capricorn Highway is a SCR (Section # 16C).

Rail, Ballast and Bridge Steel

Approximately 38% of materials will come from Gladstone, while 62% will be sourced from Sapphire. Access from Sapphire is the Sapphire – Anakie Road, right onto the Capricorn Highway (Section #16C). Materials from Gladstone (Section #10E) would arrive from the south along the Bruce Highway and from the east along the Capricorn Highway (Section #16A – 16C).

Concrete

A total of 2,040 four axel truckloads (loaded and unloaded) will be transported between Emerald and the Project site for the open-cut and underground construction phases. The Capricorn Highway SCR road segment for this area is Segment #16C.



Buildings, Plant, Steel and Services

It is assumed that materials and plant from Brisbane, Gladstone or Mackay will be delivered to site via the Bruce Highway. Access to the Project site when travelling west from Rockhampton (Section # 10A – 10G) will be directly via the Capricorn Highway (Section #16A – 16C). Materials sourced from Brisbane will be unloaded from the Port of Brisbane, which includes the SCR's Port of Brisbane Road (Section # 904) and the Gateway Arterial Road (Section #U13C).

An upgraded turnoff will be constructed along the length of the Project access road of the Capricorn Highway within the proposed corridor to facilitate the movement of construction vehicles.

Workforce

Workforce transport will follow the Capricorn Highway west, from the Emerald Township, before turning south on the upgraded access road to enter the Project site. From the Emerald Airport, vehicles will utilise the Gregory Highway, which joins Emerald and Springsure, for approximately 3.4km heading north, before joining the Capricorn Highway.

4.1.2 Materials, Plant and Mining Fleet

During the initial construction period, approximately 3,985 truckloads of plant and bulk material will be transported to the Project site from within the local area, Mackay, Gladstone and Brisbane. A large majority of these loads will be raw materials including clays, gravel, sand and aggregate that will be required during construction. The gravel will be imported from Sapphire, which is approximately 30 km west-north-west of the Project site.

The estimated quantities of construction materials were produced as part of the pre-feasibility assessment of the Project. Loaded and unloaded ESA values were taken from the Fitzroy DTMR Guidelines and are summarised below in Table 8. The data provided to AARC for the assessment of transport impacts is summarised in Table 9. This includes all raw and bulk materials, buildings and plant required to be transported to site during the 12 month open-cut construction period and six month underground construction period.

Table 8 Standardised Loaded and Unloaded ESAs for each Vehicle Type

Vehicle Type	Loaded ESA	Unloaded ESA
Four Axle Truck	2.98	0.54
Six Axle Articulated	4.93	0.51
B Double	6.3	0.5
Double Road Train	7.67	0.55



Table 9 Construction Materials

Material	Weight (t)	Estimated Loads	Vehicle Description	Origin	Trips	Loaded HV ESAs*	Unloaded HV ESAs*	Total HV ESAs
Open-cut Construction								
Excavation and Construction Equipment	695	13	Six Axle Articulated	Mackay	26	64.09	6.63	70.72
		9	B Double	Mackay	18	56.7	4.5	61.2
		3	Six Axle Articulated	Gladstone	6	14.79	1.53	16.32
Diesel Fuel	7,500 kL (6,293 t)	720	B Double	Gladstone	1,440	4,536	360	4896
Imported Gravel	39,500	630	B Double	Sapphire	1,260	3,969.00	315	4284
Rail, Ballast and Bridge Steel	46,260	22	Six Axle Articulated	Sapphire	44	108.46	11.22	119.68
		449	B Double	Sapphire	898	2,828.7	224.5	3,053.2
		274	B Double	Gladstone	548	1,726.2	137	1,863.2
Buildings, Plant and Services	1,450	50	Six Axle Articulated	Brisbane	100	246.50	25.50	272.00
		25	Six Axle Articulated	Gladstone	50	123.25	12.75	136.00
		25	B Double	Mackay	50	157.50	12.5	170.00
Structural Steel and Equipment	6,300	205	Six Axle Articulated	Brisbane	410	1,010.65	104.55	1,115.2
		103	Six Axle Articulated	Gladstone	206	648.9	52.53	701.43
		102	B Double	Mackay	204	507.79	51.5	559.29
Concrete	10,800	600	Four Axle Truck	Emerald	1,200	1,788	324	2,112
Excavators, Haul Trucks, Dozers etc.	4,720	11	Four Axle Truck	Brisbane	22	32.78	5.94	38.72
		49	Six Axle Articulated	Brisbane	98	241.57	24.99	266.56
		45	B Double	Mackay	90	283.5	22.5	306
		2	B Double	Brisbane	4	12.6	1	13.6
		19	Double Road Train	Brisbane	38	145.73	10.45	156.18

Material	Weight (t)	Estimated Loads	Vehicle Description	Origin	Trips	Loaded HV ESAs*	Unloaded HV ESAs*	Total HV ESAs
Underground Construction								
Construction Equipment	320	5	Six Axle Articulated	Mackay	10	24.65	2.55	27.20
		4		Gladstone	8	19.72	2.04	21.76
Buildings, Plant and Services	1,500	50	Six Axle Articulated	Brisbane	100	246.50	25.50	272.00
		25	Six Axle Articulated	Gladstone	50	123.25	12.75	136.00
		25	B Double	Mackay	50	157.50	12.5	170.00
Concrete	7,300	420	Four Axle Truck	Emerald	840	1,251.6	226.8	1,478.4
Structural Steel and Equipment	1,500	50	Six Axle Articulated	Brisbane	100	246.50	25.50	272.00
		25	Six Axle Articulated	Gladstone	50	123.25	12.75	136.00
		25	B Double	Mackay	50	157.50	12.5	170.00
TOTAL	126,637	3,985	-	-	7970	20,853.18	2,041.48	22,894.66

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

* Loaded equates to trucks carrying full capacity. Unloaded equates to trucks with no materials or equipment

As Table 9 above summarises, construction equipment will be transported to the Project site for the open-cut and underground works. It is expected that these loads will originate from either Gladstone or Mackay and will consist of the items detailed in Table 10. A total of 14 machines will be required for the open-cut construction works and seven for the underground works. The majority of the construction fleet will be transported from Mackay via six axle articulated trucks.



Table 10 Open-cut and Underground Construction Mining Fleet

Stage	Equipment	Number Required	Weight (tonnes)	Number of Trucks		Origin		Number Oversize	Number Escort
				Six Axle Articulated	B Double	Mackay	Gladstone		
Open-cut Construction Equipment									
Dozer	Cat D11T	2	104.257	2	8	10	0	2	2
Grader	Cat 16M	1	30.544	1	0	1	0	0	0
Front End Loader	Cat 962-k	2	20.443	2	0	2	0	0	0
Excavator	Komatsu PC300-8	1	31.1	1	0	1	0	1	0
Haul Truck	Cat 740B	2	36.628	2	0	2	0	2	0
Scraper	Cat 637G	1	51.147	1	1	2	0	1	0
Backhoe	CAT450E	1	10.95	1	0	1	0	0	0
Compactor	Cat 825H	1	31.2	1	0	1	0	1	1
Vibratory Roller	Cat CP76	1	17.126	1	0	1	0	0	0
Large Track Crane	Kobelco CKE1800, 180t	1	164	3	0	0	30	1	0
Mobile Crane	Kobelco RKE450, 45t	1	36	1	0	0	1	0	0
TOTAL		14	694.723	16	9	21	4	8	3
				64%	36%	84%	16%	32%	12%



Stage	Equipment	Number Required	Weight (tonnes)	Number of Trucks		Origin		Number Oversize	Number Escort
Underground Construction Equipment									
Grader	Cat 16M	1	30.544	1	0	1	0	0	0
Excavator	Komatsu PC300-8	1	31.1	1	0	1	0	1	0
Backhoe	CAT450E	1	10.95	1	0	1	0	0	0
Compactor	Cat 825H	1	31.2	1	0	1	0	1	1
Vibratory Roller	Cat CP76	1	17.126	1	0	1	0	0	0
Large Track Crane	Kobelco CKE1800, 180t	1	164	3	0	0	3	1	0
Mobile Crane	Kobelco RKE450, 45t	1	36	1	0	0	1	0	0
TOTAL		7	320.92	9	0	5	4	3	1
				100%	0%	56%	44%	33%	11%

4.1.3 Workforce

The construction workforce numbers during both the open-cut and underground construction periods are detailed in Table 11.

Table 11 Workforce during Open-cut and Underground Construction Periods

Calendar Year	OC / UG	Number of Persons
Project Year 0, CY 2017	Open-cut	150
Project Year 5, CY 2022	Underground	100

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

It is envisaged that 25% of the workforce will be sourced from within the local region. An additional 50% of the workforce will be sourced from the Mackay / Rockhampton / Gladstone region. The remaining 25% of the workforce will be from Brisbane. This FIFO workforce will be transported from Brisbane to Emerald by airplane, while the coastal region workforce will likely drive to and from Emerald. The FIFO workforce will then be transported to their accommodation in Emerald via pre-arranged bus services. Workforce movements from coastal regions to the Project site have not been included in this assessment, as the DIDO workforce will be utilising personal light vehicles. Light vehicles are not included in the ESA calculations, therefore are negligible for the assessment.

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

The exact scheduling arrangements for workforce change overs have not yet been finalised. For the purposes of this assessment it is assumed that return flights will occur approximately every 4 days, with a connecting bus transferring the workforce to the Emerald area. The seating capacity of these services will be adjusted to meet Project demands. For the RIA, a full, three axle bus has been assumed as transferring a majority of the workforce.

Vehicle movements associated with the transportation of the workforce during the construction period are shown in Table 12.

Table 12 Workforce Vehicle Movements per Year

Staff Movements	Vehicle	Frequency	Vehicle Movements per year *	Loaded HV ESAs per year **	Unloaded HV ESAs per year **	Total HV ESAs per year
Emerald Airport to Emerald Township	Bus	Twice weekly	200	880	-	880
Emerald Airport to Emerald Township	Personal Vehicle	Twice weekly	200	-	-	-
Emerald Township to Project site	Bus	Daily	500	2,200	-	2,200
Emerald Township to Project site	Personal Vehicle	Daily	500	-	-	-
Total	-	-	1400	3,080	-	3,080

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

**Assumes standard loading: Three axle bus Loaded ESAs = 4.4. A personal vehicle is considered a light vehicle movement.

4.1.4 Supplies

Supplies required during the construction of the Project include maintenance and miscellaneous supplies, personnel supplies and waste removal. Quantities of these supplies and likely delivery characteristics are detailed in Table 13. The total truck loads are projected to be 51, which equates to 179.4 ESAs (loaded and unloaded return trips).



Table 13 Construction Additional Supplies per Year

Item	Description	Usage (tpa)	Mass per delivery (t)	Vehicle Type	Loads	Origin	Vehicle Movements	Loaded HV ESAs*	Unloaded HV ESAs*	Total HV ESAs
Waste	Domestic Waste, Construction Waste	500	20	Four axle truck	25	Emerald	50	74.5	13.5	88.0
General Supplies	Perishables	125	10	Four axle truck	13	Emerald	26	38.7	7.0	45.7
	Non-Perishables	125	10	Four axle truck	13	Emerald	26	38.7	7.0	45.7
TOTAL	-	750	40	-	51	-	82	151.9	27.5	179.4

*Assumes standard loading: Four axle truck Loaded ESAs = 2.98, Unloaded ESAs = 0.54.

4.2 PRODUCTION PERIOD

The open-cut production period of the Taraborah Project is scheduled to commence in 3Q 2018 and continue for a production life until 3Q 2024. The underground mining will commence in 3Q 2022 and continue until 1Q 2038. Initially, production will commence at a rate of 0.5 Mtpa of product coal before reaching a rate of up to 5.5 Mtpa in Year 8 (CY 2025).

The Project is estimated to employ up to 350 full time staff at full production with the potential for additional employees to be required during major operations and special tasks throughout the life of the mine. Mine operations will continue year round; 24 hours per day, 7 days per week.

4.2.1 Transport Corridors

Diesel Fuel

Diesel fuel will be required during both the open-cut and underground operations. Weekly consumption of diesel is expected to be 350 kilolitres (kL) during open-cut operations and 100 kL per week during the underground mining phase. Diesel will be sourced from Emerald and transported by B Double road trains.

Explosives

During open-cut operations, up to 7,650 t per year of bulk ammonium nitrate/fuel oil (ANFO) and emulsion will be required, with an average annual consumption of 4,000 t per year. The explosives will be sourced from Gladstone and transported by B Double road trains. Access to the Project site will be from Gladstone to Rockhampton along the Bruce Highway (Section #10E) and then west from Rockhampton to the Project site along the Capricorn Highway (Sections #16A – 16C).

Concrete and Gravel

Concrete and gravel will be required during the underground operations for road materials. Gravel will be sourced from Sapphire, Central Queensland and transported by B Double road trains. Approximately 1,400 t of concrete will be required during underground operations. This material will be transported from Emerald in four axle trucks.

Mining and Equipment Consumables

Materials and plant from Brisbane, Gladstone or Mackay will be delivered to site via the Bruce Highway. Access to the Project site when travelling west from Rockhampton (Section # 10A – 10G) will be directly via the Capricorn Highway (Section #16A – 16C). Materials sourced from Brisbane will arrive from the Port of Brisbane, which includes the SCR's Port of Brisbane Road (Section # 904) and the Gateway Arterial Road (Section #U13C).

Workforce

Workforce transport will follow the Capricorn Highway west, from the Emerald Township, before turning south into the newly constructed access road to enter the Project site. From the Emerald Airport, vehicles will utilise the Gregory Highway, which joins Emerald and Springsure, for approximately 3.4 km heading north, before joining the Capricorn Highway.



4.2.2 Operational Supplies

Mining supplies required during the operation of the Project include diesel, bulk ANFO and emulsion, magnetite and flocculent, water treatment and solvents, concrete, gravel and mining consumables. Quantities of these supplies and likely delivery characteristics are detailed in Table 14. For the usage, loads and trips columns, maximum figures have been used to indicate the range over the life of the Project. Each year has been individually analysed in determining overall traffic impact. Refer to Table 8 for standardised loaded and unloaded HV ESA values utilised for the calculations below.



Table 14 Operation Materials

Material	Weight (t)	Estimated Loads	Vehicle Description	Origin	Trips	Loaded HV ESAs	Unloaded HV ESAs	Total HV ESAs
Open-cut Operation								
Bulk ANFO and Emulsion	7650	125	B Double	Gladstone	250	787.5	62.5	850
Diesel Fuel	17,500 kL (14,683 t)	350	B Double	Gladstone	700	11,025	875	11,900
Lubricants, Tyres and Machine Parts	10,000	7	Four Axle Truck	Gladstone	14	20.86	3.78	24.64
		8	Four Axle Truck	Mackay	16	23.84	4.32	28.16
		7	Six Axle Articulated	Brisbane	14	34.51	3.57	38.08
		8	B Double	Brisbane	16	50.4	4	54.4
Chemicals – Magnetite and Flocculent	350	24	Four Axle Truck	Gladstone	48	71.52	12.96	84.48
Chemicals – Water Treatments and Solvents	15	4	Four Axle Truck	Gladstone	8	11.92	2.16	14.08
Waste Haulage	1,000	100	Four Axle Truck	Emerald	200	298	54	352
Underground Operation								
Diesel Fuel	5,000 kL (4,195 t)	100	B Double	Gladstone	200	630	50	680
Consumables – Roof Bolts, Mesh, Stone Dust, Timber, etc.	1,700	25	Six Axle Articulated	Brisbane	50	123.25	12.75	136
		13	Six Axle Articulated	Gladstone	26	64.09	6.63	70.72
		12	Six Axle Articulated	Mackay	24	59.16	6.12	65.28
Concrete	1,400	70	Four Axle Truck	Emerald	140	208.6	37.8	246.4
Chemicals – Magnetite and Flocculent	185	6	Four Axle Truck	Gladstone	12	17.88	3.24	21.12
		3	Six Axle Articulated	Gladstone	6	14.79	1.53	16.32
		3	B Double	Gladstone	6	18.9	1.5	20.4
Chemicals – Water Treatment and Solvents	15	4	Four Axle Truck	Gladstone	8	11.92	2.16	14.08
Gravel	1,400	35	B Double	Sapphire	70	220.5	17.5	238
Waste Haulage	500	50	Four Axle Truck	Emerald	100	149	27	176

Material	Weight (t)	Estimated Loads	Vehicle Description	Origin	Trips	Loaded HV ESAs	Unloaded HV ESAs	Total HV ESAs
Lubricants, Tyres, Machine Parts, Conveyor Belt	1,000	10	Four Axle Truck	Mackay	20	29.8	5.4	35.2
		10	Four Axle Truck	Gladstone	20	29.8	5.4	35.2
		10	Six Axle Articulated	Brisbane	20	49.3	5.1	54.4
		10	B Double	Brisbane	20	63	5	68
TOTAL	44,093	2,394	-	-	4,788	14,013.54	1,209.42	15,222.96

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

4.2.3 Mining Fleet

Additional Mining Fleet equipment will also be transported onto the Project site during the production periods. It is expected that these loads will originate from either Brisbane, Gladstone or Mackay and be transported via the Bruce and Capricorn Highways.

4.2.3.1 Open-cut Mining

Open-cut spoil extraction will be conducted via 550 t hydraulic excavators loading 190 t rear dump trucks. Once overburden has been removed, open-cut coal mining will be undertaken with the assistance of 160 t hydraulic excavators and 90 t rear-dump trucks.

The Project's open-cut mining fleet has been based upon open-cut operational requirements, annual production targets (up to 2.3 Mtpa of ROM coal) and equipment productivities. The indicative mining fleet requirement, for each year of open-cut operations, is presented in Table 15.

4.2.3.2 Underground Mining

Underground longwall mining operations will require the use of two continuous miners which will run in conjunction with cable shuttle cars to haul coal from the mining face to the section feeder/breaker. A total of four cable shuttle cars of 14 t capacity each are projected to be required to service the two continuous miner sections. A summary of the indicative underground mining fleet is presented in Table 16.

Table 15 Open Cut Indicative Mining Fleet

Function & Equipment	Capacity	Maximum Operating hours/year per Machine	2018	2019	2020	2021	2022	2023	2024
Waste Mining									
<i>Hitachi EX5500</i>	550t, 28m ³	5,745	1	2	3	3	3	3	2
Coal Mining									
<i>Komatsu PC1600</i>	160t, 10m ³	3,186	1	1	1	1	1	1	1
<i>Caterpillar 988</i>	46t, 7m ³	5,745	1	1	1	1	1	1	1
Waste Haulage									
<i>Caterpillar 789</i>	190t	5,184	6	13	12	14	13	14	12
<i>Caterpillar 777 Water Truck</i>	78 t	4,289	1	1	1	2	2	2	2
Coal Haulage									
<i>Caterpillar 777</i>	90t	4,289	2	2	2	2	3	3	2
Support Plant									
<i>Large Track Dozer</i>	634kw	4,289	2	2	2	2	2	2	2
<i>Rubber Tyred Dozer</i>	235kw	1,814	1	1	1	1	1	1	1
<i>Small Track Dozer</i>	228kw	4,289	1	2	2	2	3	3	3
<i>Large Grader</i>	205kw	4,289	1	2	2	2	2	3	3

Table 16 Underground Indicative Mining Fleet

Function & Equipment	Capacity	Maximum Operating hours/year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Coal Mining																			
<i>Continuous Miner</i>	10t/min	1,300	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	0
<i>Cable Shuttle Cars</i>	12 t	950	4	4	4	4	4	4	4	4	4	4	4	4	2	2	2	2	0
<i>Feeder / Breakers</i>	165 t/hr	1,300	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	0
<i>Longwall System</i>	3000 t/hr	2,800	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Support Equipment																			
<i>Small LHD</i>	10t	4,200	2	4	6	6	6	6	6	6	6	6	6	6	5	5	5	5	3
<i>Large LHD</i>	55t	4,200	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Man Transport</i>	12 persons	3,500	3	6	8	8	8	8	8	8	8	8	8	8	6	6	6	6	6
<i>Service Vehicle</i>	4 persons	3,500	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<i>Grader</i>	85kW	2,800	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

4.2.4 Workforce

As the Project is commissioned and enters its operational phase, it is estimated that approximately 375 full-time staff will be employed over the life of the mine during both open-cut and underground operations, although the maximum at any point in time is expected to be 350. As Table 17 describes, the open-cut mine will be in operation for seven years during which time between 58 and 133 staff will be employed.

The Project will operate on a 24 hours a day, seven days a week roster system, based upon 12 hour shifts.

The workforce categories required for the Project have been summarised as follows:

- Management, supervision and administration staff;
- Operational staff – open-cut mining, underground operations, CHPP operations and support staff;
- Maintenance staff – general and mining maintenance crews; and
- Subcontractors that may be required for specialist roles such as maintenance shut downs, development and operational works.

During production, no camps will be used on site. All operational staff will live in Emerald or the surrounding region. Transport to the mine will be on a BIBO basis via a local bus service, purposely contracted to service the Project's workforce needs. Such an accommodation strategy will help the workforce to integrate into the local community, contribute to the local economy and enhance the level of participation in local activities in line with community objectives.

Following construction of the underground mine, production will steadily increase and similarly the operational workforce will grow, peaking at approximately 250 staff for the underground operation alone.

Anticipated workforce requirements for the open-cut operations (2018 – 2024) and underground operation (2022 – 2038) are provided in Table 17.

Table 17 Proposed Workforce for Operational Works

Year	Operators	Contractors	Maintenance	Supervisors / Admin	Annual Total
2018	37	-	12	9	58
2019	68	-	22	13	103
2020	63	-	21	13	97
2021	90	-	30	13	133
2022	138	8	53	29	228
2023	193	16	75	44	328
2024	209	16	78	45	348
2025	149	16	58	35	258
2026	149	16	58	35	258
2027	149	16	58	35	258
2028	130	16	58	35	239
2029	130	16	54	35	235
2030	130	16	54	35	235
2031	130	16	54	35	235
2032	130	16	54	35	235
2033	130	12	54	35	231
2034	96	9	36	28	169
2035	96	9	36	28	169
2036	96	9	36	28	169
2037	55	9	20	23	107
2038	48	9	18	22	97

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

From Emerald, the workforce will be transported along the Capricorn Highway to the Project site. It will be encouraged to utilise bus services provided by the company. Approximately 75% of the workforce will be BIDO, while 25% will DIDO utilising personal vehicles.

Vehicle movements associated with the transportation of the workforce during the various stages of operation period are shown in Table 18 and Table 19. Transport movements are staged to reflect employment numbers presented in Table 17.

Table 18 Workforce Vehicle Movements per Year 2018 – 2021 and 2034 – 2038

Staff Movements	Vehicle	Frequency	Vehicle Movements per year *	Loaded HV ESAs per year **	Unloaded HV ESAs per year **	Total HV ESAs per year
Emerald Airport to Emerald Township	Bus	Twice weekly	200	880	-	880
Emerald Airport to Emerald Township	Personal Vehicle	Twice weekly	200	-	-	-
Emerald Township to Project site	Bus	Daily	500	2,200	-	2,200
Emerald Township to Project site	Personal Vehicle	Daily	500	-	-	-
Total	-	-	1400	3,080	-	3,080

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

**Assumes standard loading: Three axle bus Loaded ESAs = 4.4. A personal vehicle is considered a light vehicle.

Table 19 Workforce Vehicle Movements per Years 2019- 2033

Staff Movements	Vehicle	Frequency	Vehicle Movements per year *	Loaded HV ESAs per year **	Unloaded HV ESAs per year **	Total HV ESAs per year
Emerald Airport to Emerald Township	Bus	Four return trips weekly	400	1,760	-	1,760
Emerald Airport to Emerald Township	Personal Vehicle	Twice weekly	200	-	-	-
Emerald Township to Project site	Bus	Three return trips daily	1,500	6,600	-	6,600
Emerald Township to Project site	Personal Vehicle	Daily	480	-	-	-
Total	-	-	2,580	8,360	-	8,360

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

**Assumes standard loading: Three axle bus Loaded ESAs = 4.4. A personal vehicle is considered a light vehicle.

During the ongoing operation, supplies will be needed to service the daily workforce. Quantities of the supplies and likely delivery characteristics are provided in Table 20 and Table 21.

Table 20 Operation Period (2018 – 2021 and 2034 – 2038) Additional Supplies Per Year

Item	Usage (tpa)	Mass per delivery (t)	Vehicle Type	Loads	Origin	Movements	Loaded HV ESAs	Unloaded HV ESAs	Total HV ESAs
Perishables	125	10	Four axle truck	13	Emerald	26	38.7	7.0	45.7
Non-Perishables	125	10	Four axle truck	13	Emerald	26	38.7	7.0	45.7
TOTAL	250	-	-	26	-	52	77.4	14.0	91.4

*Assumes standard loading: Four axle articulated Loaded ESAs = 2.98, Unloaded ESAs = 0.54.

Table 21 Operation Period (2019- 2033) Additional Supplies Per Year

Item	Usage (tpa)	Mass per delivery (t)	Vehicle Type	Loads	Origin	Movements	Loaded HV ESAs	Unloaded HV ESAs	Total HV ESAs
Perishables	250	10	Four axle truck	25	Emerald	50	110	40	150
Non-Perishables	250	10	Four axle truck	25	Emerald	50	110	40	150
TOTAL	500	-	-	50	-	100	220	80	300

*Assumes standard loading: Four axle articulated Loaded ESAs = 2.98, Unloaded ESAs = 0.54.

5.0 POTENTIAL IMPACTS

5.1 ROAD

5.1.1 Mine Area Road Works

5.1.1.1 Road Closures

With regard to blasting, it should not be required to close the highway, generally because of the separation distance and typical blasting exclusion zones of 200-300 m. Even along the northern edge in the “east “ pit, with the lowest separation of about 250 m, the visual amenity bund will act to limit fly rock distances as the blasts will be some 40 m below the ground level. However, as a precaution, during the last 2-3 years of the pit life it would be prudent to temporarily close the highway during blasts along the northern perimeter. These closures might occur 2-3 times a week for approximately 2 months of the year, or less than 20 times per year in total.

5.1.1.2 Road Upgrades

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

- To accommodate Project deliveries and workforce vehicles, the Capricorn Highway will be upgraded as it approaches the entrance to the Project site. Upgrades will require the construction of turning lanes allowing traffic from the highway to safely enter the Project site without impeding the flow of traffic on the highway. In addition, a T junction will be constructed, allowing traffic to exit the Project site and safely merge with the flow of traffic on the highway. Road modifications will be facilitated by the DTMR and will be built to State road standards. Figure 6 illustrates the proposed upgrades to the highway; and
- Secondary Roads – The new access roads within the Project site will be constructed of macadam and suitable for delivery and light vehicles. They will provide access to important Project facilities, but with a much lighter and lower traffic flow.

The Capricorn Highway will remain open during upgrade operations, although traffic diversions may be required to facilitate efficient and safe construction of road upgrades. These diversions will occur during daylight periods only. All roads will include drainage that runs off into sedimentation ponds where any silt will be deposited before the water is released to the local drainage system. All of the Project's lay-down and parking areas will be prepared in a similar manner.

5.1.1.3 Stock Routes

A stock route running northward from Lake Maraboon to the Capricorn Highway will need to be relocated approximately 3km to the west in order to accommodate the planned opencut pit and mine surface infrastructure. A route for the relocation has been proposed by Shenhua as shown in **Error! Reference source not found.** The route has been preliminarily approved by the DNR's Senior Lands Officer (Stock Routes), and both the DNR and the CHRC stock route officer will be consulted in the detailed design stage to ensure the final suitability of the relocated route.



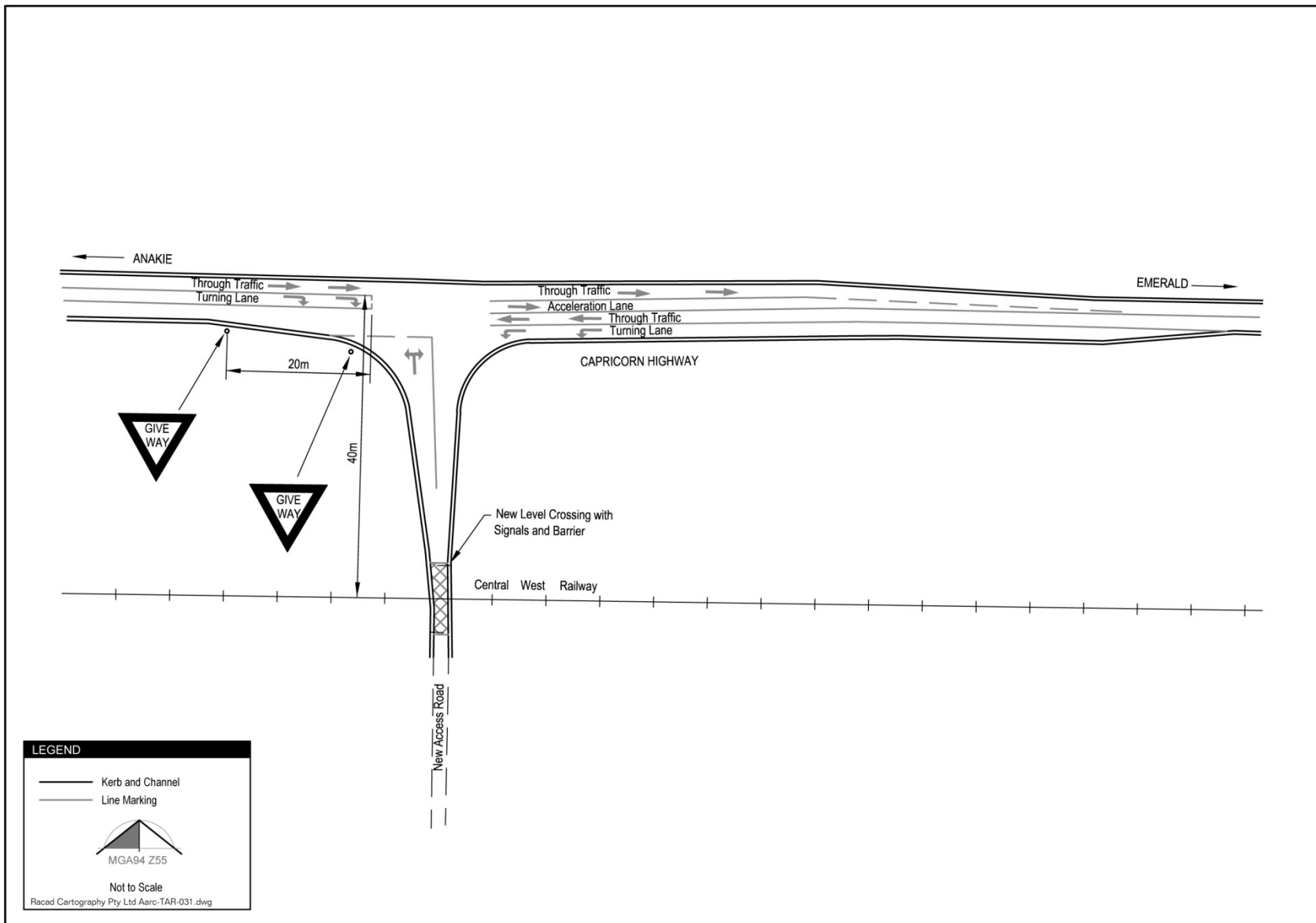


Figure 6 Capricorn Highway Road Upgrade

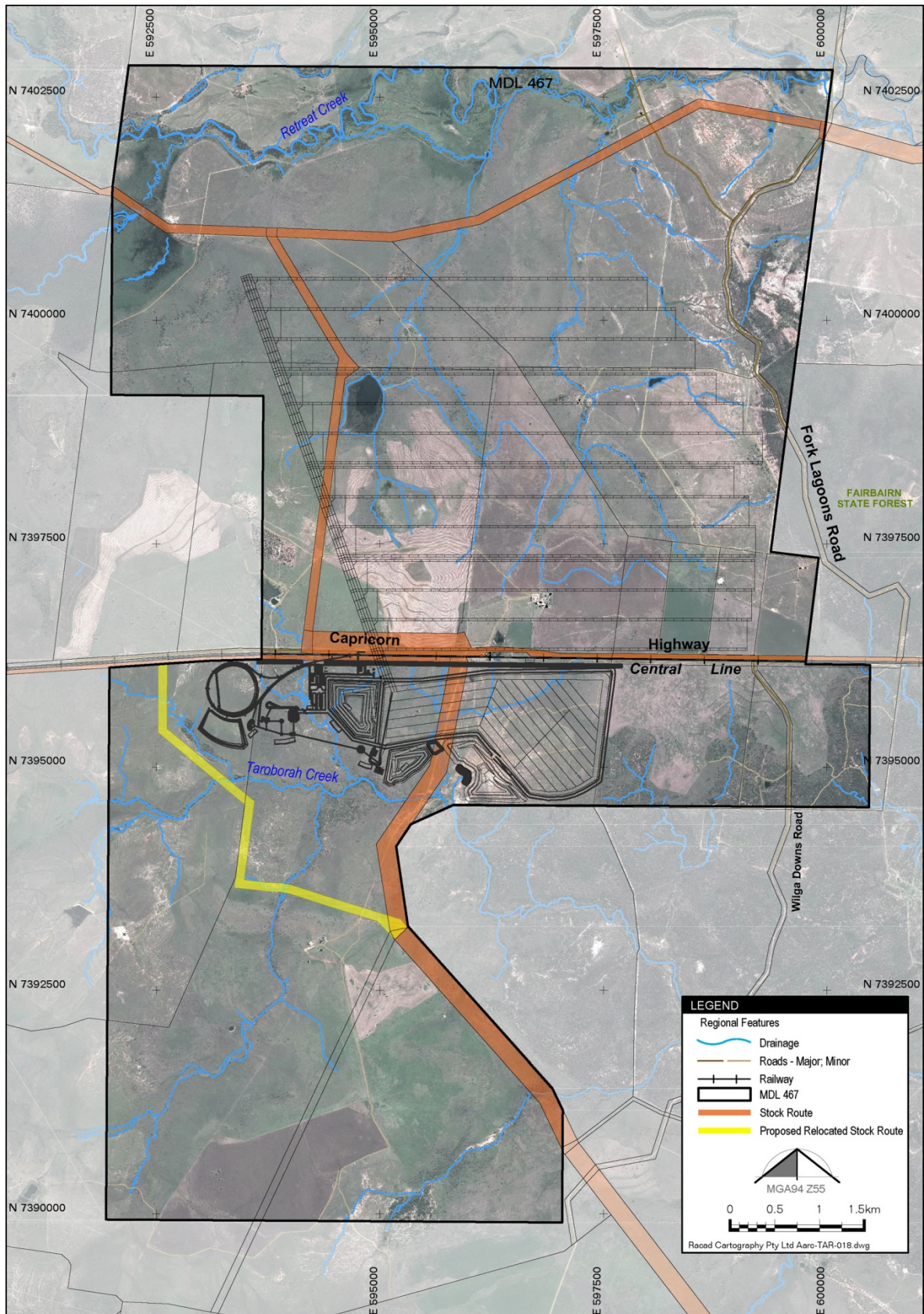


Figure 7 Proposed Relocated Stock Route

5.1.2 Road Impact Assessment

As per the Fitzroy Region DTMR and GARID Guidelines, traffic impacts need to be considered for any section of the SCR network where traffic generated as a result of the Project constitutes a 5% or greater increase in existing AADT or ESA figures.

To quantify the level of impact resultant from the construction or operation of the Project, the additional traffic generated by the Project during either the construction or production periods (as described in Section 4.1 and 4.2) will be compared to the projected future baseline traffic data (calculated in Section 3.1.3).

Assumptions for the impact assessment include:

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

5.1.2.1 Traffic Impact Assessment

The Traffic Impact Assessment provides a comparison between projected AADT and total AADT levels that can be ascribed to the Project, for both the construction and production periods. Increases, given as a percentage of Project generated traffic over projected AADT levels for each road segment, are also provided.

Construction Period

The projected background AADT levels for Year 0 (CY 2017) are compared to the anticipated Project generated traffic in Table 22. There are no segments of road which will experience percentage increases considered significant under the Guidelines (DTMR 2006) during this year.

Table 22 Predicted Traffic Increase With the Project – Construction Period

SCR Section	Road/Segment	Background AADT	Project AADT	Total AADT	Increase (%)
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	21,328	9.07	21,337	0.043
	Capricorn Hwy 3 km west Gracemere	6,729	9.07	6,738	0.135
	Capricorn Hwy WiM Site at Kabra	6,335	9.07	57,528	0.158
	Capricorn Hwy 1 km east of Westwood	5,325	9.07	4,609	0.197
	Capricorn Hwy at 41 Mile Ck	6,310	9.07	4,632	0.196
	Capricorn Hwy 300 m E of Int 16A/462	5,809	9.07	4,396	0.206
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	4,986	9.07	3,967	0.229
	Capricorn Highway 10 km E of Blackwater	4,572	9.07	3,806	0.238
	200 m West of Int 16B/469	9,127	9.07	5,701	0.159
	1 km W of Blackwater Mine CHPP T/O	4,538	9.07	3,471	0.261
	W of Comet River on Cap Hwy	3,259	9.07	3,268	0.278
	400 m west of Foley Rd on 16B	4,387	9.07	3,981	0.228
	Capricorn Hwy 200 m W of Codenwarra Rd	37,874	9.07	14,084	0.064
	Clermont St 70 m W of Borilla St	56,873	9.07	17,897	0.051
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	35,997	16.42	10,131.08	0.162
	250 m west of int. 16C/Selma Rd	7,601	16.42	4,006.64	0.410
	Capricorn Hwy 500 m west of Marshall Road	1,867	16.42	1,883.74	0.871
	500 m west inter 16C/5501 on 16C	632	0.00	631.80	0.000
	Capricorn Highway 8 km east of Alpha	502	0.00	501.97	0.000
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	11,070	1.84	11,072	0.017
	Independent Fuel (M'boro)	9,620	1.84	9,622	0.019
	North of Lenthals Dam t/off	8,306	1.84	8,308	0.022
	North of Aerodome Rd int	8,416	1.84	8,418	0.022
	Snake Gully Sth/Childers	7,549	1.84	7,551	0.024
	Childers Rail Xing	10,062	1.84	10,064	0.018
	Adjacent Apple Tree Ck RA	8,285	1.84	8,287	0.022
	West side/Sandy Creek Bridge	3,995	1.84	3,997	0.046
	At Booyal School	4,592	1.84	4,594	0.040
	South of Phillipi Road	5,640	1.84	5,641	0.033
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	6,353	1.84	6,355	0.029
	North of Jensens Road	4,264	1.84	4,266	0.043
	North of Kalpowar T/off	4,889	1.84	4,891	0.038
	Bruce Hwy at Colosseum Creek	4,687	1.84	4,689	0.039
	Bruce Hwy 100 m Nth Rodds Ck	7,295	1.84	7,297	0.025
	Bruce Hwy southern Abut Machine Ck	14,665	1.84	10,420	0.018

SCR Section	Road/Segment	Background AADT	Project AADT	Total AADT	Increase (%)
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	8,011	8.01	7010	0.114
	Bruce Calliope 25 m S Calliope River Bdg	4,314	8.01	4322	0.185
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	8,483	8.01	7619	0.105
	Bruce Hwy Mikros WiM Site (Bobs Ck)	7,465	8.01	7473	0.107
	Bruce Hwy 100 m North Gavlal Ck	6,277	8.01	6285	0.127
	Bruce Hwy 1 km North Scrubby Ck	10,433	8.01	10441	0.077
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	27,393	8.01	27401	0.029
	Bruce Hwy (Gladstone Rd) @ Derby St	30,310	8.01	30318	0.026
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	37,445	1.06	29,151	0.004
	Bruce Hwy 100 m Sth Knight St	39,436	1.06	39,437	0.003
	Bruce Hwy at Boland St	27,685	1.06	27,686	0.004
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	19,067	1.06	19,068	0.006
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	12,492	1.06	12,493	0.009
	Bruce Hwy 150 m North Terra Nova Dr	9,744	1.06	9,745	0.011
	Bruce Hwy 200 m North 14 Mile Ck Rd	5,681	1.06	5,683	0.019
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	3,273	1.06	3,274	0.032
	Bruce Hwy South of Deep Creek	3,293	1.06	3,294	0.032
	1 km south of Montrose Creek on Bruce Hwy	2,889	1.06	2,890	0.037
	South of Waverly Creek	2,703	1.06	2,704	0.039
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	2,840	1.06	2,841	0.037
	WiM Site Koumala	4,122	1.06	4,123	0.026
	South of Armstrong's Beach Turnoff	4,980	1.06	4,981	0.021
	Sichter Street - Broad Street	12,245	1.06	12,246	0.009
	Between Sarina and Sarina - Homebush TO	10,674	1.06	10,675	0.010
	Sarina - Homebush Road to Hay Point TO	9,492	1.06	9,493	0.011
	North of Macks Truck Stop	15,352	1.06	15,353	0.007
	Broadsound Road Permanent Counter	17,561	1.06	17,562	0.006
	City Gates to Lagoon Street	37,928	1.06	29,161	0.004
	Lagoon Street to Bridge Rd	30,308	1.06	25,407	0.004
	George Street Pedestrian Crossing	34,579	1.06	34,580	0.003

Production Period

Traffic volumes for year 1 (CY 2018) and year 5 (CY 2022) are employed as representative years for this traffic assessment during the earlier years of the Project. Year 1 represents the initial open-cut production period. Year 5 represents open-cut mining and underground construction simultaneously occurring. Table 23 and Table 24 present the predicted traffic with the Project compared to background traffic for CYs 2018 and 2022.



Table 23 Predicted Traffic Increase With the Project – Production Year 1

SCR Section	Road/Segment	Baseline AADT	Project AADT	Total AADT	Increase (%)
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	22,326	10.59	22,337	0.047
	Capricorn Hwy 3 km west Gracemere	7,024	10.59	7,035	0.151
	Capricorn Hwy WiM Site at Kabra	5,915	10.59	5,926	0.179
	Capricorn Hwy 1 km east of Westwood	4,738	10.59	4,749	0.223
	Capricorn Hwy at 41 Mile Ck	4,762	10.59	4,772	0.222
	Capricorn Hwy 300 m E of Int 16A/462	4,518	10.59	4,529	0.234
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	4,076	10.59	4,087	0.259
	Capricorn Highway 10 km E of Blackwater	3,911	10.59	3,921	0.270
	200 m West of Int 16B/469	5,863	10.59	5,873	0.180
	1 km W of Blackwater Mine CHPP T/O	3,565	10.59	3,576	0.296
	W of Comet River on Cap Hwy	3,411	10.59	3,421	0.310
	400 m west of Foley Rd on 16B	4,091	10.59	4,101	0.258
	Capricorn Hwy 200 m W of Codenwarra Rd	14,497	10.59	14,508	0.073
	Clermont St 70 m W of Borilla St	18,424	10.59	18,435	0.057
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	10,418	15.12	10,443	0.145
	250 m west of int. 16C/Selma Rd	4,110	15.12	4,125	0.366
	Capricorn Hwy 500 m west of Marshall Road	1,953	15.12	1,968	0.768
	500 m west inter 16C/5501 on 16C	651	0.00	651	0.000
	Capricorn Highway 8 km east of Alpha	517	0.00	517	0.000
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	11,402	0.08	11,402	0.001
	Independent Fuel (M'boro)	9,908	0.08	9,908	0.001
	North of Lenthals Dam t/off	8,555	0.08	8,555	0.001
	North of Aerodome Rd int	8,669	0.08	8,669	0.001
	Snake Gully Sth/Childers	7,776	0.08	7,776	0.001
	Childers Rail Xing	10,364	0.08	10,364	0.001
	Adjacent Apple Tree Ck RA	8,534	0.08	8,534	0.001
	West side/Sandy Creek Bridge	4,115	0.08	4,115	0.002
	At Booyal School	4,761	0.08	4,761	0.002
	South of Phillipi Road	5,844	0.08	5,844	0.001
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	6,550	0.08	6,550	0.001
	North of Jensens Road	4,392	0.08	4,392	0.002
	North of Kalpowar T/off	5,112	0.08	5,112	0.002
	Bruce Hwy at Colosseum Creek	4,877	0.08	4,877	0.002
	Bruce Hwy 100 m Nth Rodds Ck	7,603	0.08	7,604	0.001
	Bruce Hwy southern Abut Machine Ck	10,731	0.08	10,731	0.001

SCR Section	Road/Segment	Baseline AADT	Project AADT	Total AADT	Increase (%)
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	7,212	10.55	10.55	0.146
	Bruce Calliope 25 m S Calliope River Bdg	4,443	10.55	10.55	0.237
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	7,839	10.55	10.55	0.134
	Bruce Hwy Mikros WiM Site (Bobs Ck)	7,746	10.55	10.55	0.136
	Bruce Hwy 100 m North Gavial Ck	6,466	10.55	10.55	0.163
	Bruce Hwy 1 km North Scrubby Ck	10,784	10.55	10.55	0.098
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	28,223	10.55	10.55	0.037
	Bruce Hwy (Gladstone Rd) @ Derby St	31,220	10.55	10.55	0.034
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	30,024	0.04	30,025	0.000
	Bruce Hwy 100 m Sth Knight St	40,619	0.04	40,619	0.000
	Bruce Hwy at Boland St	28,515	0.04	28,515	0.000
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	19,639	0.04	19,639	0.000
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	12,867	0.04	12,867	0.000
	Bruce Hwy 150 m North Terra Nova Dr	10,077	0.04	10,077	0.000
	Bruce Hwy 200 m North 14 Mile Ck Rd	5,891	0.04	5,891	0.001
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	3,376	0.04	3,376	0.001
	Bruce Hwy South of Deep Creek	3,426	0.04	3,426	0.001
	1 km south of Montrose Creek on Bruce Hwy	2,976	0.04	2,976	0.001
	South of Waverly Creek	2,785	0.04	2,785	0.002
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	2,925	0.04	2,925	0.001
	WiM Site Koumala	4,246	0.04	4,246	0.001
	South of Armstrong's Beach Turnoff	5,130	0.04	5,130	0.001
	Sichter Street - Broad Street	12,613	0.04	12,613	0.000
	Between Sarina and Sarina - Homebush TO	11,047	0.04	11,047	0.000
	Sarina - Homebush Road to Hay Point TO	9,835	0.04	9,835	0.000
	North of Macks Truck Stop	16,027	0.04	16,027	0.000
	Broadsound Road Permanent Counter	18,088	0.04	18,088	0.000
	City Gates to Lagoon Street	30,035	0.04	30,035	0.000
	Lagoon Street to Bridge Rd	26,168	0.04	26,168	0.000
	George Street Pedestrian Crossing	35,616	0.04	35,616	0.000

Table 24 Predicted Traffic Increase With the Project – Production Year 5

SCR Section	Road/Segment	Baseline AADT	Project AADT	Total AADT	Increase (%)
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	26,808	11.74	26,820	0.0438
	Capricorn Hwy 3 km west Gracemere	8,341	11.74	8,353	0.1405
	Capricorn Hwy WiM Site at Kabra	6,658	11.74	6,669	0.1760
	Capricorn Hwy 1 km east of Westwood	5,333	11.74	5,344	0.2196
	Capricorn Hwy at 41 Mile Ck	5,360	11.74	5,371	0.2185
	Capricorn Hwy 300 m E of Int 16A/462	5,085	11.74	5,097	0.2303
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	4,588	11.74	4,600	0.2552
	Capricorn Highway 10 km E of Blackwater	4,401	11.74	4,413	0.2660
	200 m West of Int 16B/469	6,599	11.74	6,610	0.1776
	1 km W of Blackwater Mine CHPP T/O	4,013	11.74	4,025	0.2916
	W of Comet River on Cap Hwy	4,092	11.74	4,104	0.2860
	400 m west of Foley Rd on 16B	4,604	11.74	4,616	0.2543
	Capricorn Hwy 200 m W of Codenwarra Rd	16,316	11.74	16,328	0.0719
	Clermont St 70 m W of Borilla St	20,737	11.74	20,748	0.0566
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	11,726	22.62	11,748	0.1926
	250 m west of int. 16C/Selma Rd	4,626	22.62	4,648	0.4867
	Capricorn Hwy 500 m west of Marshall Road	2,337	22.62	2,360	0.9588
	500 m west inter 16C/5501 on 16C	732	0.00	732	0.0000
	Capricorn Highway 8 km east of Alpha	582	0.00	582	0.0000
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	12,833	0.63	12,834	0.0049
	Independent Fuel (M'boro)	11,152	0.63	11,152	0.0057
	North of Lenthals Dam t/off	9,629	0.63	9,630	0.0065
	North of Aerodome Rd int	9,757	0.63	9,757	0.0065
	Snake Gully Sth/Childers	8,752	0.63	8,752	0.0072
	Childers Rail Xing	11,665	0.63	11,666	0.0054
	Adjacent Apple Tree Ck RA	9,605	0.63	9,606	0.0066
	West side/Sandy Creek Bridge	4,631	0.63	4,632	0.0136
	At Booyal School	5,504	0.63	5,505	0.0114
	South of Phillipi Road	6,737	0.63	6,738	0.0094
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	7,401	0.63	7,402	0.0085
	North of Jensens Road	4,943	0.63	4,944	0.0127
	North of Kalpowar T/off	6,107	0.63	6,108	0.0103
	Bruce Hwy at Colosseum Creek	5,719	0.63	5,719	0.0110
	Bruce Hwy 100 m Nth Rodds Ck	8,974	0.63	8,975	0.0070
	Bruce Hwy southern Abut Machine Ck	12,078	0.63	12,078	0.0052

SCR Section	Road/Segment	Baseline AADT	Project AADT	Total AADT	Increase (%)
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	8,117	11.39	8,129	0.1401
	Bruce Calliope 25 m S Calliope River Bdg	5,001	11.39	5,012	0.2273
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	8,823	11.39	8,834	0.1290
	Bruce Hwy Mikros WiM Site (Bobs Ck)	8,978	11.39	8,989	0.1267
	Bruce Hwy 100 m North Gavial Ck	7,277	11.39	7,289	0.1563
	Bruce Hwy 1 km North Scrubby Ck	12,308	11.39	12,319	0.0925
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	31,802	11.39	31,814	0.0358
	Bruce Hwy (Gladstone Rd) @ Derby St	35,138	11.39	35,149	0.0324
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	33,793	0.35	33,793	0.0010
	Bruce Hwy 100 m Sth Knight St	45,717	0.35	45,718	0.0008
	Bruce Hwy at Boland St	32,094	0.35	32,094	0.0011
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	22,103	0.35	22,104	0.0016
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	14,482	0.35	14,482	0.0024
	Bruce Hwy 150 m North Terra Nova Dr	11,528	0.35	11,529	0.0030
	Bruce Hwy 200 m North 14 Mile Ck Rd	6,810	0.35	6,810	0.0051
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	3,820	0.35	3,820	0.0090
	Bruce Hwy South of Deep Creek	4,014	0.35	4,014	0.0086
	1 km south of Montrose Creek on Bruce Hwy	3,349	0.35	3,349	0.0103
	South of Waverly Creek	3,134	0.35	3,134	0.0110
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	3,293	0.35	3,293	0.0105
	WiM Site Koumala	4,779	0.35	4,779	0.0072
	South of Armstrong's Beach Turnoff	5,773	0.35	5,774	0.0060
	Sichter Street - Broad Street	14,196	0.35	14,196	0.0024
	Between Sarina and Sarina - Homebush TO	12,677	0.35	12,677	0.0027
	Sarina - Homebush Road to Hay Point TO	11,334	0.35	11,334	0.0030
	North of Macks Truck Stop	19,039	0.35	19,040	0.0018
	Broadsound Road Permanent Counter	20,358	0.35	20,358	0.0017
	City Gates to Lagoon Street	33,805	0.35	33,805	0.0010
	Lagoon Street to Bridge Rd	29,452	0.35	29,452	0.0012
	George Street Pedestrian Crossing	40,086	0.35	40,087	0.0009

By year 8, underground mining operations are at full production and continue for the next 10 years at fairly consistent levels. At the mid-point year 13 (2030), maximum tonnage is produced and operational deliveries will be representative of a majority of the production period. The projected future traffic volumes for year 13 (2030) with the development of the Project are compared to projected background levels in Table 25.

Table 25 Predicted Traffic Increase With the Project – Year 13

SCR Section	Road/Segment	Baseline AADT	Project AADT	Total AADT	Increase (%)
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	38,652	1.13	38,654	0.003
	Capricorn Hwy 3 km west Gracemere	11,763	1.13	11,764	0.010
	Capricorn Hwy WiM Site at Kabra	8,434	1.13	8,435	0.013
	Capricorn Hwy 1 km east of Westwood	6,755	1.13	6,756	0.017
	Capricorn Hwy at 41 Mile Ck	6,789	1.13	6,790	0.017
	Capricorn Hwy 300 m E of Int 16A/462	6,442	1.13	6,443	0.018
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	5,812	1.13	5,813	0.019
	Capricorn Highway 10 km E of Blackwater	5,575	1.13	5,577	0.020
	200 m West of Int 16B/469	8,359	1.13	8,360	0.014
	1 km W of Blackwater Mine CHPP T/O	5,083	1.13	5,085	0.022
	W of Comet River on Cap Hwy	5,891	1.13	5,892	0.019
	400 m west of Foley Rd on 16B	5,833	1.13	5,834	0.019
	Capricorn Hwy 200 m W of Codenwarra Rd	20,669	1.13	20,670	0.005
	Clermont St 70 m W of Borilla St	26,269	1.13	26,270	0.004
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	14,854	9.13	14,863	0.061
	250 m west of int. 16C/Selma Rd	5,860	9.13	5,869	0.156
	Capricorn Hwy 500 m west of Marshall Road	3,347	9.13	3,356	0.272
	500 m west inter 16C/5501 on 16C	928	0.00	928	0.000
	Capricorn Highway 8 km east of Alpha	737	0.00	737	0.000
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	16,257	0.25	16,257	0.002
	Independent Fuel (M'boro)	14,127	0.25	14,127	0.002
	North of Lenthals Dam t/off	12,198	0.25	12,198	0.002
	North of Aerodome Rd int	12,360	0.25	12,360	0.002
	Snake Gully Sth/Childers	11,086	0.25	11,086	0.002
	Childers Rail Xing	14,777	0.25	14,777	0.002
	Adjacent Apple Tree Ck RA	12,167	0.25	12,168	0.002
	West side/Sandy Creek Bridge	5,867	0.25	5,867	0.004
	At Booyal School	7,355	0.25	7,355	0.003
	South of Phillipi Road	8,954	0.25	8,954	0.003
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	9,449	0.25	9,449	0.003
	North of Jensens Road	6,262	0.25	6,262	0.004
	North of Kalpowar T/off	8,719	0.25	8,719	0.003
	Bruce Hwy at Colosseum Creek	7,862	0.25	7,863	0.003
	Bruce Hwy 100 m Nth Rodds Ck	12,500	0.25	12,501	0.002
	Bruce Hwy southern Abut Machine Ck	15,300	0.25	15,300	0.002

SCR Section	Road/Segment	Baseline AADT	Project AADT	Total AADT	Increase (%)
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	10,283	1.01	10,284	0.010
	Bruce Calliope 25 m S Calliope River Bdg	6,335	1.01	6,336	0.016
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	11,176	1.01	11,177	0.009
	Bruce Hwy Mikros WiM Site (Bobs Ck)	12,062	1.01	12,063	0.008
	Bruce Hwy 100 m North Gavial Ck	9,219	1.01	9,220	0.011
	Bruce Hwy 1 km North Scrubby Ck	16,032	1.01	16,033	0.006
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	40,380	1.01	40,381	0.002
	Bruce Hwy (Gladstone Rd) @ Derby St	44,512	1.01	44,513	0.002
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	42,808	0.12	42,808	0.000
	Bruce Hwy 100 m Sth Knight St	57,913	0.12	57,913	0.000
	Bruce Hwy at Boland St	40,656	0.12	40,656	0.000
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	28,000	0.12	28,000	0.000
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	18,345	0.12	18,346	0.001
	Bruce Hwy 150 m North Terra Nova Dr	15,087	0.12	15,087	0.001
	Bruce Hwy 200 m North 14 Mile Ck Rd	9,100	0.12	9,100	0.001
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	4,892	0.12	4,892	0.002
	Bruce Hwy South of Deep Creek	5,510	0.12	5,510	0.002
	1 km south of Montrose Creek on Bruce Hwy	4,242	0.12	4,243	0.003
	South of Waverly Creek	3,970	0.12	3,970	0.003
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	4,171	0.12	4,171	0.003
	WiM Site Koumala	6,054	0.12	6,054	0.002
	South of Armstrong's Beach Turnoff	7,314	0.12	7,314	0.002
	Sichter Street - Broad Street	17,983	0.12	17,983	0.001
	Between Sarina and Sarina - Homebush TO	16,693	0.12	16,693	0.001
	Sarina - Homebush Road to Hay Point TO	15,052	0.12	15,052	0.001
	North of Macks Truck Stop	26,869	0.12	26,870	0.000
	Broadsound Road Permanent Counter	25,788	0.12	25,789	0.000
	City Gates to Lagoon Street	42,823	0.12	42,823	0.000
	Lagoon Street to Bridge Rd	37,309	0.12	37,309	0.000
	George Street Pedestrian Crossing	50,780	0.12	50,780	0.000

5.1.2.2 Pavement Impact Assessment

The Pavement Impact Assessment indicates the resultant pavement degradation caused by Project heavy vehicle movements. Light vehicle movements are not considered in this assessment as they typically have negligible pavement impacts. The following sections provide a comparison between projected ESAs and total ESAs that can be ascribed to the Project. Increases, given as a percentage of Project generated traffic over projected ESA levels, are also provided.



Construction Period

The projected background ESA levels for Year 0 (CY 2017) are compared to the anticipated Project generated traffic in Table 26. There are no segments of road which will experience percentage increases considered significant under the Guidelines (DTMR 2006) during this year.

Table 26 Predicted ESA – Year 0

SCR Section	Road/Segment	Background ESA	Project ESA	Total ESA	Increase (%)
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	8,278	29.16	8,307	0.35
	Capricorn Hwy 3 km west Gracemere	5,014	29.16	5,043	0.58
	Capricorn Hwy WiM Site at Kabra	4,964	29.16	4,993	0.58
	Capricorn Hwy 1 km east of Westwood	3,743	29.16	3,772	0.77
	Capricorn Hwy at 41 Mile Ck	3,064	29.16	3,093	0.94
	Capricorn Hwy 300 m E of Int 16A/462	2,890	29.16	2,919	1.00
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	2,949	29.16	2,978	0.98
	Capricorn Highway 10 km E of Blackwater	2,166	29.16	2,196	1.33
	200 m West of Int 16B/469	2,697	29.16	2,726	1.07
	1 km W of Blackwater Mine CHPP T/O	1,918	29.16	1,947	1.50
	W of Comet River on Cap Hwy	2,102	29.16	2,131	1.37
	400 m west of Foley Rd on 16B	2,612	29.16	2,641	1.10
	Capricorn Hwy 200 m W of Codenwarra Rd	7,497	29.16	7,526	0.39
	Clermont St 70 m W of Borilla St	8,080	29.16	8,109	0.36
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	4,767	43.87	4,811	0.91
	250 m west of int. 16C/Selma Rd	2,434	43.87	2,477	1.77
	Capricorn Hwy 500 m west of Marshall Road	1,161	43.87	1,205	3.64
	500 m west inter 16C/5501 on 16C	441	0.00	441	0.00
	Capricorn Highway 8 km east of Alpha	412	0.00	412	0.00
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	6,411	5.10	6,416	0.08
	Independent Fuel (M'boro)	5,665	5.10	5,670	0.09
	North of Lenthals Dam t/off	5,477	5.10	5,482	0.09
	North of Aerodome Rd int	5,846	5.10	5,851	0.09
	Snake Gully Sth/Childers	5,036	5.10	5,041	0.10
	Childers Rail Xing	5,645	5.10	5,650	0.09
	Adjacent Apple Tree Ck RA	5,628	5.10	5,633	0.09
	West side/Sandy Creek Bridge	3,305	5.10	3,310	0.15
	At Booyal School	3,459	5.10	3,464	0.15
	South of Phillipi Road	3,741	5.10	3,747	0.14
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	4,348	5.10	4,353	0.12
	North of Jensens Road	3,079	5.10	3,085	0.17



SCR Section	Road/Segment	Background ESA	Project ESA	Total ESA	Increase (%)
	North of Kalpowar T/off	4,039	5.10	4,044	0.13
	Bruce Hwy at Colosseum Creek	3,871	5.10	3,876	0.13
	Bruce Hwy 100 m Nth Rodds Ck	5,216	5.10	5,221	0.10
	Bruce Hwy southern Abut Machine Ck	7,759	5.10	7,764	0.07
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	5,756	25.96	5,782	0.45
	Bruce Calliope 25 m S Calliope River Bdg	4,115	25.96	4,141	0.63
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	7,161	25.96	7,187	0.36
	Bruce Hwy Mikros WiM Site (Bobs Ck)	6,222	25.96	6,248	0.42
	Bruce Hwy 100 m North Gavlal Ck	5,295	25.96	5,321	0.49
	Bruce Hwy 1 km North Scrubby Ck	5,501	25.96	5,527	0.47
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	6,552	25.96	6,578	0.39
	Bruce Hwy (Gladstone Rd) @ Derby St	10,234	25.96	10,260	0.25
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	5,967	3.20	5,971	0.05
	Bruce Hwy 100 m Sth Knight St	9,259	3.20	9,262	0.03
	Bruce Hwy at Boland St	7,447	3.20	7,450	0.04
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	6,193	3.20	6,196	0.05
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	-	3.20	-	-
	Bruce Hwy 150 m North Terra Nova Dr	4,906	3.20	4,910	0.07
	Bruce Hwy 200 m North 14 Mile Ck Rd	3,389	3.20	3,392	0.09
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	2,522	3.20	2,525	0.13
	Bruce Hwy South of Deep Creek	2,354	3.20	2,358	0.14
	1 km south of Montrose Creek on Bruce Hwy	2,414	3.20	2,417	0.13
	South of Waverly Creek	2,259	3.20	2,262	0.14
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	2,363	3.20	2,367	0.14
	WiM Site Koumala	2,733	3.20	2,736	0.12
	South of Armstrong's Beach Turnoff	3,043	3.20	3,046	0.10
	Sichter Street - Broad Street	3,886	3.20	3,890	0.08
	Between Sarina and Sarina - Homebush TO	3,623	3.20	3,627	0.09
	Sarina - Homebush Road to Hay Point TO	3,715	3.20	3,719	0.09
	North of Macks Truck Stop	5,039	3.20	5,042	0.06
	Broadsound Road Permanent Counter	6,418	3.20	6,421	0.05
	City Gates to Lagoon Street	7,369	3.20	7,372	0.04
	Lagoon Street to Bridge Rd	6,495	3.20	6,498	0.05
	George Street Pedestrian Crossing	7,144	3.20	7,147	0.04

Production Period

ESA volumes for year 1 (CY 2018) and year 5 (CY 2022) are employed as representative years for this pavement assessment during the earlier years of the Project. Year 1 represents the initial open-cut production period. Year 5 represents open-cut mining and underground construction simultaneously occurring. Table 27 and Table 28 present the predicted ESAs with and without the Project for CYs 2018 and 2022.

Table 27 Predicted ESA – Year 1

SCR Section	Road/Segment	Baseline ESA	Project ESA	Total ESA	Increase (%)
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	8,665	35.60	8,701	0.41
	Capricorn Hwy 3 km west Gracemere	5,234	35.60	5,270	0.68
	Capricorn Hwy WiM Site at Kabra	5,112	35.60	5,148	0.69
	Capricorn Hwy 1 km east of Westwood	3,855	35.60	3,891	0.91
	Capricorn Hwy at 41 Mile Ck	3,156	35.60	3,192	1.12
	Capricorn Hwy 300 m E of Int 16A/462	2,977	35.60	3,012	1.18
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	3,038	35.60	3,073	1.16
	Capricorn Highway 10 km E of Blackwater	2,231	35.60	2,267	1.57
	200 m West of Int 16B/469	2,778	35.60	2,813	1.27
	1 km W of Blackwater Mine CHPP T/O	1,975	35.60	2,011	1.77
	W of Comet River on Cap Hwy	2,200	35.60	2,235	1.59
	400 m west of Foley Rd on 16B	2,690	35.60	2,726	1.31
	Capricorn Hwy 200 m W of Codenwarra Rd	7,722	35.60	7,758	0.46
	Clermont St 70 m W of Borilla St	8,322	35.60	8,358	0.43
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	4,910	45.25	4,955	0.91
	250 m west of int. 16C/Selma Rd	2,507	45.25	2,552	1.77
	Capricorn Hwy 500 m west of Marshall Road	1,215	45.25	1,260	3.59
	500 m west inter 16C/5501 on 16C	455	0.0	455	0.00
	Capricorn Highway 8 km east of Alpha	424	0.0	424	0.00
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	6,603	0.25	6,604	0.00
	Independent Fuel (M'boro)	5,835	0.25	5,835	0.00
	North of Lenthals Dam t/off	5,641	0.25	5,641	0.00
	North of Aerodome Rd int	6,022	0.25	6,022	0.00
	Snake Gully Sth/Childers	5,187	0.25	5,187	0.00
	Childers Rail Xing	5,814	0.25	5,814	0.00
	Adjacent Apple Tree Ck RA	5,797	0.25	5,797	0.00
	West side/Sandy Creek Bridge	3,404	0.25	3,404	0.01
	At Booyal School	3,586	0.25	3,587	0.01
	South of Phillipi Road	3,877	0.25	3,877	0.01



SCR Section	Road/Segment	Baseline ESA	Project ESA	Total ESA	Increase (%)
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	4,483	0.25	4,483	0.01
	North of Jensens Road	3,172	0.25	3,172	0.01
	North of Kalpowar T/off	4,223	0.25	4,223	0.01
	Bruce Hwy at Colosseum Creek	4,028	0.25	4,029	0.01
	Bruce Hwy 100 m Nth Rodds Ck	5,436	0.25	5,437	0.00
	Bruce Hwy southern Abut Machine Ck	7,992	0.25	7,992	0.00
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	5,928	35.52	5,964	0.60
	Bruce Calliope 25 m S Calliope River Bdg	4,238	35.52	4,274	0.83
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	7,376	35.52	7,411	0.48
	Bruce Hwy Mikros WiM Site (Bobs Ck)	6,456	35.52	6,492	0.55
	Bruce Hwy 100 m North Gavlat Ck	5,454	35.52	5,489	0.65
	Bruce Hwy 1 km North Scrubby Ck	5,686	35.52	5,721	0.62
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	6,750	35.52	6,786	0.52
	Bruce Hwy (Gladstone Rd) @ Derby St	10,541	35.52	10,576	0.34
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	6,146	0.08	6,146	0.00
	Bruce Hwy 100 m Sth Knight St	9,536	0.08	9,536	0.00
	Bruce Hwy at Boland St	7,670	0.08	7,670	0.00
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	6,378	0.08	6,378	0.00
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	-	0.08	-	-
	Bruce Hwy 150 m North Terra Nova Dr	5,074	0.08	5,074	0.00
	Bruce Hwy 200 m North 14 Mile Ck Rd	3,514	0.08	3,514	0.00
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	2,601	0.08	2,601	0.00
	Bruce Hwy South of Deep Creek	2,449	0.08	2,450	0.00
	1 km south of Montrose Creek on Bruce Hwy	2,486	0.08	2,486	0.00
	South of Waverly Creek	2,327	0.08	2,327	0.00
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	2,434	0.08	2,434	0.00
	WiM Site Koumala	2,815	0.08	2,815	0.00
	South of Armstrong's Beach Turnoff	3,134	0.08	3,134	0.00
	Sichter Street - Broad Street	4,003	0.08	4,003	0.00
	Between Sarina and Sarina - Homebush TO	3,750	0.08	3,750	0.00
	Sarina - Homebush Road to Hay Point TO	3,850	0.08	3,850	0.00
	North of Macks Truck Stop	5,261	0.08	5,261	0.00
	Broadsound Road Permanent Counter	6,610	0.08	6,610	0.00
	City Gates to Lagoon Street	7,590	0.08	7,590	0.00
	Lagoon Street to Bridge Rd	6,690	0.08	6,690	0.00
	George Street Pedestrian Crossing	7,358	0.08	7,358	0.00

Table 28 Predicted ESA – Year 5

SCR Section	Road/Segment	Baseline ESA	Project ESA	Total ESA	Increase (%)
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	10,405	38.90	10,444	0.37
	Capricorn Hwy 3 km west Gracemere	6,216	38.90	6,255	0.62
	Capricorn Hwy WiM Site at Kabra	5,754	38.90	5,793	0.67
	Capricorn Hwy 1 km east of Westwood	4,339	38.90	4,378	0.89
	Capricorn Hwy at 41 Mile Ck	3,552	38.90	3,591	1.08
	Capricorn Hwy 300 m E of Int 16A/462	3,350	38.90	3,389	1.15
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	3,419	38.90	3,458	1.13
	Capricorn Highway 10 km E of Blackwater	2,512	38.90	2,550	1.53
	200 m West of Int 16B/469	3,126	38.90	3,165	1.23
	1 km W of Blackwater Mine CHPP T/O	2,223	38.90	2,262	1.72
	W of Comet River on Cap Hwy	2,639	38.90	2,678	1.45
	400 m west of Foley Rd on 16B	3,028	38.90	3,066	1.27
	Capricorn Hwy 200 m W of Codenwarra Rd	8,691	38.90	8,730	0.45
	Clermont St 70 m W of Borilla St	9,367	38.90	9,405	0.41
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	5,526	61.53	5,588	1.10
	250 m west of int. 16C/Selma Rd	2,821	61.53	2,883	2.13
	Capricorn Hwy 500 m west of Marshall Road	1,454	61.53	1,515	4.06
	500 m west inter 16C/5501 on 16C	512	0.00	512	0.00
	Capricorn Highway 8 km east of Alpha	477	0.00	477	0.00
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	7,432	1.74	7,434	0.02
	Independent Fuel (M'boro)	6,567	1.74	6,569	0.03
	North of Lenthals Dam t/off	6,349	1.74	6,351	0.03
	North of Aerodome Rd int	6,778	1.74	6,779	0.03
	Snake Gully Sth/Childers	5,838	1.74	5,840	0.03
	Childers Rail Xing	6,544	1.74	6,545	0.03
	Adjacent Apple Tree Ck RA	6,524	1.74	6,526	0.03
	West side/Sandy Creek Bridge	3,831	1.74	3,833	0.05
	At Booyal School	4,146	1.74	4,147	0.04
	South of Phillipi Road	4,469	1.74	4,471	0.04
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	5,065	1.74	5,067	0.03
	North of Jensens Road	3,570	1.74	3,572	0.05
	North of Kalpowar T/off	5,046	1.74	5,047	0.03
	Bruce Hwy at Colosseum Creek	4,723	1.74	4,725	0.04
	Bruce Hwy 100 m Nth Rodds Ck	6,416	1.74	6,418	0.03
	Bruce Hwy southern Abut Machine Ck	8,995	1.74	8,997	0.02

SCR Section	Road/Segment	Baseline ESA	Project ESA	Total ESA	Increase (%)
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	6,672	37.82	6,710	0.56
	Bruce Calliope 25 m S Calliope River Bdg	4,770	37.82	4,808	0.79
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	8,301	37.82	8,339	0.45
	Bruce Hwy Mikros WiM Site (Bobs Ck)	7,483	37.82	7,521	0.50
	Bruce Hwy 100 m North Gavial Ck	6,138	37.82	6,176	0.61
	Bruce Hwy 1 km North Scrubby Ck	6,489	37.82	6,527	0.58
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	7,606	37.82	7,644	0.49
	Bruce Hwy (Gladstone Rd) @ Derby St	11,864	37.82	11,901	0.32
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	6,918	1.08	6,919	0.02
	Bruce Hwy 100 m Sth Knight St	10,733	1.08	10,734	0.01
	Bruce Hwy at Boland St	8,633	1.08	8,634	0.01
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	7,179	1.08	7,180	0.02
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	-	1.08	-	-
	Bruce Hwy 150 m North Terra Nova Dr	5,805	1.08	5,806	0.02
	Bruce Hwy 200 m North 14 Mile Ck Rd	4,062	1.08	4,063	0.03
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	2,943	1.08	2,944	0.04
	Bruce Hwy South of Deep Creek	2,870	1.08	2,871	0.04
	1 km south of Montrose Creek on Bruce Hwy	2,798	1.08	2,799	0.04
	South of Waverly Creek	2,619	1.08	2,620	0.04
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	2,740	1.08	2,741	0.04
	WiM Site Koumala	3,169	1.08	3,170	0.03
	South of Armstrong's Beach Turnoff	3,527	1.08	3,528	0.03
	Sichter Street - Broad Street	4,505	1.08	4,506	0.02
	Between Sarina and Sarina - Homebush TO	4,303	1.08	4,305	0.03
	Sarina - Homebush Road to Hay Point TO	4,436	1.08	4,437	0.02
	North of Macks Truck Stop	6,249	1.08	6,251	0.02
	Broadsound Road Permanent Counter	7,440	1.08	7,441	0.01
	City Gates to Lagoon Street	8,543	1.08	8,544	0.01
	Lagoon Street to Bridge Rd	7,530	1.08	7,531	0.01
	George Street Pedestrian Crossing	8,282	1.08	8,283	0.01

By year 13 (2030), underground mining operations have been at full production for five years and operational deliveries will be representative of a majority of the production period. The projected future ESAs for 2030, without and with the development of the Project, are presented in Table 29.

Table 29 Predicted ESA – Year 13

SCR Section	Road/Segment	Baseline ESA	Project ESA	Total ESA	Increase (%)
16A	Capricorn Highway (Rockhampton to Duaringa)				
	Capricorn Hwy 1.5 km west Bruce Hwy	15,002	3.33	15,005	0.02
	Capricorn Hwy 3 km west Gracemere	8,765	3.33	8,768	0.04
	Capricorn Hwy WiM Site at Kabra	7,289	3.33	7,292	0.05
	Capricorn Hwy 1 km east of Westwood	5,497	3.33	5,500	0.06
	Capricorn Hwy at 41 Mile Ck	4,500	3.33	4,503	0.07
	Capricorn Hwy 300 m E of Int 16A/462	4,244	3.33	4,247	0.08
16B	Capricorn Highway (Duaringa - Emerald)				
	1.5 km East of Dingo	4,331	3.33	4,334	0.08
	Capricorn Highway 10 km E of Blackwater	3,182	3.33	3,185	0.10
	200 m West of Int 16B/469	3,961	3.33	3,964	0.08
	1 km W of Blackwater Mine CHPP T/O	2,817	3.33	2,820	0.12
	W of Comet River on Cap Hwy	3,799	3.33	3,803	0.09
	400 m west of Foley Rd on 16B	3,835	3.33	3,839	0.09
	Capricorn Hwy 200 m W of Codenwarra Rd	11,010	3.33	11,013	0.03
	Clermont St 70 m W of Borilla St	11,865	3.33	11,869	0.03
16C	Capricorn Highway (Emerald to Alpha)				
	200 m east of int. 16C/Selma Rd	7,000	28.22	7,029	0.40
	250 m west of int. 16C/Selma Rd	3,574	28.22	3,602	0.78
	Capricorn Hwy 500 m west of Marshall Road	2,081	28.22	2,110	1.34
	500 m west inter 16C/5501 on 16C	648	0.00	648	0.00
	Capricorn Highway 8 km east of Alpha	605	0.00	605	0.00
10C	Bruce Highway (Maryborough to Gin Gin)				
	North/Showgrounds Rd (M'boro)	9,415	0.71	9,416	0.01
	Independent Fuel (M'boro)	8,319	0.71	8,320	0.01
	North of Lenthals Dam t/off	8,042	0.71	8,043	0.01
	North of Aerodome Rd int	8,586	0.71	8,586	0.01
	Snake Gully Sth/Childers	7,396	0.71	7,396	0.01
	Childers Rail Xing	8,289	0.71	8,290	0.01
	Adjacent Apple Tree Ck RA	8,265	0.71	8,265	0.01
	West side/Sandy Creek Bridge	4,853	0.71	4,854	0.01
	At Booyal School	5,540	0.71	5,540	0.01
	South of Phillipi Road	5,940	0.71	5,941	0.01
10D	Bruce Highway (Gin Gin to Benaraby)				
	South of Roadtek Depot Gin Gin	6,466	0.71	6,467	0.01
	North of Jensens Road	4,522	0.71	4,523	0.02
	North of Kalpowar T/off	7,203	0.71	7,204	0.01



SCR Section	Road/Segment	Baseline ESA	Project ESA	Total ESA	Increase (%)
	Bruce Hwy at Colosseum Creek	6,494	0.71	6,495	0.01
	Bruce Hwy 100 m Nth Rodds Ck	8,937	0.71	8,938	0.01
	Bruce Hwy southern Abut Machine Ck	11,395	0.71	11,395	0.01
10E	Bruce Highway (Benaraby to Rockhampton)				
	Bruce Hwy 500 m S Dawson Hwy	8,452	3.06	8,455	0.04
	Bruce Calliope 25 m S Calliope River Bdg	6,043	3.06	6,046	0.05
	Bruce Hwy 1 km south Hut Ck (North Ambrose)	10,516	3.06	10,519	0.03
	Bruce Hwy Mikros WiM Site (Bobs Ck)	10,054	3.06	10,057	0.03
	Bruce Hwy 100 m North Gavial Ck	7,776	3.06	7,779	0.04
	Bruce Hwy 1 km North Scrubby Ck	8,453	3.06	8,456	0.04
	Bruce Hwy 100 m N Oswald St (Lower Dawson R)	9,658	3.06	9,661	0.03
	Bruce Hwy (Gladstone Rd) @ Derby St	15,028	3.06	15,031	0.02
10F	Bruce Highway (Rockhampton to St Lawrence)				
	Bruce Hwy @ Archer St (Lights)	8,763	0.28	8,764	0.00
	Bruce Hwy 100 m Sth Knight St	13,597	0.28	13,597	0.00
	Bruce Hwy at Boland St	10,936	0.28	10,936	0.00
	Bruce Hwy 800 m Sth Rton - Yeppoon Rd	9,094	0.28	9,094	0.00
	Bruce Hwy 200 m Sth Mason Ave (Parkhurst)	-		-	-
	Bruce Hwy 150 m North Terra Nova Dr	7,597	0.28	7,597	0.00
	Bruce Hwy 200 m North 14 Mile Ck Rd	5,428	0.28	5,429	0.01
	Bruce Hwy 40 m Sth Mountain Ck (Kunwarara)	3,769	0.28	3,769	0.01
	Bruce Hwy South of Deep Creek	3,940	0.28	3,940	0.01
	1 km south of Montrose Creek on Bruce Hwy	3,545	0.28	3,545	0.01
	South of Waverly Creek	3,318	0.28	3,318	0.01
10G	Bruce Highway (St Lawrence to Mackay)				
	North of Claireview	3,471	0.28	3,471	0.01
	WiM Site Koumala	4,014	0.28	4,014	0.01
	South of Armstrong's Beach Turnoff	4,468	0.28	4,468	0.01
	Sichter Street - Broad Street	5,707	0.28	5,708	0.00
	Between Sarina and Sarina - Homebush TO	5,667	0.28	5,667	0.00
	Sarina - Homebush Road to Hay Point TO	5,892	0.28	5,892	0.00
	North of Macks Truck Stop	8,820	0.28	8,820	0.00
	Broadsound Road Permanent Counter	9,425	0.28	9,425	0.00
	City Gates to Lagoon Street	10,822	0.28	10,822	0.00
	Lagoon Street to Bridge Rd	9,538	0.28	9,539	0.00
	George Street Pedestrian Crossing	10,491	0.28	10,492	0.00

5.1.3 Local Road Traffic and Pavement Impacts

Traffic generated as part of the construction of the Project will impact upon the local road network managed by CHRC, along a section of the Anakie – Sapphire Road, which will intersect the Capricorn Highway to the west of the Project. Based on the transport corridors presented in Section 3.1.1 and the anticipated AADT increases presented in the Road Impact Assessment undertaken on the SCR network, an attempt has been made to quantify project vehicle movements on the local road network.

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

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

5.1.4 Road Safety

Additional vehicular movements and the transport of hazardous material to and from the mining operation have the potential to reduce road network efficiency and create additional road safety concerns. The Transport Impact Assessment identified traffic increases due to the Project to be low. Nonetheless, measures will be implemented to ensure that road safety is maintained during the whole life of the Project. As the mine evolves, Taraborah will continue to engage with relevant regional councils and DTMR to discuss safety concerns.

Appendix B of the GARID provides a checklist of potential safety issues that should be addressed for all developments. These issues pertain to intersections, site access, road links, and other road users. The following sections address potential road safety concerns associated with development and operation of the Project.

Table 30 Road Safety Issues Checklist

Safety Aspects	
Intersections and Access	On and off-site queuing
	Access location and layout / sight distance
	Bus stops
	Lighting
	Pavement marking & signage
	Speed environment
	Intersection operation & acceleration / deceleration lane
	Auxiliary turn lanes / lengths / weaving
	Heavy vehicle and bus turnpaths
	Utilities (hardware / services)
	Location of poles / traffic signal
Road Links	Road width
	Shoulder seals
	Vertical / horizontal alignment
	Bridges and approaches
	Clearance to obstructions
	Overtaking opportunities



Safety Aspects	
Pedestrians	Road crossing facilities
	Footpaths
	Disabled provision
Cyclists	Cycle lanes / paths
	Road crossing facilities
	Intersection provision
Motorcyclists	Road surface
	Warning of hazards
	Barrier kerbs
	Visibility at intersections
	Drainage pits and culverts

Source: Department of Main Roads (DMR) (2006)

5.1.4.1 Heavy Vehicles

Road safety impacts typically associated with increased HV usage of the road network, particularly secondary or local roads, include visibility issues for other road users, increased risk of collision due to an increased number of road users, and driver fatigue. The greatest road safety risks associated with the Project's heavy vehicle usage will occur during the construction phases, primarily to transport materials and equipment to the site.

Heavy vehicles proposed to be used for Project construction include Six Axle Articulated and Four Axle trucks, and B-Double Road Trains. The Anakie – Sapphire Road (a local major road) will primarily be utilised during the open-cut construction phase for the Project for the transport of road materials and a proportion of rail, ballast and bridge steel materials. An estimated total of 2,202 HV trips with a total of 7,456.88 HV ESAs will be required along the Anakie – Sapphire Road during the construction periods. However, safety risks associated with heavy vehicle use of this route will be short-term; following open-cut construction, this route is only proposed to be used for the transport of approximately 35 loads of gravel material per annum from Sapphire in a B-Double Road Train.

The remainder of materials required during construction and production of the Project will be sourced from Gladstone, Mackay, Emerald, and Brisbane (in some cases), and will be transported via the Bruce and Capricorn Highways. An estimated total of 5,768 HV trips from Mackay / Gladstone and Emerald with a total of 15,437.78 HV ESAs will be required for the open-cut and underground construction periods. However, the Traffic Impact Assessment determined that the construction period would not generate any increases along the relevant SCR routes considered to be significant under the GARID. Traffic increases along Section #16A – 16C are estimated to be up to 0.871%.

A total of 116 trucks have been involved in road accidents along the Capricorn Highway between 2002 and 2013. During this period, a further 94 trucks have been involved in accidents on the Peak Downs Highway and another 39 on the Gregory Highway. The upgrades to the Capricorn Highway to facilitate Project access will reduce the risk of collisions resulting from heavy vehicles turning off onto the Project access road. The intersection of the Anakie-Sapphire Road with the Capricorn Highway has pavement markings indicating traffic turning onto the Capricorn Highway to give-way. Visibility is not a significant concern; there are few physical obstructions impeding visibility and the road is relatively straight and level at this intersection.



5.1.4.2 Hazardous Material Transport

The movement of hazardous materials has road safety implications. Spills, whilst infrequent, have potentially serious consequences. The transport of hazardous materials will be by certified carriers and will abide by the guidelines set out in the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (National Road Transport Commission 1998).

The storage and handling of hazardous materials will be conducted in an appropriate way consistent with the relevant standards. The management of spills will be in accordance with the recommended mitigation strategies to reduce the risk and consequence of hazardous material movements.

Table 31 lists the principal dangerous goods, their purpose, maximum quantity stored and the location onsite. Other dangerous goods, which may be required for the Project in minor quantities, will be identified prior to their arrival on-site and appropriate measures implemented to manage their safe storage and use in accordance with the requirements of the relevant legislation and standards.

Material Safety Data Sheets (MSDS) for all materials and chemicals used will be available at appropriate locations such as the chemicals storage facilities and the CHPP. Spill prevention and spill response strategies will be implemented in accordance with the relevant Australian Standards (AS). All hazardous materials on-site will be managed in accordance with the relevant AS. These standards include:

- *AS 4452:1997 The Storage and Handling of Toxic Substances (AS 4452:1997);*
- *AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids (AS 1940:2004);*
- *AS 3780:1994 The Storage and Handling of Corrosive Substances (AS 3780:1994);*
- *AS 4452:1997 The Storage and Handling of Toxic Substances (AS 4452:1997);*
- *AS 2187: Part 1 Storage of Explosives; and*
- *AS 2187: Part 2 Use of Explosives.*

Given that these materials will be correctly stored, handled and disposed of, there is negligible risk to nearby land users or to the social and natural environments.

The key hazards associated with dangerous goods during the both the construction and operational phases are similar to those used at present at other operating mines in the Bowen Basin region. Dangerous goods and hazardous substances required at the Project will be acquired from approved manufacturers and suppliers. Diesel will be the most significant hazardous substance utilised. Explosives, detonators and boosters will also be used in the mining process.

Shenhua will engage a specialist contractor to audit the fuel systems and explosives magazine to ensure compliance with legislation and leading practice management procedures. With the correct controls in place, there will be negligible risk to employees, adjacent land users, general public and the environment. While the likelihood of an incident is low, the impact from any potential incident involving dangerous goods and hazardous substances would most likely occur and be contained within the site, where the materials are stored and used. Emergency response procedures will be implemented to manage any such incidents which may occur.



Table 31 Indicative List of Hazardous and Dangerous Goods

Chemical	Hazardous Goods Class	Raw Concentration (W%)	Store Concentration (W%)	United Nations (UN) Number	Packaging Group	Location on Site	Purpose / Use
Diesel Fuel Oil	Three (Class C1)*	N/A	N/A	1202	III	Fuel Area	Fuel for mobile equipment
Hydraulic Oil	Three (Class C2)**	N/A	N/A	N/A	N/A	Workshop	Lubricate plant and equipment
Caustic Soda	Eight	50	50	1823	II	Warehouse	Concrete degreasing agent
Detonators and Explosives	One	N/A	N/A	0029/0020 and 0082/0331	N/A	Explosives Magazine	Blasting
Batteries and Acid	Eight	N/A	N/A	2794 and 2796	II	Warehouse	Vehicles and Equipment
Solvents	Three	99.5	99.5	1090	II	Warehouse	Workshop degreasing agent
Paints	Three	N/A	N/A	1263	III	Warehouse	Paint

Note: * Class C1 – a combustible liquid that has a flashpoint of 150°C or less.

** Class C2 – a combustible liquid that has a flashpoint exceeding 150°C.



5.1.4.3 Driver Fatigue

Driver fatigue is particularly dangerous because it affects everyone, no matter how experienced the driver is. Driving when becoming fatigued is a high risk behaviour. Fatigue contributes to 20-30% of all deaths on the road and is as major a contributory factor to the road toll as speeding and drink driving. The contribution of fatigue may even reach 40-50% in particular crash types, such as fatal single vehicle semi-trailer crashes (CARRS – Q, 2011).

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

Management strategies to address driver fatigue of the DIDO worker's as they travel to and from their home base and Emerald at the beginning and end of their roster periods will also be implemented. Strategies to be considered will include shorter shift lengths at the beginning and end of the roster periods, mandatory rest periods at the end of rosters, etc.

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

A fatigue risk assessment will be conducted during the detailed design phase prior to construction in order to determine the major issues to be addressed in the development of the site's Fatigue Risk Management Plan. The commuting times to and from the Project site will be considered in this assessment process, as will the fatigue of DIDO workers.

5.1.4.4 Intersections, Access and Road Links

Access to the Project will be via a new access road adjoining the Capricorn Highway. The Project access design incorporates dedicated turning lanes to safely access the Project, acceleration / deceleration lane and appropriate pavement markings to minimise the risks associated with turning off the Capricorn Highway into the Project area. A T-intersection will be constructed where the access road intersects the Capricorn Highway, allowing vehicles exiting the site to merge onto the Highway. All State road standards will be adhered to in the design of intersections and access roads.

Lighting is not considered to be a key safety concern for the Project. All anticipated access to the Project site, including material deliveries and workforce shift changeovers will occur during daylight periods.

The CHRC's Strategic Framework states that development that significantly increases the volume of traffic on rural roads may necessitate improvements to the road design to maintain operational efficiency and road users' safety. Although a significant increase in traffic is not anticipated, opportunities to minimise road safety risks, particularly at key intersections and routes, will be investigated prior to Project development, in consultation with the CHRC and DTMR. Prior to construction of the Project, a comprehensive RIA will be undertaken, addressing specific and detailed design requirements, such as enhanced lighting, signage and pavement markings on routes utilised by the Project, to ensure compliance with the Road Planning and Design Manual (2nd edition) (DTMR 2013).

The intersection of the Anakie-Sapphire Road with the Capricorn Highway has 'give-way' pavement markings for traffic turning onto the Capricorn Highway. Visibility is not a significant concern; there are



few physical obstructions impeding visibility, and the road is relatively straight and level at this intersection. Queensland road crash statistics from 2002 – 2013 indicate that three road accidents have occurred at the intersection of the Anakie – Sapphire Road and Capricorn Highway. No fatalities resulted from these incidents.

As described above, upgrades to the proposed access road intersection with the Capricorn Highway will minimise the risk of collisions due to vehicles turning to and from the Project site. A total of 42 fatalities have been recorded along the Capricorn Highway between 2002 and 2013, the majority of which occurred during daylight hours on clear days on a dry sealed road surface. Most did not occur at intersections, although the data indicate a lack of traffic control (e.g. give way / stop signage) at T- and Cross-intersections. Of all these fatalities, a total seven trucks, four motorcycles, five pedestrians, and 44 cars were involved.

5.1.4.5 Other Road Users

There are no known public transport services in the area of the Project. Given the nature of the location, there are no identifiable designated cycle ways or pedestrian networks present. Similarly, the nature of the rural location dominated by mining and agriculture means that motorcyclists and pedestrians are infrequent.

5.1.5 Impacts on Environmental Values

5.1.5.1 Dust and Greenhouse Gas

The major sources of dust emissions relate to operational activities on the Project site rather than transport.

Dust emission rates were calculated based on detailed activity data determined from the mine plans and other available data. For the majority of dust producing activities, the dust emission rate is dependent on the wind speed, with little or no dust emissions occurring for some activities below a threshold wind speed.

A number of dust controls are proposed to be used throughout the duration of the Project. Those specific to transport include the flattening (to a ‘garden-bed’ shape) and veneering of product coal in the train wagons before transport to the Port of Gladstone. The transport of goods and personnel to and from the Project site is not considered to create significant dust emission issues.

The total dust emission rates associated with the Project are discussed in Section 4.6.

Greenhouse gases associated with the Project have been assessed in the Greenhouse Gas Impact Assessment report provided in Appendix A16.

5.1.5.2 Noise and Vibration

The rail noise contribution has been considered for trains associated with the proposed Taraborah Project as they travel along the existing Central West and Blackwater rail systems to the WICET near Gladstone.

It is predicted that the train pass-bys would meet the QR average maximum A-weighted sound pressure level noise criteria of 87 ‘A’ weighted decibels (dBA) at approximately 40 m from the railway under neutral meteorological conditions, or approximately 60 m under adverse meteorological conditions (e.g. downwind). It is predicted that the QR equivalent continuous sound level, (24 hour) noise limit of 65 dBA would be met within 10 m of the main QR rail line for six train movements per



day (i.e. 3 trains both to and from the mine). In summary, QR noise criteria are predicted to be met at approximately 60 m or less from the railway lines along the route from the mine to the export terminal, under adverse, neutral and favourable meteorological conditions.

There is a small potential risk that flyrock may be deposited on the Capricorn Highway during open-cut blasting in the last 2 years, and therefore, the road will be temporarily shut for 20-30 minutes during these occasions, which could occur approximately 20 times in each year.

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

5.2 RAIL

The existing rail traffic on this section of the Central West railway system is four x 450 m length trains (peak per week) and is generally restricted to the bi-weekly passenger service to Longreach. Due to the Project, rail traffic along this system is planned to be increased by an additional three x 1425 m length trains in each direction (total of six per day) (ALCAM 2013). The Blackwater railway system has a higher peak per day usage; therefore the three additional trains per day from the Project will not cause significant impact on this system.

The Central West railway system will be temporarily closed daily from Q4 2017 to 3Q 2018, with the closures to work around the minimal regular train movements each week.

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

5.2.1 ALCAM Assessment

The Australian Level Crossing Assessment Model (ALCAM) is the Australian and New Zealand standard for assessing level crossings. ALCAM is an assessment tool used to identify key potential risks at level crossings and to assist in the prioritisation of railway level crossings according to their comparative safety risk. ALCAM is a complex scoring algorithm which considers each level crossing's physical properties (characteristics and controls) including consideration of the related common human behaviours, to provide each level crossing with a likelihood factor score. This score is then multiplied by the level crossing's exposure score (a factor taking into account the volumes of Vehicles / Pedestrians and Trains) and finally multiplied by the consequence score to give the ALCAM Risk score. The tool can also be used to assess the current and projected safety of each level crossing following the commencement of a proposed Project utilising the railway system. All public level crossings on the Government supported non-commercial rail network in Queensland have been risk assessed using ALCAM.

Impacts to rail crossings within and adjacent to the Project site have been undertaken using the ALCAM. Rail traffic for the Project is planned to utilise the existing QR Central West railway system and existing level crossings from Nogoa Junction (263.3 km) westwards through Emerald to approximately the St Helen's Road Level Crossing (287.7 km), totalling a distance of 24.4 km. The Blackwater railway system is not assessed under ALCAM, as it is a privately managed, commercial railway. The full ALCAM report, with an assessment of each crossing and suggested mitigation measures to increase safety, is provided in Appendix A.



Locations of each ALCAM site assessed are provided in Figure 8 below. A total of 14 crossings (including pedestrian) are included in the ALCAM report. A summary of findings is presented in Table 32 below. Note that the St Helens private road crossing (ID2777) will become dysfunctional when the Project begins as the road will be relocated to accommodate the open-cut mine and MIA. Therefore, it has been omitted from Table 32.

To compare the risk scores for a range of crossings, a reference score is used that can provide an indicative assessment of the risk relative to the collision. Two reference scores are used; the installation limit score and the intervention limit score. It can be noted that these scores do not determine whether or not a crossing is safe, but rather how the risk score compares with the level of risk that may be acceptable at other crossings with a similar traffic and road environmental profile. The installation limit score indicates a level below which the level crossing risk is likely to be within acceptable limits. The intervention limit score indicates a level which there is likely to be safety hazards that require priority attention to mitigate the level of risk. Scores highlighted in blue currently exceed the intervention limit scores. This occurs at the Opal Street pedestrian crossing. These scores are a reflection of the anticipated Project impacts with no mitigation measures, rather than current conditions. With mitigation efforts, the up and down train crossings will be well within acceptable safety limits. It is noted that the crossing within the Project site will not require any safety upgrades to meet the ALCAM reference scores. Shenhua have committed to the provision of boom gates and automated signals at the newly constructed rail crossing for the TLO and rail loop facility.

Table 32 ALCAM Assessment Scores Along the Central West Railway System

Level Crossing	Scores	Existing ALCAM Likelihood Factor	Proposed ALCAM Likelihood Factor with Additional Safety Works	Proposed ALCAM Likelihood Factor with Additional Safety Works and Proposed Project
Gregory Highway Level Crossing ID755	ALCAM Score	91	N/A*	97
	Installation Limit	170		153
	Intervention Limit	280		223
Gregory Highway Pedestrian Crossing (UP side) ID755	ALCAM Score	21	20	21
	Installation Limit	225	350	350
	Intervention Limit	300	500	500
Opal Street Level Crossing ID 756	ALCAM Score	123	90	93
	Installation Limit	123	200	200
	Intervention Limit	400	400	400
Opal Street Pedestrian Crossings (upside) ID756	ALCAM Score	222	No Data	55
	Installation Limit	100		350
	Intervention Limit	140		500
Opal Street Pedestrian Crossings (down side) ID756	ALCAM Score	308	No Data	54
	Installation Limit	100		350
	Intervention Limit	140		500
Selma Road Level Crossing ID 2771	ALCAM Score	110	95	100
	Installation Limit	103	198	195
	Intervention Limit	390	390	380
Stock Route Occupation Crossing ID6890	N/A**			
Marshall Level Crossing ID2772	ALCAM Score	214	188	172
	Installation Limit	190	200	200
	Intervention Limit	400	400	400
Denison Road Level Crossing ID2773	ALCAM Score	211	191	182
	Installation Limit	193	200	200

Level Crossing	Scores	Existing ALCAM Likelihood Factor	Proposed ALCAM Likelihood Factor with Additional Safety Works	Proposed ALCAM Likelihood Factor with Additional Safety Works and Proposed Project
	Intervention Limit	400	400	400
Main Roads Stockpile Access Road Crossing ID2774	N/A**			
Property Access Road ID3769	N/A**			
Old Selma Siding Access Road ID2775	N/A**			
Wilga Downs Road Level Crossing ID2776 ¹	ALCAM Score	334	199	190
	Installation Limit	193	200	200
	Intervention Limit	400	400	400
St Helens Road Level Crossing ID2777	ALCAM Score	282	168	161
	Installation Limit	195	200	200
	Intervention Limit	400	400	400

Notes: * indicates this level crossing is up to standard and no remedial actions are recommended.

** indicates the crossing is not being utilised and is privately owned

¹ indicates the level crossing is within the Taraborah Project Site



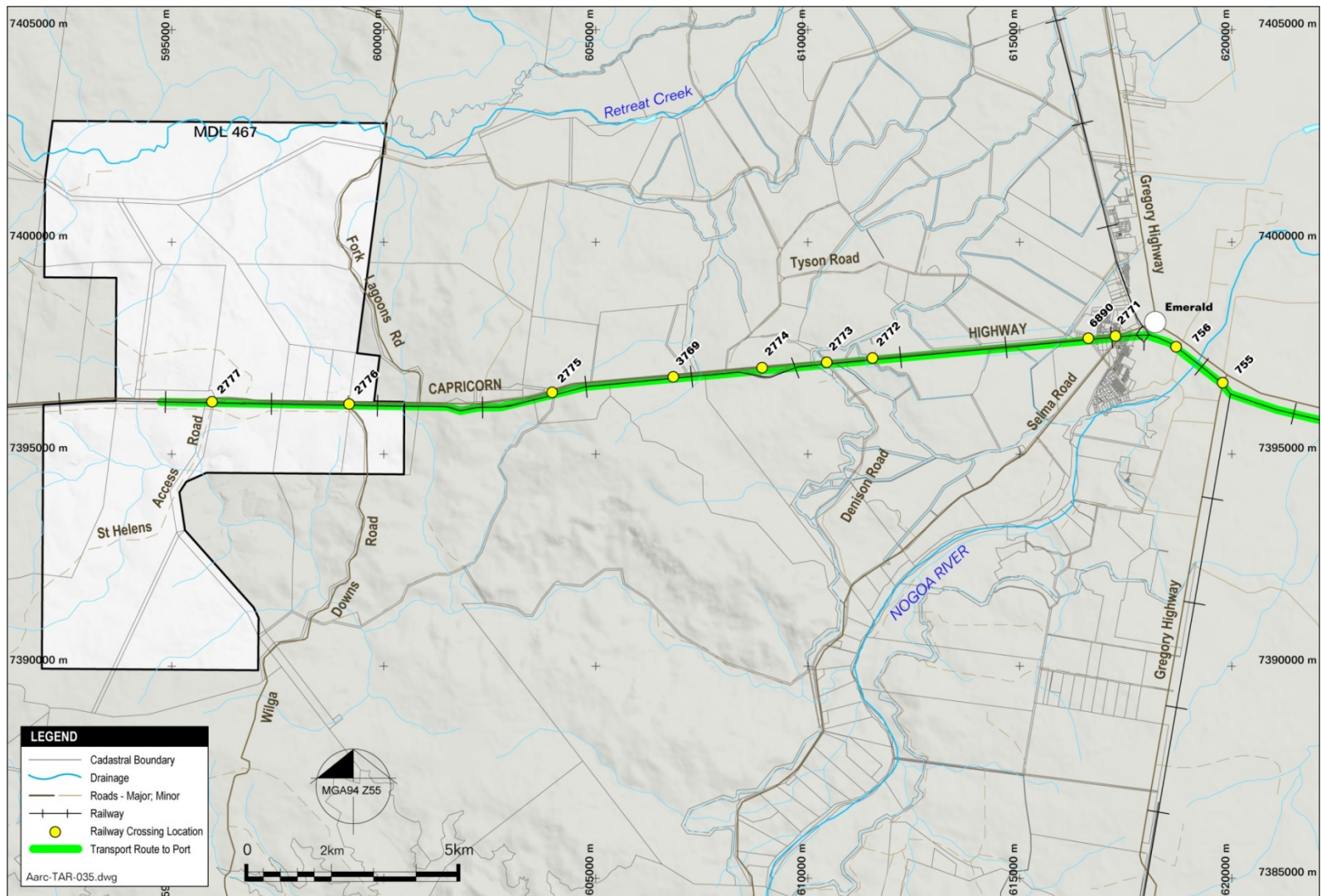


Figure 8 ALCAM Sites

5.2.2 Level Crossing Traffic Impact Assessment

Brown Consulting were engaged to undertake an assessment of the impacts on traffic flow at the three level railway line crossings in Emerald as a result of the coal product transport by rail from the Project. The assessment consisted of traffic simulation modelling and sensitivity analysis using AIMSUN transport simulation modelling software in order to identify any potential significant congestion impacts as a result of the proposed coal transport rail traffic. The following provides a synopsis of the results of the assessment, while the full Brown Consulting report is provided as Appendix B.

Modelling of the base year 2014 and ten year design horizon year 2024 conditions for each of the following three sites was undertaken in AIMSUN transport simulation software.

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

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

The results of the AIMSUN simulations are provided in Table 33 through Table 35, and illustrated in Figure 9 through **Error! Reference source not found.** for the worst case queuing for each time period for each crossing assuming the slowest train speed.

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

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

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



Table 33 Summary of impacts at level crossing adjacent to Capricorn Highway / Gregory Highway intersection

Scenario	Maximum Queue Length – No Trains (veh)	Mean Queue Length – With Trains (veh)	Maximum Queue Length – With Trains* (veh)	Maximum LOS [^] at Railway Crossing – With Trains	Maximum Queue Length – With Fastest Train (veh)
AM Peak (8:00 – 9:00am)					
Base year 2014	5 [30m] at south approach	8	28 [168m]	B	23 [138m]
Future year 2024	12 [72m] at south approach	9	33 [198m]	C	32 [192m]
Off-Peak (12:30 – 1:30pm)					
Base year 2014	4 [24m] at south approach	2	13 [78m]	B	11 [66m]
Future year 2024	6 [36m] at south approach	2	10 [60m]	B	12 [72m]
PM Peak (4:45 – 5:45pm)					
Base year 2014	4 [24m] at west approach	6	22 [132m]	B	12 [72m]
Future year 2024	7 [42m] at west approach	9	26 [156m]	C	24 [144m]

*Refer Figure 9 showing indicative location of maximum queues for the year 2024 scenario

[^]LOS = Level of Service, presented on a scale A – F where A represents free-flowing conditions with minimal delays, F represents heavy congestion

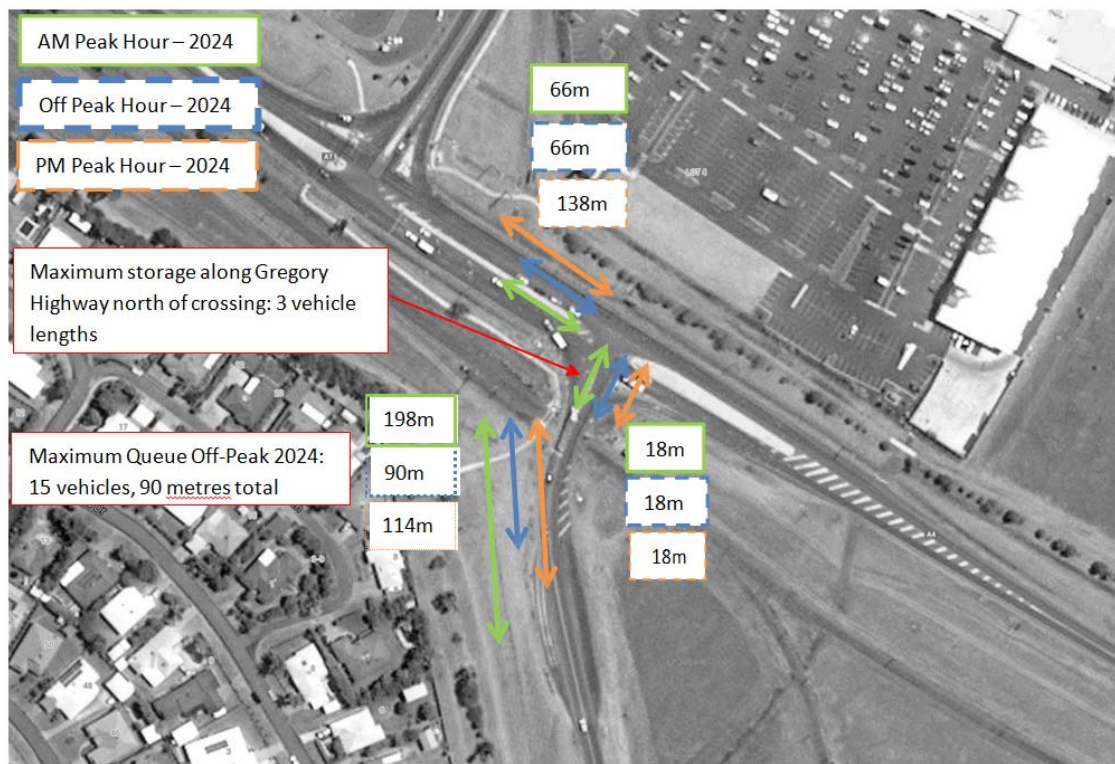


Figure 9 Indicative location of maximum queues obtained from modelling future year 2024 – Capricorn Highway / Gregory Highway intersection

Table 34 Summary of impacts at level crossing adjacent to Capricorn Highway / Opal Street intersection

Scenario	Maximum Queue Length – No Trains (veh)	Mean Queue Length – With Trains (veh)	Maximum Queue Length – With Trains* (veh)	Maximum LOS [^] at Railway Crossing – With Trains	Maximum Queue Length – With Fastest Train (veh)
AM Peak (8:00 – 9:00am)					
Base year 2014	5 [30m] at south approach	9	34 [204m]	B	33 [198m]
Future year 2024	8 [48m] at south approach	15	50 [300m]	C	48 [288m]
Off-Peak (10:15 – 11:15am)					
Base year 2014	3 [18m] at west approach	10	19 [114m]	B	15 [90m]
Future year 2024	4 [24m] at west approach	15	22 [132m]	B	20 [120m]
PM Peak (5:00 – 6:00pm)					
Base year 2014	7 [42m] at west approach	12	50 [300m]	B	18 [108m]
Future year 2024	10 [60m] at west approach	34	59 [354m]	B	37 [222m]

*Refer Figure 10 showing indicative location of maximum queues for the year 2024 scenario

[^]LOS = Level of Service, presented on a scale A – F where A represents free-flowing conditions with minimal delays, F represents heavy congestion

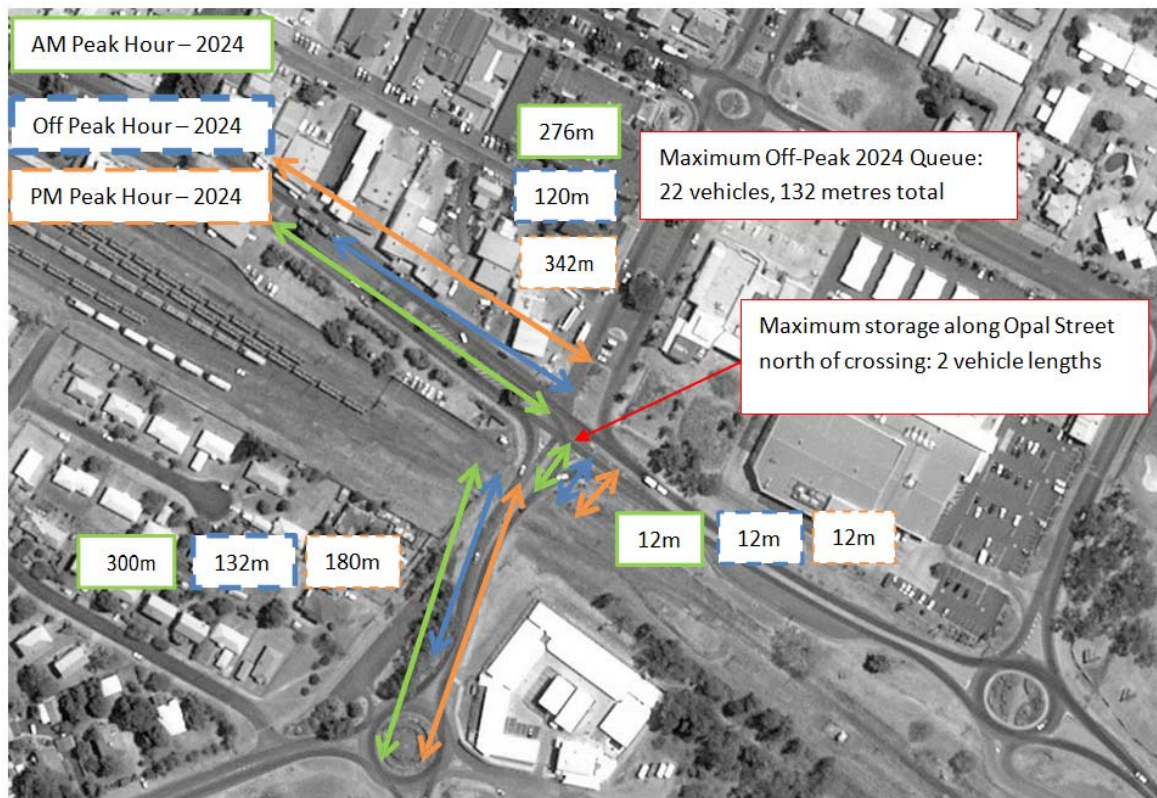


Figure 10 Indicative location of maximum queues obtained from modelling future year 2024 – Capricorn Highway / Opal Street intersection

Table 35 Summary of impacts at level crossing adjacent to Capricorn Highway / Selma Road intersection

Scenario	Maximum Queue Length – No Trains (veh)	Mean Queue Length – With Trains (veh)	Maximum Queue Length – With Trains* (veh)	Maximum LOS^ at Railway Crossing – With Trains	Maximum Queue Length – With Fastest Train (veh)
AM Peak (7:45 – 8:45am)					
Base year 2014	3 [18m] at south approach	2	12 [72m]	A	10 [60m]
Future year 2024	6 [36m] at south approach	3	13 [78m]	A	11 [66m]
Off-Peak (12:00 – 1:00pm)					
Base year 2014	3 [18m] at south approach	1	6 [36m]	A	6 [36m]
Future year 2024	5 [30m] at south approach	8	12 [72m]	A	11 [66m]
PM Peak (4:45 – 5:45pm)					
Base year 2014	3 [18m] at south approach	2	10 [60m]	A	6 [36m]
Future year 2024	6 [36m] at south approach	3	12 [72m]	A	8 [48m]

*Refer Figure 11 showing indicative location of maximum queues for the year 2024 scenario

^LOS = Level of Service, presented on a scale A – F where A represents free-flowing conditions with minimal delays, F represents heavy congestion

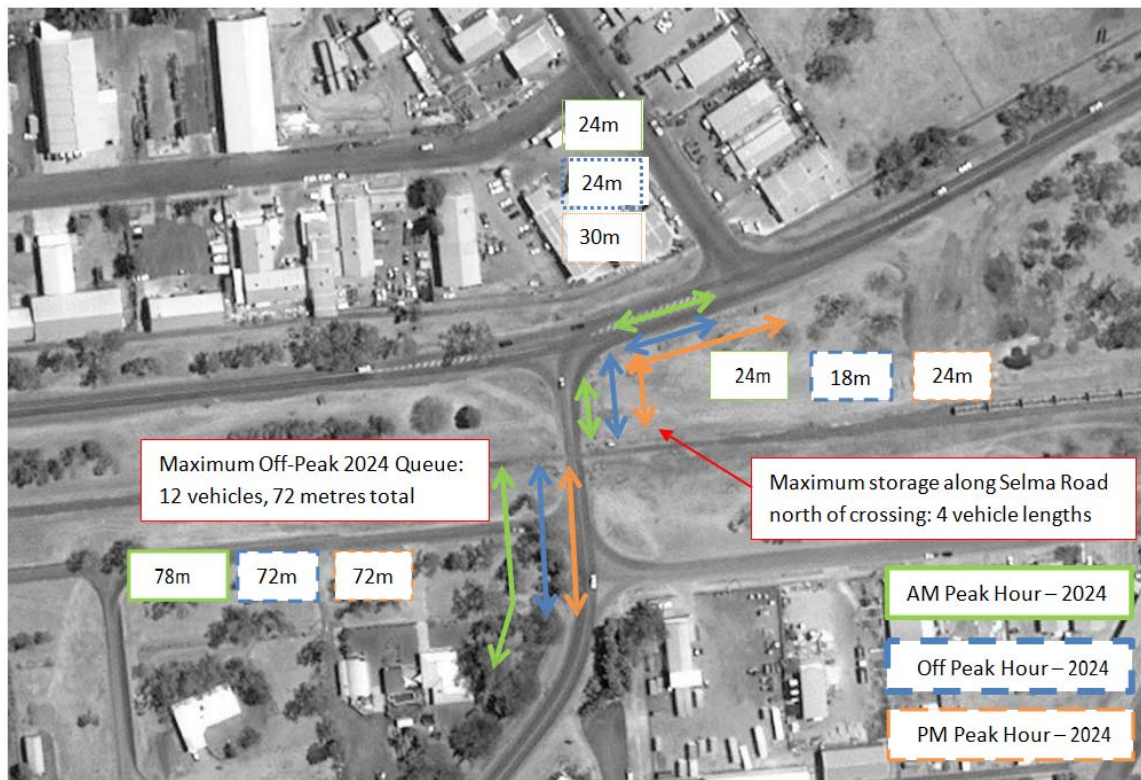


Figure 11 Indicative location of maximum queues obtained from modelling future year 2024 – Capricorn Highway / Selma Road intersection

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

It should be noted that the predicted queues at the Opal Street intersection in the future year 2024 scenario are principally attributable to the increase in base load traffic. With the assumed 2.5% annual growth rate in traffic volumes, the projected year 2024 traffic volumes will exceed the capacity of the current single lane configuration of the Capricorn Highway in terms of vehicles per hour by some 40%, which will cause traffic delays in and of itself. Therefore, it is likely that upgrades to the Capricorn Highway infrastructure in this area will be required in future that will positively affect the queue lengths and delays projected in this assessment.

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

5.3 PORT

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

WICET is proposed to cater for 27 Mtpa coal handling capacity for the Stage 1 program (estimated for completion in 2014 and fully subscribed), with a total projected capacity of 80 Mtpa. The expansion project will occur in three stages, in alignment with the projected industry handling capacity demand. The preferred WICET port option is being developed in Gladstone by a Queensland consortium of existing and potential coal exporters, to provide an increased long-term coal export capacity for both the Bowen and Surat coal basins. At full capacity, WICET will duplicate the existing capacity of the Port of Gladstone's RG Tanna Coal Terminal and provide the level of throughput required to meet customer coal export demands from 2014.

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

5.4 AIRPORT

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

An Emerald Airport Master Plan tender was awarded in late 2012; the final document is still being drafted. The purpose of the Master Plan is to establish a framework for the future planning and



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

The provision of alternative aerodrome facilities in the vicinity of the Project to support the proposed FIFO strategy is considered inadequate. Indicative assessments have suggested that the Project workforce movements would require larger aircraft than are currently supported at the nearby airstrips of Capella, Dingo, Duaringa, Rolleston and Springsure, nor are these facilities convenient to the planned accommodation strategy. Therefore these ALAs will only be utilised for emergency aircraft, if ever required and no commercial aircrafts will use these facilities.

5.4.1 State Planning Policy 1/02

The Emerald Airport is identified as of state significance under the *State Planning Policy 1/02: Development in the Vicinity of Certain Airports and Aviation Facilities (Annexure 1)*. This Policy aims to provide guidance on decreasing the risk to public safety near the ends of airport runways, avoid any increase in the numbers of people adversely affected by significant aircraft noise and avoid affecting the safety and operational efficiency of airports and aviation facilities. The Emerald Airport is not listed under *Annexure 3 Airport Runways for which a Public Safety Area Applies*. The State Significant listing is based on meeting the following criteria:

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

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

5.5 CUMULATIVE IMPACTS

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

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

The upgrading of the Central West rail system, including re-railing, re-sleepering, increasing the ballast profile, selective capping layer strengthening, replacing some of the mainline crossing loop turnouts and level crossing upgrades is planned to be undertaken, and will benefit the railway track



between Blackwater and the mine site. A safer, higher grade railway track will be in place, which may benefit future coal and mineral projects to the west of Taraborah in the Galilee Basin.

For the most part, the Taraborah Project will utilise existing and operational transport infrastructure including the Emerald Airport, planned WICET port terminal upgrades, Bruce Highway, Capricorn Highway, Blackwater rail system and Central West rail system. Road link, intersection and pavement impacts have all been assessed and show that minimal mitigation measures are required. Air and rail impacts have also been assessed. No consultative arrangements with other industries in the Bowen Basin region have been established.

A review of coal resource areas and existing mines in the Bowen Basin revealed that there is a concentration of mining activity further north, in the Isaac-Connors sub-catchment if the Fitzroy River Basin. Mines and developments in this area most likely utilise the Peak Downs Highway, Suttor Developmental Road, and Gregory Highway. The section of the Capricorn Highway in proximity to the Project site (Section #16C) is not heavily utilised by other mining projects or large developments.

Materials transport from Mackay or Gladstone will make a greater contribution to cumulative road and traffic impacts than materials transport from Sapphire. However, as revealed by the traffic and pavement impact assessments, the predicted increases are not considered to be significant, reducing the overall contribution of the Taraborah Project to cumulative impacts.

Table 36 provides an overview of operational projects in the region and their location relative to the Project. The operational phases of these projects may overlap with the construction and operational phases of the Taraborah Project.

Table 36 Operational Projects

Name of Development	Principal Proponent	Status	Location Relative to Taraborah Project
Baralaba	Cockatoo Coal Limited	Operational	202 km SE, Dawson sub-catchment
Blackwater	BHP Coal Pty Ltd	Operational	93 km SE, Mackenzie sub-catchment
Broadlea North	Vale Australia Pty Ltd	Operational	186 km N, Isaac / Connors sub-catchment
Burton	Peabody Energy	Operational	218 km N, Isaac / Connors sub-catchment
Callide Mine & Boundary Hill South expansion	Anglo American Metallurgical Coal	Operational	286 km SE, Dawson sub-catchment
Carborough Downs	Vale Australia Pty Ltd	Operational	179 km N, Isaac / Connors sub-catchment
Caval Ridge	BHP Billiton Mitsubishi Alliance	Operational (2010)	Isaac / Connors sub-catchment
Clermont	Rio Tinto Coal Australia	Operational	100 km NW, Nogoa sub-catchment
Coppabella	Peabody Energy	Operational	195 N, Isaac / Connors sub-catchment
Cook / Eldorado Hill	Cook Resource Mining Pty Ltd	Operational	101 km ESE, Mackenzie sub-catchment
Cracow	Newcrest Operations Limited	Operational	306 km SE, Dawson sub-catchment



Name of Development	Principal Proponent	Status	Location Relative to Taraborah Project
Curragh	Wesfarmers Resources	Operational	93 km E, Mackenzie sub-catchment
Curragh North	Wesfarmers Resources	Operational	109 km NE, Mackenzie sub-catchment
Daunia	BHP Billiton Mitsubishi Alliance	Operational (2009)	Isaac / Connors sub-catchment
Dawson Central	Anglo American Metallurgical Coal	Operational	246 km SE, Dawson sub-catchment
Dawson South	Anglo American Metallurgical Coal	Operational	259 km SE, Dawson sub-catchment
Dawson North	Anglo American Metallurgical Coal	Operational	227 km SE, Dawson sub-catchment
Ensham	Ensham Resources Pty Limited	Operational	58 km ENE, Nogoa sub-catchment
Foxleigh	Anglo American Metallurgical Coal	Operational	108 km NE, Mackenzie sub-catchment
German Creek & German Creek East	Anglo American Metallurgical Coal	Operational	96 km NE, Mackenzie sub-catchment
Goonyella Riverside and Broadmeadow	BHP Billiton Mitsubishi Alliance	Operational	193 N, Isaac / Connors sub-catchment
North Goonyella	Peabody Energy	Operational	210 km N, Isaac / Connors sub-catchment
Gregory Crinum	BHP Billiton Mitsubishi Alliance	Operational	59 km NE, Nogoa sub-catchment
Grosvenor Coal Mine	Anglo American Metallurgical Coal	Operational	Isaac / Connors sub-catchment
Hail Creek	Rio Tinto Coal Australia	Operational	231 km N, Isaac / Connors sub-catchment
Isaac Plains	Vale Australia Pty Ltd	Operational	173 km N, Isaac / Connors sub-catchment
Jellinbah East	Jellinbah Group Pty Ltd	Operational	104 km ENE, Mackenzie sub-catchment
Kestrel	Rio Tinto Coal Australia	Operational	55 km NE, Nogoa sub-catchment
Lake Lindsay	Anglo American Metallurgical Coal	Operational	100 km NE, Mackenzie sub-catchment
Lake Vermont	Jellinbah Group Pty Ltd	Operational	137 km NE, Isaac / Connors sub-catchment
Middlemount	Yancoal and Peabody Energy	Operational	104 km NE, Mackenzie sub-catchment
Millennium	Peabody Energy	Operational	172 km N, Isaac / Connors sub-catchment
Minerva	Sojitz Coal Mining	Operational	44 km S, Comet sub-catchment
Moorvale	Peabody Energy	Operational	177 N, Isaac / Connors sub-catchment
Moranbah Ammonium Nitrate Project	Dyno Nobel Asia Pacific Ltd	Operational	-

Name of Development	Principal Proponent	Status	Location Relative to Taraborah Project
Moranbah Gas Project	Arrow Energy Limited	Operational (2004)	-
Moranbah North	Anglo American Metallurgical Coal	Operational	184 N, Isaac / Connors sub-catchment
Northern Missing Link Project	Queensland Rail	Operational (2005)	-
Norwich Park	BHP Billiton Mitsubishi Alliance	Operational	114 km NNE, Isaac / Connors sub-catchment
Oaky Creek	Xstrata Coal	Operational	79 km NE, Mackenzie sub-catchment
Peak Downs	BHP Coal Pty Ltd	Operational	147 km N, Isaac / Connors sub-catchment
Poitrel	BHP Billiton Mitsui Coal	Operational	169 km N, Isaac / Connors sub-catchment
Rolleston	Xstrata Coal	Operational	112 km SSE, Comet sub-catchment
Saraji	BHP Coal Pty Ltd	Operational	135 km N, Isaac / Connors sub-catchment
South Blackwater	South Blackwater Coal Pty Limited	Operational	99 km SE, Comet sub-catchment
South Walker Creek	BHP Billiton Mitsui Coal	Operational	205 km NNE, Isaac / Connors sub-catchment
Yarrabee	Yancoal	Operational	113 km ENE, Mackenzie sub-catchment

Table 37 details proposed developments in the region and their current status. The construction and operational phases of these developments may overlap with Taraborah construction and / or operations.

Table 37 Proposed Projects

Name of Development	Principal Proponent	Status	Location
Baralaba North Continued Operations (expansion of Baralaba)	Cockatoo Coal Limited	Proposed (EIS underway)	Dawson sub-catchment
Baralaba South Coal Project	Wonbindi Coal Pty Limited	Proposed (EIS underway)	Dawson sub-catchment
Carborough Downs Mine Expansion	Vale Australia Pty Ltd	Proposed (EIS complete)	Isaac / Connors sub-catchment
Central Queensland Gas Pipeline	Central Queensland Pipeline Pty Ltd	(EIS complete – 2007)	-
Central Queensland Integrated Rail	Aurizon Holdings Limited	Proposed	-
Connors River Dam and Pipelines	SunWater Ltd	Proposed (EIS complete – 2012)	Isaac / Connors sub-catchment
Elimatta	New Hope Coal	Proposed (EIS complete)	Dawson sub-catchment
Ensham Underground	Ensham Resources Pty Limited	Proposed (EIS complete)	Nogoa sub-catchment



Name of Development	Principal Proponent	Status	Location
Foxleigh Plains (extension of Foxleigh)	Anglo American Metallurgical Coal	Proposed (EIS complete)	Mackenzie sub-catchment
Red Hill (expansion of Goonyella Riverside and Broadmeadow)	BM Alliance Coal Operations Pty Ltd	Proposed	Isaac / Connors sub-catchment
Grosvenor West Project	Carabella Resources Limited	Proposed (EIS underway)	Isaac / Connors sub-catchment
Lower Fitzroy River Infrastructure Project	Gladstone Area Water Board & SunWater Ltd	Proposed (EIS underway)	-
Meteor Downs South	U&D Mining Industry Australia Pty Ltd	Proposed	Comet sub-catchment
Millennium Expansion Project	Peabody Energy	Proposed (EIS complete)	Isaac / Connors sub-catchment
Minyango	Blackwater Coal Pty Ltd	Proposed (EIS complete)	Mackenzie sub-catchment
Moranbah South	Anglo American Metallurgical Coal	Proposed (EIS complete)	Isaac / Connors sub-catchment
New Lenton	New Hope Group	Proposed (EIS underway)	Isaac / Connors sub-catchment
Olive Downs	Peabody Energy	Proposed	Isaac / Connors sub-catchment
Red Mountain Joint Venture	Peabody Energy	Proposed	Isaac / Connors sub-catchment
Rolleston Coal Mine Expansion	Xstrata Coal	Proposed (EIS underway)	Comet sub-catchment
Teresa Coal Project	New Emerald Coal (Linc Energy)	Proposed (EIS underway)	Nogoa sub-catchment
West Emerald	Cuesta Coal	Proposed	Nogoa sub-catchment
Wandoan	Xstrata Coal	Proposed (EIS complete)	Dawson sub-catchment
Washpool	Washpool Coal Pty Ltd	Proposed (EIS complete)	Mackenzie sub-catchment

6.0 MITIGATION STRATEGIES AND RECOMMENDATIONS

As per the GARID and DTMR Fitzroy Basin Guidelines, an Impact Assessment of transport movement and corridors associated with the Taraborah Project has indicated significant impacts are unlikely on state controlled roads.

Consultation with CHRC and local DTMR regions has been undertaken during this assessment in order to acquire departmental road usage data and confirm transport impact assessment methodologies. The Fitzroy Regional DTMR office was initially contacted for AADT data and for provision of their Regional Guideline. Where traffic increases on the local road network are shown to be significant, negotiations will be undertaken at the appropriate time with the CHRC to reach a suitable agreement that will include provisions for any necessary upgrades and ongoing maintenance and rehabilitation. This currently includes an upgrade to the existing Capricorn Highway, with one T intersection, turning and accelerating lanes from / to Emerald and a turning lane from the west.

6.1 PAVEMENT IMPACTS

When pavement impacts shorten the design life of the road, compensation is usually required based on the increase in annual road maintenance and the accelerated need for resurfacing. While the annual maintenance costs have not been determined at this time, it is suggested that the percentage increases determined in Section 5.1 be used as a starting point for these discussions with DTMR. Shenhua will commit to informing and liaising with the relevant road management authorities regarding planned growth-generating activities.

6.2 ROAD CLOSURES AND DIVERSIONS

To limit the impact of local road diversions and closures as a result of the Project (as discussed in Section 5.1.1), these will be developed in accordance with the *Road Planning and Design Manual* (DTMR 2004) and signed in accordance with the *Manual of Uniform Traffic Control Devices* (DTMR 2011). The public will be notified prior to the closure of any public road, and a Closure Management Plan will be developed in consultation with the DTMR that will include details on the traffic management controls to be implemented to ensure safety. While the diversion of local roads is designed to create minimum disruption to existing patterns of movements, consultation with locals is imperative to ensure transparency, minimise impacts and foster community understanding. Shenhua will commit to the dissemination of relevant information and consultation, where appropriate, to minimise community and safety impacts.

During the access intersection construction, closure and diversion of the Capricorn Highway will occur only during daylight hours and will be conducted in accordance with appropriate traffic management techniques. This will ensure the safety of construction workers and the public, and minimise disruptions to affected traffic movements.

Because of the orientation of the pit to the Capricorn highway, the potential temporary closures for blasting are likely to occur only two months of the year at a frequency of 2-3 times per week during the last 2 years of the opencut mine life. To minimise disruptions to both mine operations as well as traffic along the highway, the blasts would likely occur in the afternoon just prior to shift change. It is expected that closures would last no more than approximately 20-30 minutes, which allows for the blast to take place and inspection/clean-up of large debris if required. To minimise this time, road cleaning equipment would be on hand to effect immediate removal of the debris.



6.3 DUST EMISSIONS

The following control techniques are recommended to minimise dust emissions associated with ore transport:

- The surface of coal in wagons will be profiled to a flat “garden bed” shape and a surface treatment be applied to minimise coal dust emissions during transit to the WICET. This is a currently requirement of all trains using the Port of Gladstone.

6.4 HAZARDOUS MATERIALS

Spills of products or hazardous materials during transport to and from the site will be dealt with in accordance with an appropriate Spill Management Plan, developed prior to the commencement of the construction phase. This plan will be developed based on six key principles: preparation, training, notification, containment, treatment and monitoring and review. This will ensure Shenhua maintains its compliance with its regulatory requirements, spills are recorded, appropriate authorities are notified and spills are cleaned up to minimise any possible impacts.

6.5 ROAD SAFETY AND HEAVY VEHICLES

While the increase in traffic resulting from Project development and operation is estimated to be minimal, a number of management and mitigation practices will be employed to ensure the safety of all road users is maintained, both on and off the Project site. The following practices will be implemented to ensure driver safety is upheld at all times:

- All personnel who are required to operate and drive company vehicles or equipment shall be in possession of a current valid licence or certificate of competency for that class of vehicle or machinery;
- All drivers will receive training in the handling of heavy vehicles or vehicles transporting oversized loads;
- Personnel are to notify the Site Manager immediately of any changes to the conditions of their drivers or operation licences (i.e. cancellation, suspension or special conditions);
- Personnel will always drive vehicles at a safe speed for the prevailing road conditions and pay attention to other hazards (vehicles, pedestrians, stock and wildlife, flooded roads);
- Seat belts must always be worn when driving or travelling in vehicles;
- Before commencing a trip in a field vehicle, the driver should conduct an inspection and check tyres, lights, fluids and brakes;
- A vehicle shall never be employed for any purpose other than its intended use;
- Appropriate signage identifying Project site roads, haul roads and Project boundaries, indicating access restrictions where applicable;
- On the Project site, road safety management will include strict enforcement of zero alcohol and illicit drugs tolerance and enforcement of appropriate vehicle speeds; and



- The Project's Emergency Response and Contingency Plan will incorporate and address road safety impacts and management strategies discussed above.

Driver fatigue for heavy vehicle operators will be managed in accordance with *The National Heavy Vehicle Regulator's fatigue management guidelines* (NHVR, 2013) and incorporated into the Project's Health and Safety Management System. This includes the following practices:

- Counting work and rest time;
- Record keeping – including driver work diaries, schedules and rosters, health assessments and fatigue incident records. Maintaining work diaries to ensure rest and work hours are compliant with relevant laws (e.g. HVNL Act) and minimise risks associated with driver fatigue is particularly important for drivers of heavy vehicles; and
- Risk identification, assessment and control.

Other potential safety risks, particularly those related to visibility issues, may be mitigated with further design considerations and traffic management controls. Considerations of upgrades or installation of lighting, signage and/or pavement markings, or other design options to improve safety concerns, particularly at intersections, will be addressed at the RIA stage of the Project, prior to commencement of construction.

6.6 ROAD USE MANAGEMENT PLAN

Prior to Project construction, a Road Use Management Plan will be prepared and implemented by both Project employees and contractors involved in the transportation of goods and materials for the Project.

The Road Use Management Plan will facilitate the safe operation of vehicles and use of transport routes. The Plan will also provide for recording and addressing any road or traffic related incidents and complaints.

7.0 CONCLUSION

The following conclusions can be made from this assessment:

- The proposed Taroborah Project will use rail to transport its coal product. As the transport of staff, material deliveries, earthmoving equipment and waste will be undertaken by road, this Transport Impact Assessment has been undertaken to assess impacts on SCRs;
- Investigations conducted as part of this study have indicated that transport movements associated with the Project will not result in any substantial or widespread adverse impacts to transport networks;
- The increased rail traffic through Emerald as a result of the Project has been assessed to impart minimal impacts on both congestion and safety at the three level crossings in Emerald; and
- Existing or proposed port and air facilities will be able to cater for Project demand.



8.0 REFERENCES

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Queensland Rail (2013), *Level Crossing ALCAM Assessment - Emerald Area*



Appendix A ALCAM Assessment



Taraborah Coal Project: Central Line Level Crossing Review - October 2013

Planning is in progress in the area west of Emerald in association with the Taraborah Coal Project. Rail traffic for the project is planned to utilise existing single QR track and existing level crossings from Nogo Junction (263.3km) westwards through Emerald to approximate 296km Central Line metrage (total distance - about 33km).

Existing rail traffic on this section of track - 7 x 450m length trains (peak per day).

Rail traffic is planned to be increased by an additional 3 x 1425m length trains in each direction (total of 6 per day) with implementation of the project.

A "DESKTOP ASSESSMENT ONLY" review of the level crossings and pedestrian crossings between 263km and 296km has been compiled from QR in house drawings, photographs and information collected at each level crossing location over the past few years.

The reports for each crossing contain "Observations" and "Works" (noted characteristics, non-compliance, and deficiencies of the crossing), "Proposals" (actions to correct non-compliance and deficiencies), and "Comment" (additional on-going actions or actions for consideration).

Information contained in the report for each crossing is "Proposed Only" at time of creation on 1st October 2013 and refers to upgrade of this crossing if required for use as outlined in above.

Existing or outstanding non-compliance issues at a crossing may not be the responsibility of the developer should the project proceed. Should any existing or outstanding non-compliance require a higher standard or additional works due to the proposed project, the proposal action may be responsibility of the developer. Areas of responsibility to be determined.

Central Line: Gregory Highway Level Crossing ID755 at 263.395km

Observations and "works" in need of attention at crossing include:

1. Road crossing is located over single track.
2. Crossing is located on an operational route for Type 1 (36.5m) Road Trains.
3. High proportion of heavy vehicles use crossing (estimated at about 12%).
4. Crossing has been upgraded in accordance with AS 1742.7 - 2007 and as shown on QR Signal and Operational Systems Drawing No.CL219.2.
5. Maintain crossing control measures, advance warning signage, vehicle holding lines and barrier lines on both approaches to crossing in accordance with Figures 4.6 and 4.11 of AS 1742.7 - 2007.
6. Maintain yellow cross-hatching and G9-67 "Keep Clear" signs over crossing as shown in Clause 3.6 of AS 1742.7 - 2007.
7. Maintain bitumen crossing surface and road approaches in accordance with QR Standard Drawing No.2586.
8. Whistle boards are installed (+/-10% location tolerance) on both sides of crossing for UP and DN train running - 60km/h in accordance with QR Whistle Board table (2008) and QR Standard Drawing No.10732.
9. Incident Reporting Signage (755) is installed at crossing.
10. On day of inspection, evidence suggested that some heavy vehicle south-west bound road traffic from Capricorn Highway onto Gregory Highway was cutting road boundary corner at that location. Note: Proposals are in place to widen roadway over this crossing. Refer to Queensland Government - Capricorn and Gregory Highway Intersection Resumption Plan - 5 Year plan (Job No. 225/16B/901).
11. Re-assessment is required if any additional proposal is made to the Taraborah Coal Project which might impact on the safety of this level crossing.

Comments:

Existing data for this crossing has been processed through ALCAM - results being:

1. ALCAM Likelihood Factor if works as outlined above are maintained according to standards and with current train volume = 91
(Intervention Score = 280, Installation Score = 170)
2. Proposed ALCAM Likelihood Factor with proposed train volume associated with Taraborah Coal Project = 97
(Intervention Score = 223, Installation Score = 153)

Central Line: Gregory Highway Pedestrian Crossing (UP Side) ID755 at 263.395km

Observations:

1. A new pedestrian crossing has been constructed on UP side of Gregory Highway at about 60m west of TOS - Nogoia Western Fork.
2. Crossing is located over single track - Central Line.
Note: Rail traffic over crossing is from Central Line as well as west bound rail traffic from Springsure Branch into Emerald.
3. UP side crossing pathway has been installed to standards specified by QR Standard Drawing No.10698 and AS 1742.7 - 2007.
4. Passive pedestrian mazes have been installed on both sides of crossing to standards specified by QR Standard Drawings No.2642, No.2643 and AS 1742.7 - 2007.
5. Pedestrian signage is installed at both entrances to crossing as specified by QR Standard Drawing No.2642 and AS 1742.7 - 2007.
6. Crossing is electrified.
7. Overhead Live Wires safety warning signage is installed at approaches to crossing as shown on QR Standard Drawing No.2642.
8. RX-12 active pedestrian visual and audible alarms (red man / green man) have been installed as the control measures on each side of the crossing as shown on QR Standard Drawing No.2642 and SAOS Drawing D2009.
9. Funnel approach pathways are present on both sides of crossing.
10. Guide fencing on some pathways is not present.
11. Rail corridor is fenced adjacent to UP side pedestrian crossing in order to prevent trespass and potential pedestrian injury.
12. Crossing is located adjacent to an operational route for Type 1 (36.5m) Road Trains - Gregory Highway.
13. High proportion of heavy vehicles use crossing (estimated at about 12%).
14. Adjacent roadway over crossing is controlled by RX-5 flashing lights.
15. Rail runs E-W. Potential exists for Sun to obscure train from crossing.
16. Pedestrian lighting not present.
17. Whistle boards are present. Refer to road report.
18. Incident Reporting Signage is installed at crossing. Refer to road report.

Proposals:

1. Install guide fencing on funnel pathways on both approaches to the crossing so as to encourage pedestrians to use the crossing.

Comments:

1. Railway corridor is not fenced on DN side of Gregory Highway. Pedestrians can cross rails at this location by stepping over rails or by using edge of roadway. Consideration should be given to fence railway corridor on DN side of crossing in order to prevent trespass and potential pedestrian injury.
2. Consider installation of overhead lighting for pedestrians in accordance with Clause 6.3.3 (g) of AS 1742.7 - 2007.
3. Maintain vegetation maintenance of rail corridor.
4. UP Side Pedestrian Crossing:
Existing ALCAM Likelihood Factor = 21
(Intervention Score = 300, Installation Score = 225)
5. Proposed ALCAM Likelihood Factor with implementation of above mentioned maintenance "works" and current train volume = 20
(Intervention Score = 500, Installation Score = 3508)
6. Proposed ALCAM Likelihood Factor with implementation of above mentioned "works" and proposed train volume associated with Taroborah Coal Project = 21
(Intervention Score = 500, Installation Score = 350)

Central Line: Opal Street Level Crossing ID756 at 264.800km

Observations:

1. Existing train speeds are too fast for existing sight distances.
Note: Active protection (half boom gates) installed at crossing provide adequate level of protection for failure of sight distances in accordance with AS 1742.7 - 2007.

2. Road crossing is located over two tracks - UP / DN main line and Shunt line.

Note: Only one track is operational at any one time.

3. Crossing is located at eastern end of Emerald Station Yard.

4. Non-Conformance of road traffic controls with AS 1742.7 - 2007, i.e. some advance warning signage missing and some positioned incorrectly. In addition, some advance warning signage on UP side of Clermont Street could be masked by large road vehicles while legally parked at kerbside of road. Vehicle holding lines and barrier lines are faded.

5. UP / DN main line only over crossing is electrified. Some Overhead Live Wires safety warning signage at crossing is faded.

6. Some Overhead Live Wires safety advance warning signage missing / positioned incorrectly.

7. Distance from nearest rail to intersection control point on right side exit from crossing is limited - about 23m. Traffic environment especially in peak hours could lead to "queuing".

Note: Yellow cross-hatching and G9-67 "Keep Clear" signs have been installed over crossing as shown in Clause 3.6 of AS 1742.7 - 2007. However, Yellow cross-hatching has faded.

8. Crossing is located on an operational route for Type 1 (36.5m) Road Trains. A designated heavy vehicle route has been implemented in order to guide long vehicles through Emerald and to ensure that "short stacking" is not an issue for northbound road traffic over crossing due to the limited space on right side exit from crossing. I.e. Long vehicles (23m / 25m B-Double and Type 1 Road Trains are not permitted to travel northwards over the crossing and therefore designed to eliminate "short stacking" issues. Refer to DMR Report Intersection of the Capricorn Highway and Opal Street Upgrade Report - Job No.50/16B/305 (21 October 2004). However, long vehicles have been observed travelling northwards over the crossing.

9. Whistle board is missing on UP Side of crossing.

10. Whistle board is installed on DN Side of crossing but requires repositioning.

11. High proportion of heavy vehicles use crossing (estimated at about 20%).

12. Rail runs E-W. Potential exists for Sun to obscure train from crossing.

13. Incident Reporting Signage is installed at crossing.

Proposals:

1. Install any missing or incorrectly positioned advance warning signage and repaint faded road markings in accordance with Figures 4.6 and 4.11 of AS 1742.7 - 2007.

2. Repaint / replace any faded Overhead Live Wires safety warning signage at crossing in accordance with QR Standard Drawing No.2458.

3. Ensure that all Overhead Live Wires advance warning signage is installed in accordance with QR Standard Drawing No.2458.

4. Repaint yellow cross-hatching over crossing and maintain in accordance with Clause 3.6 of AS 1742.7 - 2007.

5. Install whistle board at 100m (+/-10% location tolerance) on the UP side of crossing in accordance with QR Whistle Board table (2008) and QR Standard Drawing No.10732.

6. Relocate whistle board to 100m (+/-10% location tolerance) on the DN side of crossing in accordance with QR Whistle Board table (2008) and QR Standard Drawing No.10732.

7. Maintain crossing surface and road approaches in accordance with QR Standard Drawing No.2586.

8. Relocate Incident Reporting Signage (756) to front side of flashing light assemblies on both sides of crossing.

Comments:

1. If it is considered an issue that "short stacking" of northbound long vehicles over crossing is occurring, then Police enforcement of infringements is requested.

2. Maintain vegetation clearance of road / rail corridors.

3. Re-assessment is required if any additional proposal is made to the Taroborah Coal Project which might impact on the safety of this level crossing.

4. Existing ALCAM Likelihood Factor = 100

(Intervention Score = 400, Installation Score = 123)

5. Proposed ALCAM Likelihood Factor with implementation of above mentioned maintenance "works" and current train volume = 90

(Intervention Score = 400, Installation Score = 200)

6. Proposed ALCAM Likelihood Factor with implementation of above mentioned "works" and proposed train volume associated with Taroborah Coal Project = 93

(Intervention Score = 400, Installation Score = 200)

Central Line: Opal Street Pedestrian Crossings (UP and DN Sides) ID756 at 264.800km

Observations:

1. Crossings are located at eastern end of Emerald Station Yard.
2. Crossings are located over two tracks - UP / DN main line and Shunt line.
Note: Only one track is operational at any one time.
3. UP / DN main line over crossings is electrified.
4. Existing Overhead Live Wires safety warning signage is non-standard type and some is faded.
5. DN side crossing is located adjacent to an operational route for Type 1 (36.5m) Road Trains.
6. High proportion of heavy vehicles use crossing (estimated at about 20%).
7. Adjacent roadway over crossing is controlled by flashing lights and boom gates.
8. UP side existing crossing pathway fails to meet required standards specified by QR Standard Drawing No.10698 and AS 1742.7 - 2007 due to;
 - (a) Flange gaps and depths exceed required maximum as specified in standards.
 - (b) TGSi pads not present at entrances to crossing or on edges of pathway.
9. DN side crossing is not formed. Pedestrians are forced to use edge of road to cross or to step over rails. DN side crossing therefore fails to meet required standards specified by QR Standard Drawing No.10698 and AS 1742.7 - 2007;
10. Non-standard pedestrian warning signage is located at entrances to both crossings.
11. Sight distances on UP side of both crossings are insufficient due to masking issues caused by rolling stock present in Emerald Station Yard.
12. Rail runs E-W. Potential exists for Sun to obscure train from crossing.
13. Funnel approach pathways are not present on DN side crossing.
14. Some guide fencing is missing on UP side pathway and is not present on DN side pathway.
15. Railway corridor not fenced on DN side crossing.
16. Rail runs E-W. Potential exists for Sun to obscure train from crossing.
17. Pedestrian lighting not present.
18. Whistle boards are present. Refer to road report.
19. Incident Reporting Signage is installed at crossing. Refer to road report.

Proposals:

For UP side crossing and if approved for construction of DN Side crossing.

1. Reconstruct / construct crossing pathway ensuring that;
 - (a) Edge of pathway is a minimum of 2.5m from edge of unkerbed road or 600mm from edge of kerbed road.
 - (b) At an angle between 70 degrees and 110 degrees to railway.
 - (c) All grades are positive towards rail and between 0 and 1 in 40.
 - (d) TGSi pads are installed at entrances to crossings and on edges of pathways.
2. Maintain / install funnel pathways with guide fencing leading up to the crossings on both sides so as to encourage pedestrians to use the crossings.
3. Fence rail corridor in vicinity of DN side crossing if constructed in order to prevent trespass and potential pedestrian injury.
4. Install pedestrian Overhead Live Wires Safety Warning signage at entrances to crossings as shown on QR Standard Drawing No.2458.
5. Install overhead lighting for pedestrians in accordance with Clause 6.3.3 (g) of AS 1742.7 - 2007.

In order to address insufficient sight distance issues then;

Option A:

1. Install passive pedestrian mazes in accordance with QR Standard Drawings No.2642 and No.2643.
2. Install Tapping Rails through mazes in accordance with QR Standard Drawings No.2642 and No.2643.
3. Install RX-12 active pedestrian visual and audible alarms (red man / green man).

Option B:

1. Install active gated enclosures in accordance with QR Standard Drawings No.2644 and No.2645.
2. Install Tapping Rails through gated enclosures and Push Plates on emergency exits in accordance with QR Standard Drawing No. 2644.
3. Install pedestrian warning signage in accordance with QR Standard Drawing No.2644.

Comments:

1. Maintain vegetation maintenance of rail corridor.
2. UP Side Pedestrian Crossing
Existing ALCAM Likelihood Factor = 222
(Intervention Score = 140, Installation Score = 100)
Note: Above score reflects revised train count and length of trains associated with Taroborah Coal Project.
Option 1:
Proposed ALCAM Likelihood Score with implementation of above works = 55 (Intervention Score = 500, Installation Score = 350)
Option 2:
Proposed ALCAM Likelihood Score with implementation of above works = 8
(Intervention Score = 500, Installation Score = 350)
3. DN Side Pedestrian Crossing
Existing ALCAM Likelihood Factor = 308
(Intervention Score = 140, Installation Score = 100)
Note: Above score reflects revised train count and length of trains associated with Taroborah Coal Project.
Option 1:
Proposed ALCAM Likelihood Score with implementation of above works = 54
(Intervention Score = 500, Installation Score = 350)
Option 2:
Proposed ALCAM Likelihood Score with implementation of above works = 8
(Intervention Score = 500, Installation Score = 350)

Central Line: Selma Road Level Crossing ID2771 at 266.200km

Observations and "works" in need of attention at crossing include;

1. Existing train speeds are too fast for some existing sight distances. S3 sight distances on DN side of crossing are insufficient due to "masking" issues associated with stationary trains in Emerald Station Yard and location of QR communication hut adjacent to roadway over crossing.
Note: Active protection (RX-5 Flashing Lights) installed at crossing provide adequate level of protection for failure of sight distances in accordance with AS 1742.7 - 2007.
2. Road crossing is located over single track.
3. Advance warning signage is installed on both approaches to crossing. Ensure that signage is installed in accordance with Figures 4.6 and 4.11 of AS 1742.7 - 2007.
4. Vehicle holding lines and barrier lines are beginning to fade. Consideration should be given to repaint road markings in accordance with Figures 4.6 and 4.11 of AS 1742.7 - 2007.
5. Distance from nearest rail to intersection control point on right side exit from crossing is limited - about 43m. Traffic environment especially in peak hours could lead to "queuing".
Note: Yellow cross-hatching and G9-67 "Keep Clear" signs have been installed over crossing as shown in Clause 3.6 of AS 1742.7 - 2007. However, Yellow cross-hatching is beginning to fade. Consideration should be given to repaint yellow cross-hatching over crossing in accordance with Clause 3.6 of AS 1742.7 - 2007.
6. Crossing is located on an operational route for Type 1 (36.5m) Road Trains.
7. Existing distance of 43m from nearest rail to intersection control point on right side exit from crossing onto Capricorn Highway is sufficient to accommodate 36.5m long vehicles in use over crossing. Required distance is equal to length of longest vehicle in use over crossing plus an additional 5m i.e. 41.5m.
8. High proportion of heavy vehicles use crossing (estimated at about 12%).
9. Ensure that existing whistle boards are installed at 220m (+/-10% location tolerance) on both sides of crossing for UP and DN train running - 50km/h in accordance with QR Whistle Board table (2008) and QR Standard Drawing No.10732.
10. Maintain bitumen crossing surface and road approaches in accordance with QR Standard Drawing No.2586.
11. Rail runs E-W. Potential exists for Sun to obscure train from crossing.
12. Incident Reporting Signage (2771) is installed at crossing but should be relocated to front side of flashing light assemblies on both sides of crossing.
13. Consider installation of RX-9 width markers on both sides of crossing as shown on Clause 2.4.2 of AS1742.7 - 2007.

14. Re-assessment is required if any additional proposal is made to the Taroborah Coal Project which might impact on the safety of this level crossing.
15. Pedestrian crossings are not installed at this location. Pedestrians are forced to step over rails or to use edge of road to cross rail. Investigations should be implemented for installation of such.

Comments:

Existing data for this crossing has been processed through ALCAM - results being:

1. Existing ALCAM Likelihood Factor = 110
(Intervention Score = 390, Installation Score = 103)
2. Proposed ALCAM Likelihood Factor with implementation of above mentioned maintenance "works" and current train volume = 95
(Intervention Score = 390, Installation Score = 198)
3. Proposed ALCAM Likelihood Factor with implementation of above mentioned "works" and proposed train volume associated with Taroborah Coal Project = 100
(Intervention Score = 380, Installation Score = 195)

Central Line: Stock Route Occupation Crossing ID6890 at 266.840km

Note: Upgrade works required for compliance with the relevant standards should be undertaken at private crossings regardless of project proposals.

Observations:

1. This crossing and marked as a Stock Route.
2. Road traffic control measures and procedure warning signage for livestock in accordance with QR Standard requirements (MD-10-115 "Civil - Level Crossing Safety" - Version 2.0) and as shown on QR Standard Drawings No.2701, No.2702 and No.2703 are not in place at crossing.
3. Insufficient sight distance at S3_1, (Exist = 200m, Req'd = 230m) due to vegetation in rail corridor. Note: Potential sight distance is approximately 300m.
4. Insufficient sight distance at S3_3, (Exist = 100m, Req'd = 230m) due to vegetation in rail corridor. Note: Potential sight distance is approximately 300m.
5. Crossing surface is ballast only and is not suitable for use by motor vehicles of any type.
6. Moderate grade on right and left side approaches (5% at S3).
7. Crossing road approaches are not formed.
8. Evidence that crossing is being utilised by vehicles.
9. The crossing has some guide fencing in place on approaches to crossing but is inadequate to prevent live stock from straying into the rail corridor while in use. Construction and material types not in accordance with QR Standard Drawings No.2701 and No.2702 for this type of crossing.
10. Rail corridor not fenced on DN side of crossing.
11. Whistle boards not installed.
12. Incident Reporting Signage is not installed at crossing.

Proposals:

1. Because crossing it is intended to utilised for passage of livestock then the crossing has been deemed to be a "designated" occupation stock crossing.
2. Install RX-2 Stop assemblies and procedure warning signage on both sides of crossing in accordance with QR standard requirements (MD-10-115 "Civil - Level Crossing Safety" - Version 2.0) and as shown on QR Standard Drawings No.2701, No.2702 and No.2703.
3. In addition, then install QOX-5 Procedure Warning Signage whereby all users of the crossing must contact train control before using the crossing. (Refer clause 64.1.9 - QR Standard MD-10-115 "Civil - Level Crossing Safety" - Version 2.0 and as shown on QR Standard Drawing No.2588).
4. All procedures must be included in any crossing agreements.
5. Install QOX-6 warning signage at the crossing as shown on QR Standard Drawing No.2588, in order to reduce the possibility of inadvertent use by the public.
6. If road vehicles could be in use over crossing, then reconstruct crossing surface with gravel in accordance with QR Standard Drawing No.2587.
7. Grade road approaches on both sides of crossing in order to achieve a maximum change in grade of 6% in accordance with QR Standard Drawing No. 2587.
8. Install stock proof fencing and 'lockable' gates at crossing in accordance with QR Standard Drawings No.2701 and No.2702.
9. Install D4-1 signage on gates as shown on QR Standard Drawing No.2701.

10. Install whistle boards at 220m (+/- 10% location tolerance) on both UP and DN sides of crossing for UP and DN train speeds over crossing - 50km/h in accordance with QR Whistle Board table (2008) and QR Standard Drawing. No.10732.
11. Reduce height of grass and vegetation at S3_1 and at S3_2 in order to maintain existing sight distances.
12. Install Incident Reporting Signage (6890) at crossing in accordance with QR Standard Drawing No.2622.
13. In order to acknowledge existence of the crossing, then train control should be informed with all details by means of a Train Notice if not already done.

Comments:

1. Maintain vegetation clearance of rail corridor.
2. Consider fencing rail corridor on DN side of crossing in accordance with QR Standard Drawing No.2587 in order to limit "trespass" to rail corridor or stock straying into corridor.
3. If crossing is no longer required, then close and remove crossing in accordance with QR Standard Drawing No.2623.

Central Line: Marshall Road Level Crossing ID2772 at 271.950km

Observations and "works" in need of attention at crossing include;

1. Road crossing is located over single track.
2. RX-2 Stop assemblies have been installed at crossing but are "leaning" over and should be reinstalled in accordance with Figure 4.4 of AS 1742.7 - 2007.
3. Advance warning signage is installed on both approaches to crossing. Ensure that signage is in accordance with Figures 4.4 and 4.10 of AS 1742.7 - 2007.
4. Ensure that RAIL X road markings are installed on left side road approach to crossing in accordance with Figures 4.4 and 4.5 of AS 1742.7 - 2007.
5. Maintain vegetation clearance of rail corridor in order that existing sight distances remain in excess of minimum requirements of 241m.
6. Ensure that existing whistle boards are installed at 220m (+/-10% location tolerance) on both sides of crossing for UP and DN train running - 50km/h in accordance with QR Whistle Board table (2008) and QR Standard Drawing No.10732.
7. Maintain bitumen crossing surface and gravel road approaches in accordance with QR Standard Drawing No.2586.
8. Crossing is located in an operational area for Type 1 (36.5m) Road Trains.
9. Distance from nearest rail to intersection control point on right side exit from crossing onto Capricorn Highway is limited - about 37m. Required distance is equal to length of longest vehicle in use over crossing plus an additional 5m. To be determined
10. If "Short stacking" of long vehicles is considered an issue, then install "Limited Clearance To Rails" signage on left side approach as shown on DMR Drawing TC1556.
11. Local road authority should be made aware of any long vehicle overhang issue onto public road on right side of crossing if existing.
12. Volume of road traffic over crossing is low.
13. Rail runs E-W. Potential exists for Sun to obscure train from crossing.
14. Incident Reporting Signage (2772) is installed at crossing.
15. Consider installation of RX-9 width markers on both sides of crossing as shown on Clause 2.4.2 of AS1742.7 - 2007.
16. Re-assessment is required if any additional proposal is made to the Taraborah Coal Project which might impact on the safety of this level crossing.

Comments:

Existing data for this crossing has been processed through ALCAM - results being:

1. Existing ALCAM Likelihood Factor = 214
(Intervention Score = 400, Installation Score = 190)
2. Proposed ALCAM Likelihood Factor with implementation of above mentioned maintenance "works" and current train volume = 188
(Intervention Score = 400, Installation Score = 200)
3. Proposed ALCAM Likelihood Factor with implementation of above mentioned "works" and proposed train volume associated with Taraborah Coal Project = 172
(Intervention Score = 400, Installation Score = 200)

Central Line: Denison Road Level Crossing ID2773 at 273.030km

Note: (a) Denison Road provides public access to "Denison Downs" rural property.
(b) Denison Road provides public access southwards through to Selma Road.
(c) Public road signage at intersection of Denison Road and Capricorn Highway reads - S406 STOCK ROUTE. Refer to Point No.16 in report.

Observations and "works" in need of attention at crossing include:

1. Road crossing is located over single track.
2. RX-2 Stop assemblies have been installed at crossing in accordance with Figure 4.4 of AS 1742.7 - 2007.
3. Advance warning signage is installed on both approaches to crossing but some is missing and some located incorrectly. Ensure that signage is installed in accordance with Figures 4.4 and 4.10 of AS1742.7 - 2007.
4. Maintain vegetation clearance of rail corridor in order that existing sight distances remain in excess of minimum requirements of 252m.
Note: Grass adjacent to railway could reduce sight distances to below minimum requirements if not maintained.
5. Ensure that existing whistle boards are installed at 220m (+/-10% location tolerance) on both sides of crossing for UP and DN train running - 50km/h in accordance with QR Whistle Board table (2008) and QR Standard Drawing No.10732.
6. Maintain gravel crossing surface and road approaches in accordance with QR Standard Drawing No.2586.
7. Crossing is located in an operational area for Type 1 (36.5m) Road Trains.
8. Distance from nearest rail to intersection control point on right side exit from crossing onto Capricorn Highway is limited - about 37m. Required distance is equal to length of longest vehicle in use over crossing plus an additional 5m. To be determined.
9. If "Short stacking" of long vehicles is considered an issue, then install "Limited Clearance To Rails" signage on left side approach as shown on DMR Drawing TC1556.
10. Local road authority should be made aware of any long vehicle overhang issue onto public road on right side of crossing if existing.
11. Volume of road traffic over crossing is low.
12. Rail runs E-W. Potential exists for Sun to obscure train from crossing.
13. Incident Reporting Signage (2773) is installed at crossing.
14. Consider installation of RX-9 width markers on both sides of crossing as shown on Clause 2.4.2 of AS1742.7 - 2007.
15. Re-assessment is required if any additional proposal is made to the Taraborah Coal Project which might impact on the safety of this level crossing.
16. Public road signage at intersection of Denison Road and Capricorn Highway reads - S406 STOCK ROUTE. If this is confirmed, then as shown on QR Standard Drawing No.2586, in areas where livestock enter into road reserve, fencing and grids should be provided as required by road authority. In addition for livestock movements over crossing, then install procedure signage. Refer to MUTCD, AS 1742.7 - 2007 and QR standard requirements (MD-10-115 "Civil - Level Crossing Safety" - Version 2.0).

Comments:

Existing data for this crossing has been processed through ALCAM - results being:

1. Existing ALCAM Likelihood Factor = 211
(Intervention Score = 400, Installation Score = 193)
2. Proposed ALCAM Likelihood Factor with implementation of above mentioned maintenance "works" and current train volume = 191
(Intervention Score = 400, Installation Score = 200)
3. Proposed ALCAM Likelihood Factor with implementation of above mentioned "works" and proposed train volume associated with Taraborah Coal Project = 182
(Intervention Score = 400, Installation Score = 200)

Central Line: Main Roads Stock Pile Access Road Crossing ID2774 at 274.500km

Note: Upgrade works required for compliance with the relevant standards should be undertaken at private crossings regardless of project proposals.

Observations:

1. Main line train speed has been reduced from 70kph to 50 kph in UP and DN direction. Site inspection of 13.09.2011 showed:
2. Crossing control is RX-2 Stop assembly on single pipe post.
3. Recorded sight distances are sufficient for UP and DN 50kph train speeds over crossing and control as installed.
4. Vegetation is a recorded issue reducing S3 to below required sight distances at this crossing.
5. Placement of gravel stockpiles may restrict sight distance on approach from left side.
6. Crossing surface consists of gravel. Photographs taken in September 2011 indicate the surface may need repair.
7. Whistle boards may require relocating.
8. Incident Reporting signage installed.

Proposals:

1. Confirm crossing is still required by Council (or others) for stockpile of, and access to, road base materials or similar materials.
2. If crossing is still required, then implement any outstanding Proposals arising from "QR Desktop Assessment – 12 May 2011" i.e. Proposals 1, 3, 4, 7, 8, 9, 10 and 13 (refer below).
3. In addition consider installing RX-2 Stop assembly on two pipe posts in accordance with QR Standard Drawing No. 2588.
4. Install QOX-6 signage "AUTHORISED USE ONLY" as shown on QR Standard Drawings Nos. 2587 and 2588.
5. Repair gravel crossing surface in accordance with QR Standard Drawing No.2587.
6. If not already installed in correct location, install whistle boards to 220m (+/-10% location tolerance) on the UP and DN sides of crossing in accordance with QR Standard Drawing No. 10732 and QR Whistle Board Location Table (2008) for 50kph train speed.
7. If crossing is no longer required, then close and remove crossing in accordance with QR Standard Drawing No.2623.

Proposals 1, 3, 4, 7, 8, 9, 10 and 13 from "QR Desktop Assessment – 12 May 2011".

1. Remove / reduce height of trees and vegetation in rail corridor in order to achieve minimum required sight distances of 390m at S3_1 and at S3_2 and 355m at S3_3 and at S3_4.
3. Duplicate RX-2 Stop assembly on right side approach in order to increase visibility and to provide S1 ight distances in excess of minimum requirements. Assemblies should face about 5 degrees inwards towards crossing in order to be better observed by approaching road traffic.
4. Install advance warning signage on right side approach in accordance with Figure 4.10 of AS 1742.7 - 2007.
7. In order to prevent potential damage to crossing surface and road approaches caused by the passage of large volumes of loaded trucks entering / leaving the site, then engineering advice should be obtained as to whether or not additional requirements should be included into the design of the crossing surface, otherwise ensure that surface and approaches are repaired / maintained in accordance with QR Standard Drawing No.2587.
8. Install "limited clearance to rails" signage in accordance with DMR Traffic Plan TC1556.
Note: Distance on sign to match remeasured distance - nearest rail to intersection.
Available clearance distance could disallow right turn from crossing access road onto Capricorn Highway for vehicles above 26m - To be investigated.
9. Local Road Authority should be informed of short stacking issue and long vehicle overhang problem onto public road on right side of crossing.
10. Alternately, then implement infrastructure changes in order to address "short stacking" issue so that available space on right side approach accommodates the length of the longest vehicle to use crossing plus additional 5 metres.
13. Instigate a site Awareness Education Program on the safe use of crossing by all truck drivers involved. In particular by including the program in "on site" induction safety training and "tool box" briefings.

Comments:

1. Maintain vegetation clearance of rail corridor.

Central Line: Property Access Road ID3769 at 276.750km

Note: Upgrade works required for compliance with the relevant standards should be undertaken at private crossings regardless of project proposals.

Observations:

1. Train speeds over crossing have been reduced from 70kph to 50kph.
Site inspection of 13.09.2011 showed:
2. Crossing control is RX-2 Stop assembly on single pipe post.
3. Recorded sight distances are sufficient for UP and DN 50kph train speeds over crossing and control as installed.
4. Crossing surface consists of ballast rather than gravel.
5. Locked gates on left side of crossing. Note: Long vehicles could overhang onto rail on when stopped to open gates on left side of crossing. Approx distance rail to gates is 15 metres, distance required is length of longest vehicles to use crossing plus 5 metres clearance.
6. Whistle boards may require relocating.
7. Incident Reporting signage installed.

Proposals:

1. Consider installing RX-2 Stop assembly on two pipe posts in accordance with QR Standard Drawing No. 2588.
2. Consider installing a gravel crossing surface in accordance with QR Standard Drawing No.2587.
3. If not already installed in correct location, relocate whistle boards to 220m (+/-10% location tolerance) on the UP and DN sides of crossing in accordance with QR Standard Drawing No. 10732 and QR Whistle Board Location Table (2008).
4. Confirm long vehicle overhang is not an issue. i.e. length of longest vehicle to use crossing plus 5m is less than distance rail to gate.
5. If long vehicle overhang is an issue develop a procedure with the property owner for use of crossing with such vehicles i.e. property owner must contact train control before using the crossing. (Refer clause 6.1.9 - QR Standard MD-10-115 "Civil - Level Crossing Safety" - Version 2.0 and as shown on QR Standard Drawing No.2588). This procedure should be included in the Private Crossing Agreement.
6. Install additional signage similar to Crossing Procedure Signage shown on QR Standard Drawing No. 2703. Amend signage wording to "Prior to crossing vehicles over XX (insert maximum length vehicle allowable) metres in length" or similar.
7. Install signage at crossing facing oncoming road traffic.

Comments:

1. Maintain clearance of vegetation in rail corridor.

Central Line: Old Selma Siding Access Road ID2775 at 279.650km

1. Crossing control is RX-2 Stop assembly on single pipe post.
2. Recorded sight distances are sufficient for UP trains at 70kph train speeds over crossing and control as installed (Recorded available sight distance on DN side = 400m, Req'd = 322m).
3. Recorded sight distances may be insufficient for DN trains at 70kph train speeds over crossing and control as installed (Recorded available sight distance on UP side = 300m, Req'd = 322m).
4. Crossing surface consists of ballast rather than gravel.
5. Locked gate on left side of crossing. Note: Long vehicles could overhang onto rail on when stopped to open gates on left side of crossing. Approx distance rail to gates is 20 metres. Minimum distance required is length of longest vehicles to use crossing plus 5 metres clearance.
6. Whistle boards may require relocating.
7. Incident Reporting signage installed.

Proposals:

1. Consider installing RX-2 Stop assembly on two pipe posts in accordance with QR Standard Drawing No. 2588.
2. Consider installing gravel crossing surface in accordance with QR Standard Drawing No.2587.
3. If not already installed in correct location, install whistle boards to 310m (+/-10% location tolerance) on the UP and DN sides of crossing in accordance with QR Standard Drawing No. 10732 and QR Whistle Board Location Table (2008).

4. Confirm available sight distances in all quadrants.
5. If sight distance in any quadrant is insufficient, then crossing should be classified as a "designated private level crossing" and QOX-5 Procedure Warning Signage installed whereby property owners must contact train control before using the crossing. (Refer clause 6.1.9 - QR Standard MD-10-115 "Civil - Level Crossing Safety" - Version 2.0 and as shown on QR Standard Drawing No.2588). This procedure should be included in the Private Crossing Agreement.
6. Install 'lockable' gate on right side of crossing
7. Maintain gates on both approaches to crossing in 'locked' position when crossing is not in use.
8. Confirm long vehicle overhang is not an issue i.e. length of longest vehicle to use crossing plus 5m is less than distance rail to gate.
9. If long vehicle overhang is an issue develop a procedure with the property owner for use of crossing with such vehicles i.e. property owner must contact train control before using the crossing. (Refer Clause 6.1.9 - QR Standard MD-10-115 "Civil - Level Crossing Safety" - Version 2.0 and as shown on QR Standard Drawing No.2588). This procedure should be included in the Private Crossing Agreement.
10. Install additional signage similar to Crossing Procedure Signage shown on QR Standard Drawing No. 2703. Amend signage wording to "Prior to crossing vehicles over XX (insert maximum length vehicle allowable) metres in length, Phone" or similar.
11. Install signage facing oncoming road traffic.
12. If crossing is to be classified as a "designated private level crossing" and Proposals 5 to 7 are implemented, then Proposals 9 to 10 are not necessary.

Comments:

1. Maintain clearance of vegetation in rail corridor.

Central Line: Wilga Downs Road Level Crossing ID2776 at 284.540km

Note: Wilga Downs Road provides public access to several rural properties and to Lake Maraboon. It is not a through road.

Observations or "works" in need of attention at crossing include:

1. Road crossing is located over single track.
2. RX-1 Give Way assemblies are installed at crossing in accordance with QR Standard Drawing No.2588.

Note: Give Way assemblies can only be provided as control measures proving that all of minimum required S2 as well as S3 sight distances can be achieved.

3. However, S2 sight distances are insufficient of minimum requirements of 271m due to presence of trees and vegetation in rail corridor and adjacent to roadway on approaches to crossing. In addition, S2 sight distances are insufficient on right side approach due to angle of road approach towards crossing and consequent limitation of 110 degrees maximum sighting angle to the right and 95 degrees maximum sighting angle to the left from the S1 position which is located at 51m from the crossing.
4. For that reason, then RX-1 Give Way assemblies should be removed from crossing and replaced with RX-2 Stop assemblies in accordance with Figure 4.4 of AS 1742.7 - 2007.
5. Advance warning signage is installed on both approaches to crossing and should be reinstalled for RX-2 Stop assemblies in accordance with Figures 4.4 and 4.10 of AS 1742.7 - 2007.
6. Tree overhang (S3_3) and vegetation regrowth was observed in rail corridor and should be maintained in order that existing sight distances remain in excess of minimum requirements of 370m for 36.5m length vehicles if in use over crossing.
7. Due to location of crest in rail formation on DN side of crossing, then only the top third of an approaching locomotive might be seen at minimum required sight distance of 370m for 36.5m length vehicles if in use over crossing.
8. Ensure that existing whistle boards are installed at 310m (+/-10% location tolerance) on both sides of crossing for UP and DN train running - 70km/h in accordance with QR Whistle Board table (2008) and QR Standard Drawing No.10732.
9. Maintain bitumen crossing surface and gravel road approaches in accordance with QR Standard Drawing No.2586.
10. Crossing is located in an operational area for Type 1 (36.5m) Road Trains.

11. Distance from nearest rail to intersection control point on right side exit from crossing onto Capricorn Highway is limited - about 35m. Required distance is equal to length of longest vehicle in use over crossing plus an additional 5m.

Note: Deceleration / acceleration lanes have been constructed at intersection with highway. "Short stacking" of long vehicles is not an issue for long vehicles turning left onto Capricorn Highway. 12. If "Short stacking" of long vehicles is considered an issue for long vehicles turning right onto Capricorn Highway, then install "Limited Clearance To Rails" signage on left side approach as shown on DMR Drawing TC1556.

13. Volume of road traffic over crossing is low.

14. Rail runs E-W. Potential exists for Sun to obscure train from crossing.

15. Incident Reporting Signage (2776) is installed at crossing.

16. Consider installation of RX-9 width markers on both sides of crossing as shown on Clause 2.4.2 of AS1742.7 - 2007.

17. Re-assessment is required if any additional proposal is made to the Taroborah Coal Project which might impact on the safety of this level crossing.

Comments:

Existing data for this crossing has been processed through ALCAM - results being:

1. Existing ALCAM Likelihood Factor = 334

(Intervention Score = 400, Installation Score = 193)

2. Proposed ALCAM Likelihood Factor with implementation of above mentioned maintenance "works" and current train volume = 199

(Intervention Score = 400, Installation Score = 200)

3. Proposed ALCAM Likelihood Factor with implementation of above mentioned "works" and proposed train volume associated with Taroborah Coal Project = 190

(Intervention Score = 400, Installation Score = 200)

Central Line: St Helens Road Level Crossing ID2777 at 287.680km

Note: (a) Crossing has been deemed "Occupation in Use"

(b) For that reason, then advance warning signage is not present on crossing approaches.

(c) Closed gates are present on left side approach to crossing (67m from nearest rail).

Observations or "works" in need of attention at crossing include:

1. Road crossing is located over single track.

2. RX-1 Give Way assemblies are installed at crossing in accordance with QR Standard Drawing No.2588.

Note: Give Way assemblies can only be provided as control measures proving that all of minimum required S2 as well as S3 sight distances can be achieved.

3. However, S2 sight distances are insufficient of minimum requirements of 274m on right side due to presence of trees and vegetation in rail corridor and 583m on left side due to presence of trees and vegetation in rail corridor and steep road grade.

4. For that reason, then RX-1 Give Way assemblies should be removed from crossing and replaced with RX-2 Stop assemblies in accordance with QR Standard Drawing No.2588.

Note: As stated in QR Standard MD-10-115 "Civil - Level Crossing Safety" - Version 2.0, then the normal control measure for private level crossings must be in accordance with installation of the RX-2 Stop assembly.

5. Tall vegetation was observed growing in rail corridor (especially at S3_4) and should be maintained in order that existing sight distances remain in excess of minimum requirements of 348m for 19m length vehicles, 657m for 26m length vehicles or 776m for 36.5m length vehicles if in use over crossing.

6. Ensure that existing whistle boards are installed at 310m (+/-10% location tolerance) on both sides of crossing for UP and DN train running - 70km/h in accordance with QR Whistle Board table (2008) and QR Standard Drawing No.10732.

7. Maintain bitumen crossing surface and gravel road approaches in accordance with QR Standard Drawing No.2587.

8. Crossing is located in an operational area for Type 1 (36.5m) Road Trains.

9. Existing distance of 65m from nearest rail to intersection control point on right side exit from crossing onto Capricorn Highway is sufficient to accommodate 36.5m long vehicles if in use over

crossing. Required distance is equal to length of longest vehicle in use over crossing plus an additional 5m i.e. 41.5m.

10. Volume of road traffic over crossing is low.

11. Rail runs E-W. Potential exists for Sun to obscure train from crossing.

12. Incident Reporting Signage (2777) is installed at crossing.

13. Re-assessment is required if any additional proposal is made to the Taroborah Coal Project which might impact on the safety of this level crossing.

Comments:

Because of installation of RX-1 Give Way assemblies as crossing control measures, then existing data for this crossing has been processed through ALCAM - results being:

1. Existing ALCAM Likelihood Factor = 282

(Intervention Score = 400, Installation Score = 195)

2. Proposed ALCAM Likelihood Factor with implementation of above mentioned maintenance "works" and current train volume = 168

(Intervention Score = 400, Installation Score = 200)

3. Proposed ALCAM Likelihood Factor with implementation of above mentioned "works" and proposed train volume associated with Taroborah Coal Project = 161

(Intervention Score = 400, Installation Score = 200)

Central Line: Glendarriwell Road Level Crossing ID2778 at 295.660km

Note: Glendarriwell Road provides public access to several rural properties and is not a through road.

Observations or "works" in need of attention at crossing include:

1. Road crossing is located over single track.

2. RX-1 Give Way assemblies are installed at crossing in accordance with QR Standard Drawing No.2588. Note: Give Way assemblies can only be provided as control measures proving that all of minimum required S2 as well as S3 sight distances can be achieved.

3. However, S2 sight distances are insufficient of minimum requirements of 225m due to presence of trees and vegetation in rail corridor and adjacent to roadway on approaches to crossing. In addition, S2 sight distances are insufficient on right side approach due to angle of road approach towards crossing and consequent limitation of 110 degrees maximum sighting angle to the right and 95 degrees maximum sighting angle to the left from the S1 position which is located at 51m from the crossing.

4. For that reason, then RX-1 Give Way assemblies should be removed from crossing and replaced with RX-2 Stop assemblies in accordance with Figure 4.4 of AS 1742.7 - 2007.

5. Advance warning signage is installed on both approaches to crossing and should be reinstalled for RX-2 Stop assemblies in accordance with Figures 4.4 and 4.10 of AS 1742.7 - 2007.

6. Vegetation regrowth was observed in rail corridor and should be maintained in order that existing sight distances remain in excess of minimum requirements of 353m for 36.5m length vehicles if in use over crossing.

7. Ensure that existing whistle boards are installed at 310m (+/-10% location tolerance) on both sides of crossing for UP and DN train running - 70km/h in accordance with QR Whistle Board table (2008) and QR Standard Drawing No.10732.

8. Maintain gravel crossing surface road approaches in accordance with QR Standard Drawing No.2586.

9. Crossing is located in an operational area for Type 1 (36.5m) Road Trains.

10. Distance from nearest rail to intersection control point on right side exit from crossing onto Capricorn Highway is limited - about 36m. Required distance is equal to length of longest vehicle in use over crossing plus an additional 5m. To be determined

11. If "Short stacking" of long vehicles is considered an issue, then install "Limited Clearance To Rails" signage on left side approach as shown on DMR Drawing TC1556.

12. Local road authority should be made aware of any long vehicle overhang issue onto public road on right side of crossing if existing.

13. Volume of road traffic over crossing is low.

14. Rail runs E-W. Potential exists for Sun to obscure train from crossing.

15. Incident Reporting Signage (2778) is installed at crossing.

16. Consider installation of RX-9 width markers on both sides of crossing as shown on Clause 2.4.2 of AS1742.7 - 2007.

17. Re-assessment is required if any additional proposal is made to the Taroborah Coal Project which might impact on the safety of this level crossing.

Comments:

Existing data for this crossing has been processed through ALCAM - results being:

1. Existing ALCAM Likelihood Factor = 374

(Intervention Score = 400, Installation Score = 185)

2. Proposed ALCAM Likelihood Factor with implementation of above mentioned maintenance "works" and current train volume = 197

(Intervention Score = 400, Installation Score = 200)

3. Proposed ALCAM Likelihood Factor with implementation of above mentioned "works" and proposed train volume associated with Taroborah Coal Project = 187

(Intervention Score = 400, Installation Score = 200)

Appendix B Rail Crossing Traffic Assessment





Emerald Rail Crossing Assessment

Final Report

Taroborah Coal Project SEIS

B14343ER01

November 2014



Prepared for IMC Mining Pty Ltd
on behalf of Shenhua International Group Pty Ltd

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2014

DOCUMENT CONTROL

REFERENCE NUMBER: B14343ER01

Revision	Date	Details	Author	Reviewed	Approved
8	20/11/2014	Rail Crossing Assessment Final Report	AK	JvP	JvP (RPEQ 7280)

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Appendices

Appendix A	Traffic Survey Information
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1. Introduction and Context

Brown Consulting have prepared the following report for IMC Mining Pty Ltd on behalf of Shenhua International Group Pty Ltd.

Shenhua International Group Pty Ltd (the proponent) commenced an Environmental Impact Statement (EIS) process for the Taraborah Coal Project (TCP) in 2011. On 20th February 2012, the Commonwealth Department of Sustainability, Environment, Water, Population and Communities determined the proposed project to be a controlled action under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The controlling provisions are:

- » Listed threatened species and communities (sections 18 & 18A)
- » Listed migratory species (sections 20 & 20A)
- » Water resources (sections 24D & 24E)

The EIS will be prepared pursuant to the bilateral agreement (section 45 of the EPBC Act) between the Commonwealth and Queensland governments for the purposes of the Commonwealth Government's assessment under part 8 of the EPBC Act. The Proponent is preparing an EIS in accordance with the Terms of Reference (ToR) issued by the Department of Environment and Heritage Protection in August 2012.

The Taraborah Coal Project is located approximately 22km due west of Emerald, and the major activities proposed are.

- » open-cut mining,
- » underground mining,
- » processing of mined coal, and
- » transport of the coal to the port of Gladstone via the Central West and Blackwater rail systems.

The proposed rail traffic is to transport coal as part of the Taraborah Coal Project. Brown Consulting have undertaken an assessment of the operational impacts associated with the proposed development rail traffic at three existing railway crossing locations within the township of Emerald. Each of the three crossing locations within Emerald are within close proximity of road intersections. Traffic simulation modelling and sensitivity analysis has been undertaken in AIMSUN transport simulation modelling software in order to identify any potential significant congestion impacts as a result of the proposed development rail traffic.

The following level crossing locations have been considered:

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

Refer to Figure 1.1 showing the regional context of the existing railway and the level rail crossings sites.

It is understood that an Australian Level Crossing Assessment Model (ALCAM) and assessment of the safety impacts associated with the rail traffic is being undertaken by others.

Figure 1.1 Regional Context of Emerald Transport Network (Image: Google Earth)

The indicative locations of the three rail crossing locations are circled



2. Development Traffic Conditions

The development traffic consists of rail movements travelling to and from the proposed mine that is situated west of Emerald. The proposed rail traffic is understood to consist of three additional trains in each direction, or six trains per day total two-way along the existing Central West railway system in Emerald. It is understood that this rail traffic is anticipated to occur during times that do not coincide with the peak periods of the existing road network, ie: off-peak periods, to minimise potential impacts to the existing road network.

The train vehicle has the following parameters:

- » Train length: 1,425m
- » Speed: 50km/h proposed, with 40km/h minimum to 60km/h maximum

The following report examines the impact of rail traffic occurring at any time of the day (peak and off-peak), and any potential for congestion within the vicinity of three railway crossings. Do note that since it is proposed that all rail traffic operate during off-peak periods, that modelling rail traffic during peak hours is a “worst-case” scenario that is unlikely to eventuate. The peak hour and off-peak hour scenarios are modelled using AIMSUN transport simulation software.

The assessment adopts the slowest train speed (40km/h), resulting in the maximum total event time of 167 seconds for a train to clear the crossing. This is inclusive of 9 seconds warning time, 10 seconds delay to ensure vehicles clear the crossing, 20 seconds boom gate operation time and 128 seconds train clearance time. This is considered conservative.

The AIMSUN simulation models the base year 2014 traffic volumes, as well as the projected traffic volumes in the future design horizon year of 2024. Traffic survey information obtained from DTMR is provided in Appendix A. The anticipated growth rate across the Emerald road network is anticipated to be 2.5% p.a. given the moderate rate of development in the surrounding area. The anticipated annual growth rate of 2.5% per annum for the traffic volumes is considered to be a medium to high growth rate, and is considered to be appropriate for the purposes of the traffic operations assessment in the following section.

The background traffic volumes for an average weekday at each of the three intersection sites are shown graphically in Figure 2.1 to Figure 2.3 below. For each site the base year 2014 conditions and design horizon year 2024 conditions were modelled. The traffic operations were assessed for the worst recorded AM peak traffic data, the worst recorded PM peak traffic and the worst recorded off-peak hour traffic obtained in the traffic surveys in order to assess the most severe potential impacts. In this regard, the change in directionality of all trips across the existing intersection sites is captured by the models. Thus the impact of the development rail traffic at each of the three railway crossing sites during all periods of the day has been captured by the following assessment.

Figure 2.1 Base Year 2014 Traffic Volume – Gregory Highway / Capricorn Highway intersection

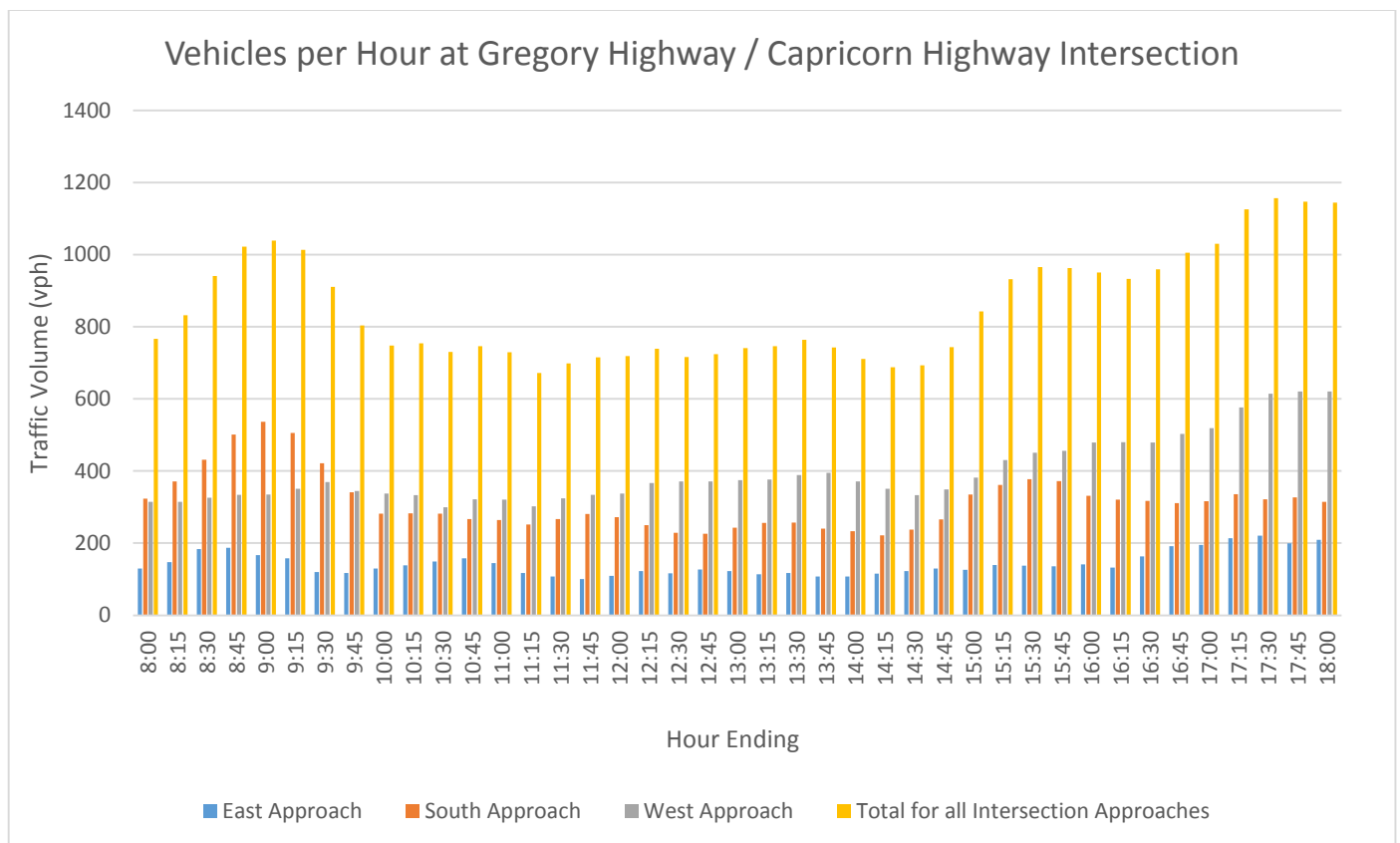


Figure 2.2 Base Year 2014 Traffic Volume – Capricorn Highway / Opal Street intersection

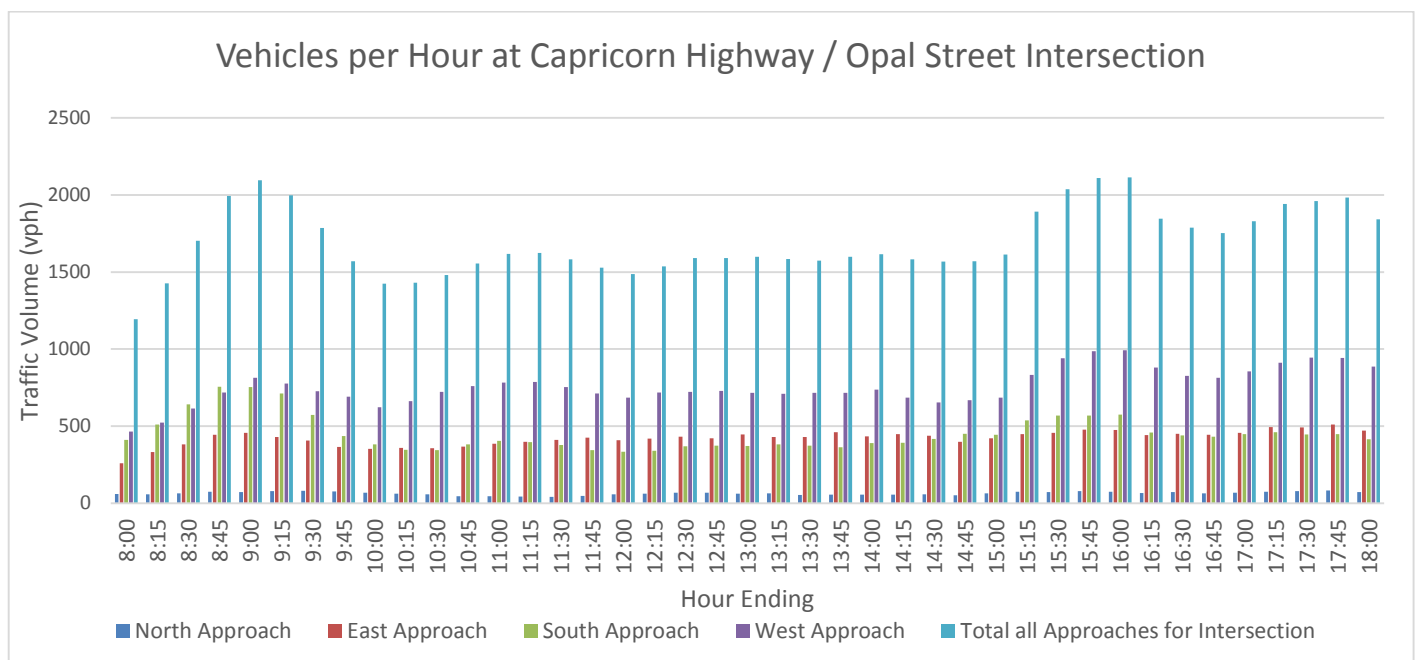
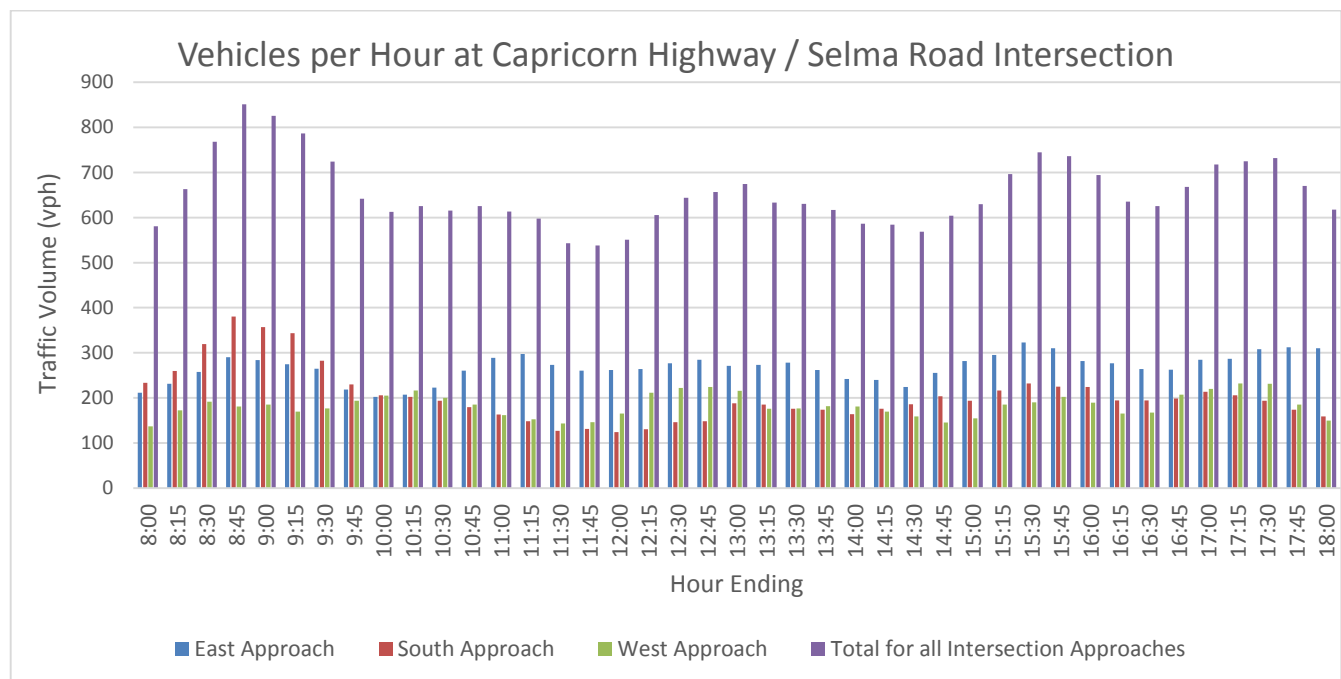


Figure 2.3 Base Year 2014 Traffic Volume – Capricorn Highway / Selma Road intersection



3. Traffic Assessment

Modelling of the base year 2014 and ten year design horizon year 2024 conditions for each of the following three sites was undertaken in AIMSUN transport simulation software.

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

The models were run five times with five of the standard RTA seeds (28, 560, 2849, 7771 and 86524). The model is considered to be stable due to limited variation between each seed.

The following assessments provide a summary of the modelling results and overview of the resulting traffic operations at each of the three intersection sites. The AIMSUN modelling results for three models are provided: the scenario of no trains, the scenario with the slowest 40km/h speed trains, and the scenario with the fastest 60km/h speed trains. In each location, the maximum queue results were similar despite the speed of the train modelled. Hence detailed output results including mean queue, level of service at the railway crossing and average time delay per vehicle have been reported for the worst case 40km/h speed train only.

The level of service at the railway crossing is a measure of the average delay per vehicle across the intersection. The level of service has been calculated in accordance with the Roads and Transport Authority (RTA) Level of Service Criteria for Intersections, refer Table 3.1 below.

Table 3.1 Level of Service Criteria for Intersections

(adapted from RTA Guide to Traffic Generating Developments, Table 4.2)

Level of Service	Average Delay per Vehicle (secs/veh)	Intersection Service – for Give Way & Stop Signs
A	< 14	Good operation
B	15 to 28	Acceptable delays & spare capacity
C	29 to 42	Satisfactory, but incident study required
D	43 to 56	Near capacity & incident study required
E	56 to 70	At capacity, requires other control mode
F	> 70	Heavily congested flow with traffic demand exceeding capacity

The level of service provides an indication of the traffic conditions in terms of speed, travel time, freedom to manoeuvre, comfort, convenience, traffic interruptions and safety. The following assessment considers the level of service at each intersection location in combination with other site-specific factors including maximum queue lengths (and their effect on lane blocking), the influence of nearby intersections and the ability of the intersection to recover to a level of service following a train event.

3.1 Level crossing south of the Capricorn Highway / Gregory Highway intersection

The AIMSUN traffic simulation results for this site are summarised in Table 3.2.

Table 3.2 Summary of impacts at level crossing adjacent to Capricorn Highway / Gregory Highway intersection

Scenario	Maximum Queue Length – No Trains (veh)	Mean Queue Length – With 40km/h Train (veh)	Maximum Queue Length – With 40km/h Train* (veh)	Maximum LOS [^] With 40km/h Train	Maximum Queue Length – With 60km/h Train (veh)
AM Peak (8:00 – 9:00am)					
Base year 2014	5 [30m] at south approach	8	28 [168m]	B	23 [138m]
Future year 2024	12 [72m] at south approach	9	33 [198m]	C	32 [192m]
Off-Peak (12:30 – 1:30pm)					
Base year 2014	4 [24m] at south approach	2	13 [78m]	B	11 [66m]
Future year 2024	6 [36m] at south approach	2	15 [90m]	B	12 [72m]
PM Peak (4:45 – 5:45pm)					
Base year 2014	4 [24m] at west approach	6	22 [132m]	B	21 [126m]
Future year 2024	7 [42m] at west approach	9	26 [156m]	C	24 [144m]

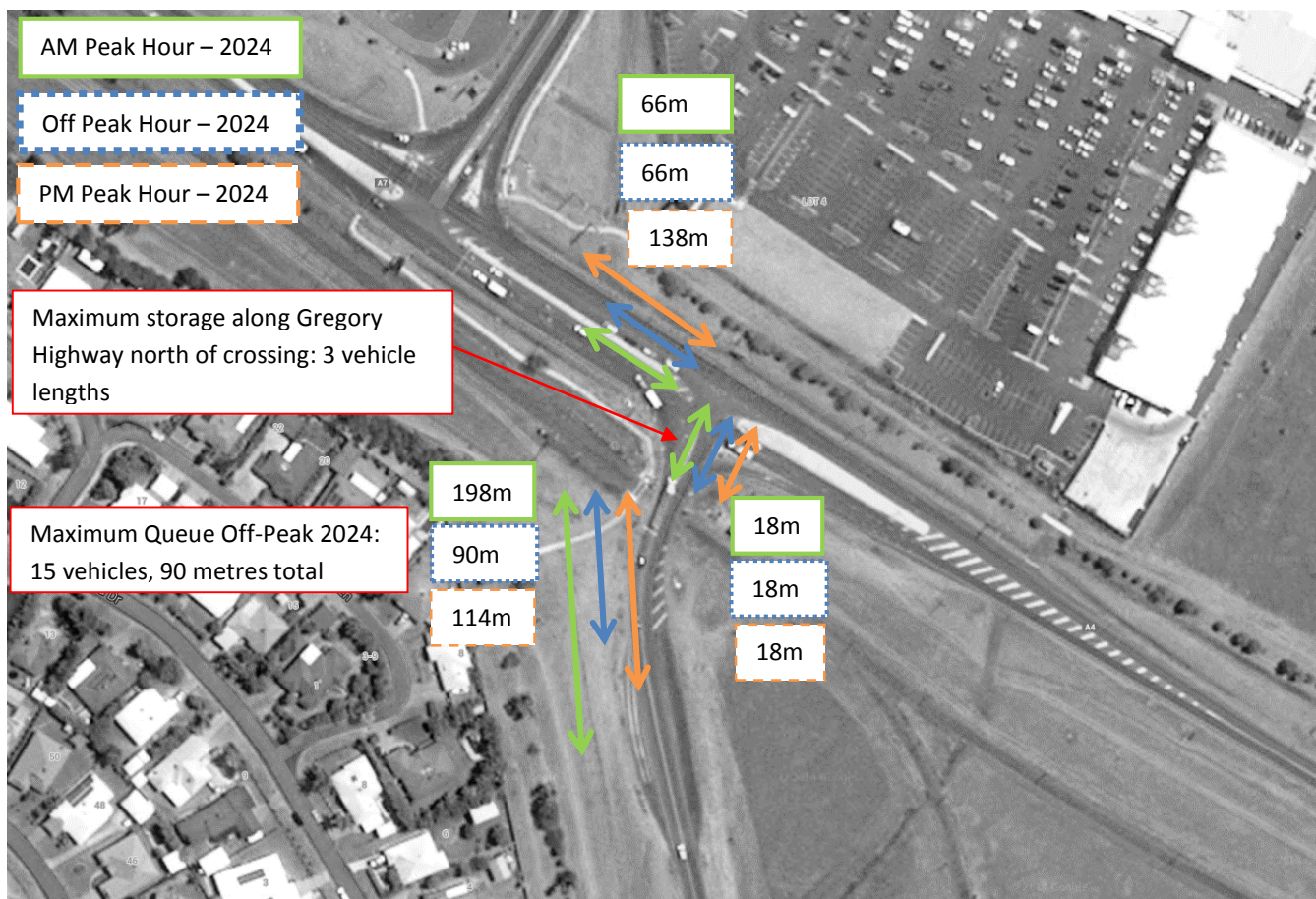
*Refer Figure 3.1 showing indicative location of maximum queues for the year 2024 scenario

[^]LOS = Level of Service, presented on a scale A – F where A represents free-flowing conditions with minimal delays, F represents heavy congestion

The AIMSUN modelling results show that for the slowest train speed there are significant queues anticipated during the morning and evening peak periods of the future design horizon year 2024. The maximum queue lengths for year 2024 traffic conditions are shown indicatively in Figure 3.1. The queue length north of the railway crossing is 18m maximum along the Gregory Highway, with the additional queues continuing along Capricorn Highway, refer Figure 3.1. The maximum queue length of 198 metres was observed during the morning peak hour of 2024 along the southern approach of the intersection. The maximum queue length during the evening peak hour of 2024 was 156 metres along the west approach. In each morning and evening peak hour model, the maximum queue lengths along the southern approach of the intersection site did not appear to impact any intersections to the south.

The queues during the off-peak period are moderate. The maximum queue length during the off peak period occurs on the southern approach and is 15 vehicle lengths or 90 metres in the design horizon year 2024. The queues on the western approach along the Capricorn Highway during the off-peak hour are approximately 14 vehicle lengths or 84 metres in total. The mean queue length during the future year 2024 off-peak hour was 2 vehicle lengths or 12 metres. The intersection appears to recover quickly following the departure of the train from the crossing. Following the worst-case train event (for slowest 40km/h speed train), the time taken for vehicles to return to average travel speed is 80 seconds during the off-peak hour of future year 2024. Refer to Figure 3.2 and Figure 3.3 showing the change in speed of vehicles travelling through the intersection with and without the train event in the future year 2024 off-peak scenario. Given that the average flow of vehicles travelling through the intersection is restored within 80 seconds of the train departure under worst-case off-peak hour traffic conditions, the 'recovery time' of the intersection is good. Hence it is not expected that additional rail movements during off-peak periods at this site will significantly impact upon the road network.

Figure 3.1 Aerial Image showing indicative location of maximum queues obtained from modelling future year 2024 – Capricorn Highway / Gregory Highway (Image: Google Earth)



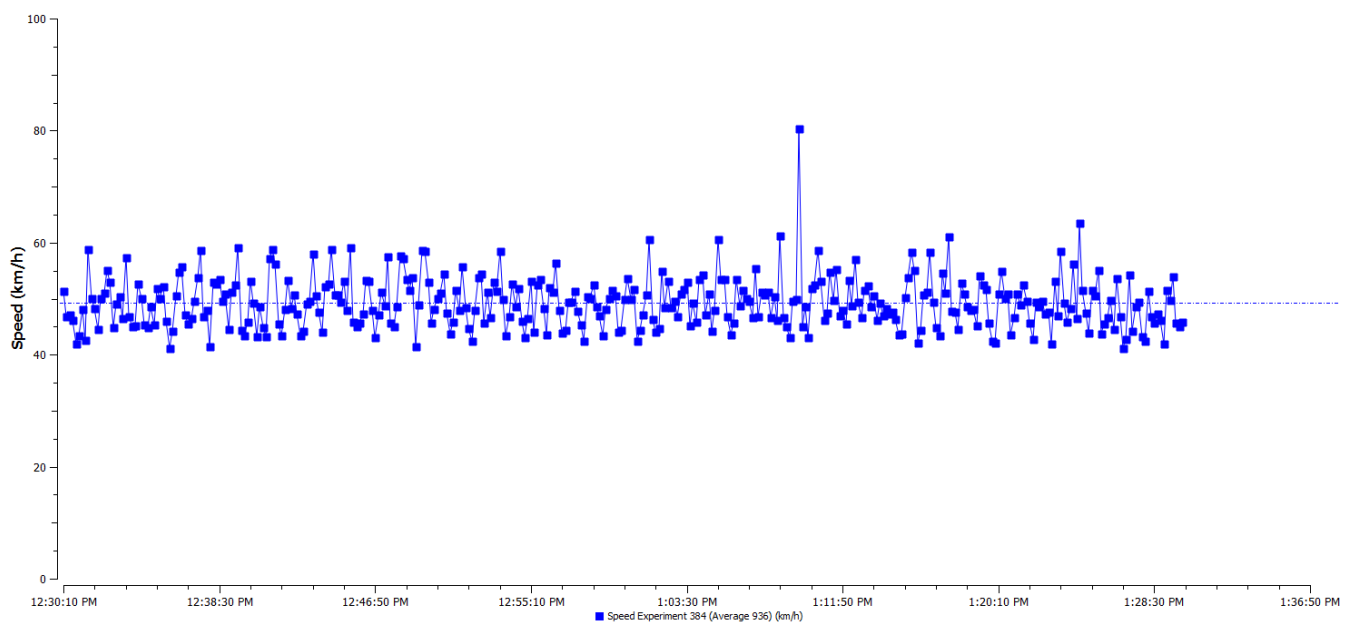


Figure 3.2 Change in Speed of Vehicles Travelling through Capricorn Highway / Gregory Highway intersection – No Train, Future Year 2024 Off-Peak Hour

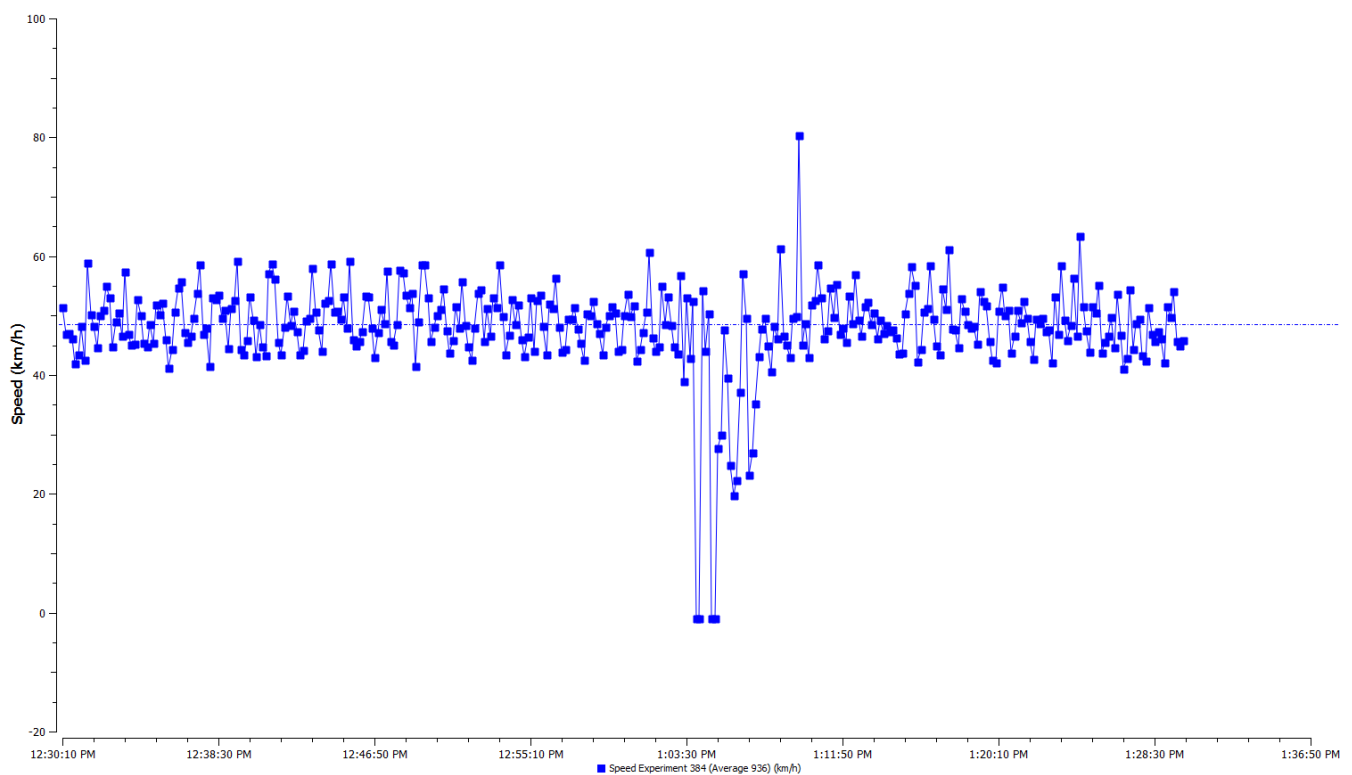


Figure 3.3 Change in Speed of Vehicles Travelling through Capricorn Highway / Gregory Highway intersection – With 40km/h Train, Future Year 2024 Off-Peak Hour

3.2 Level crossing south of the Capricorn Highway / Opal Street intersection

The AIMSUN traffic simulation results for this site are summarised in Table 3.3.

Table 3.3 Summary of impacts at level crossing adjacent to Capricorn Highway / Opal Street intersection

Scenario	Maximum Queue Length – Without Trains (veh)	Mean Queue Length – With 40km/h Train (veh)	Maximum Queue Length – With 40km/h Train* (veh)	Maximum LOS [^] With 40km/h Train	Maximum Queue Length – With 60km/h Train (veh)
AM Peak (8:00 – 9:00am)					
Base year 2014	5 [30m] at south approach	9	34 [204m]	B	33 [198m]
Future year 2024	8 [48m] at south approach	15	50 [300m]	C	48 [288m]
Off-Peak (10:15 – 11:15am)					
Base year 2014	3 [18m] at west approach	10	19 [114m]	B	15 [90m]
Future year 2024	4 [24m] at west approach	15	22 [132m]	B	20 [120m]
PM Peak (5:00 – 6:00pm)					
Base year 2014	7 [42m] at west approach	12	50 [300m]	B	18 [108m]
Future year 2024	10 [60m] at west approach	34	59 [354m]	B	37 [222m]

*Refer Figure 3.4 showing indicative location of maximum queues for the year 2024 scenario

[^]LOS = Level of Service, presented on a scale A – F where A represents free-flowing conditions with minimal delays, F represents heavy congestion

The maximum queue lengths at the slowest train speed obtained in the AIMSUN model for year 2024 conditions are shown indicatively in Figure 3.4. There is queue storage of 2 vehicle lengths (approximately 12m) north of the railway crossing along Opal Street. Additional vehicles entering the railway crossing from the north queue along the Capricorn Highway.

The maximum queue length observed was approximately 354 metres at the west approach in the evening peak hour of 2024. During the evening peak hour, the most severe queue length was observed to extend beyond the right turn lane to the single lane on the western approach of the intersection, blocking through movements from the west. During the morning peak hour periods there were significant queues at the southern approach due to the high volume of left turning vehicles from the southern approach travelling towards the town centre of Emerald during the morning peak hour. The maximum morning queue length in year 2024 extended approximately 50 vehicle lengths (300m) along the southern approach of Opal Street to the roundabout intersection located further south. The AIMSUN models show that during the morning and evening peak hours a large proportion of trips travel between the south and west intersection approaches, travelling against the east-west priority at the intersection. The queue lengths during all time periods did not block the through lane on the eastern leg of the intersection.

The decline in performance of the intersection in year 2024 across all time periods is largely due to the high background traffic volumes. For example, the projected volume of eastbound traffic along the Capricorn Highway in year 2024 is 1,426 vehicles per hour, which exceeds the traffic capacity of 900 – 1,200 vehicles per hour per lane.

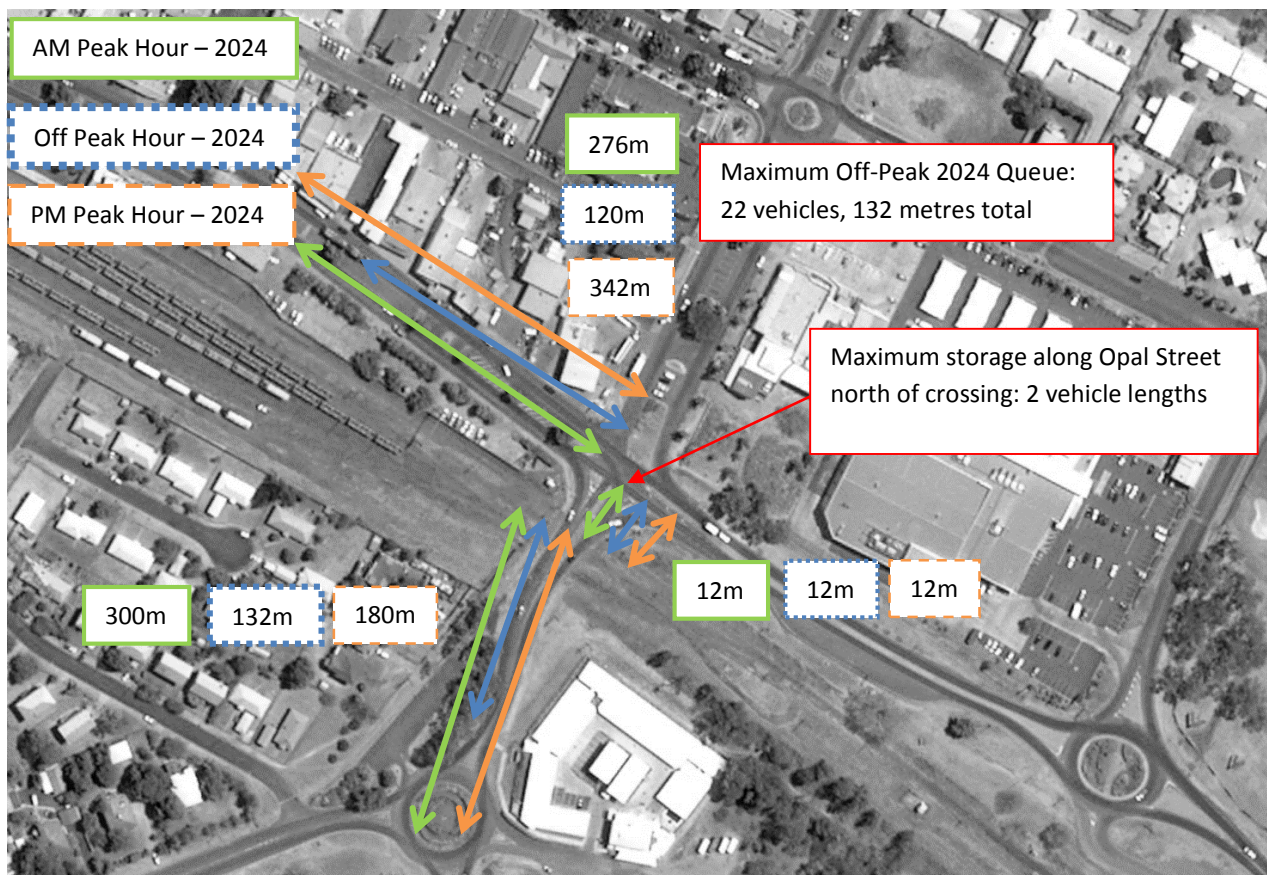
The high traffic volumes during year 2024 conditions likely explains the high queue lengths obtained in the 2024 models and the decline of the intersection performance following a train event. It is likely that the existing infrastructure at this location in year 2024 will need to be improved, as the existing intersection capacity will begin to erode even without the additional rail movements.

The queue lengths during the worst off-peak hours ranged up to 22 vehicle lengths (132m) maximum in year 2024 traffic conditions. The mean queue length over the off-peak hour was 15 vehicle lengths (90m) for the future year 2024 slowest train speed scenario. As per the queueing results in Table 3.3, the presence of the train event during the off-peak hour in future year 2024 is anticipated to result in an additional 18 vehicles (108 metres) queued at the western approach of the intersection as compared to the scenario without any train event. The Capricorn Highway / Opal Street intersection site showed the most severe maximum queue length for any off-peak period across all three intersection sites modelled.

However it is important to note that the modelling of the off-peak hour is conservative, as the traffic volumes inputted were the “worst-case” off-peak volumes, and that the future horizon year 2024 volumes were factored by 2.5% p.a. growth which is a medium to high rate of growth in background traffic volume. Sensitivity testing of the future year 2024 off-peak hour with decreased traffic volumes along Opal Street showed that if traffic volumes are decreased by a third along Opal Street the maximum queue length at the southern approach decreased to 13 vehicle lengths (78 metres), which is a reduction of 9 vehicle lengths (54 metres) of anticipated queueing as compared to the results in Table 3.3.

The traffic simulation models show that the operation of trains during the worst off-peak hour are anticipated to cause delays to the traffic movements from the southern approach, as well as delays to the west approach right and through movements. Do note that the model is conservative in regards to lane blocking, as in practice it is likely that vehicles travelling from the western approach wishing to continue through or wishing to turn left would utilise the wide road shoulder to pass any stationary vehicles that are queued to turn right. On average, the recovery time taken for vehicles travelling through the Opal Street intersection to return to average travel speed following the departure of the train event was approximately 90 seconds. Refer Figure 3.5 and Figure 3.6. This was the longest recovery time of the three intersection sites. However the intersection recovers well following a train event during the off-peak hour, with traffic flow conditions completely returning to normal within 90 seconds. From a traffic operations perspective, it is recommended that rail traffic be restricted to operate during off-peak periods only, resulting in minimal impacts per train event anticipated at this intersection.

Figure 3.4 Aerial Image showing indicative location of maximum queues obtained from modelling future year 2024 – Capricorn Highway / Opal Street
(Image: Google Earth)



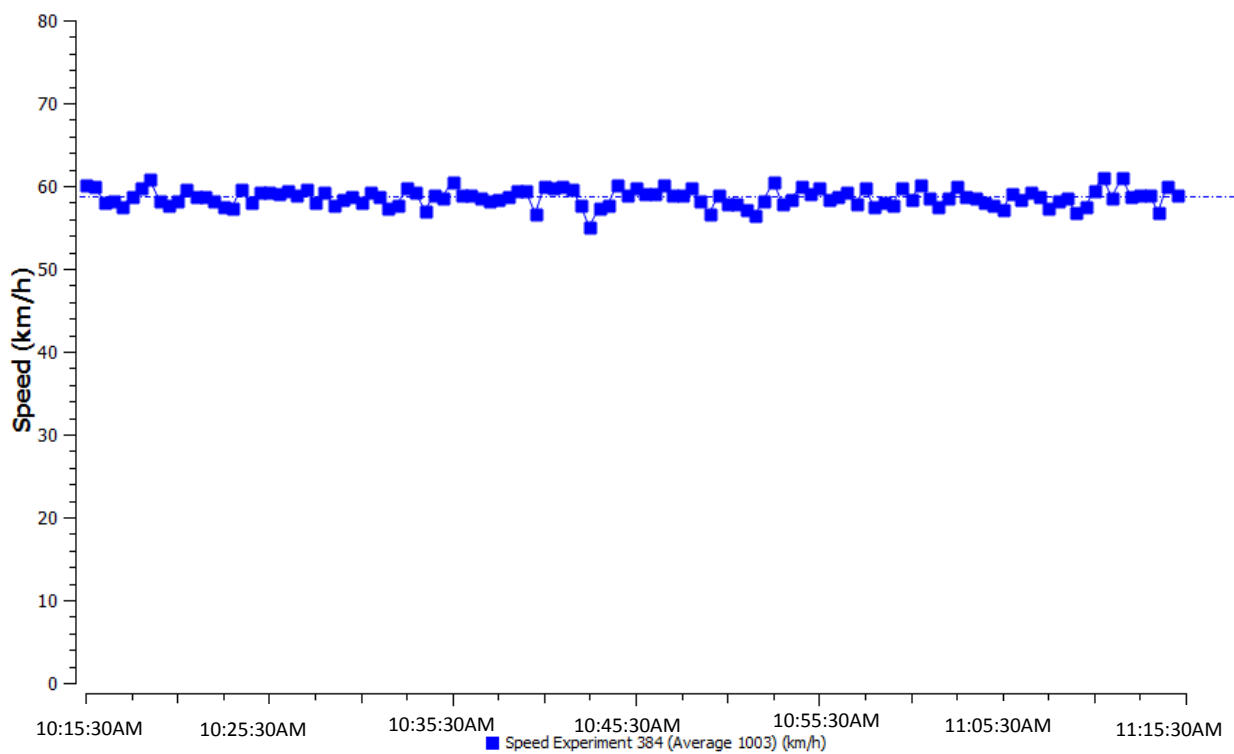


Figure 3.5 Change in Speed of Vehicles Travelling through Capricorn Highway / Opal Street intersection – No Train, Future Year 2024 Off-Peak Hour

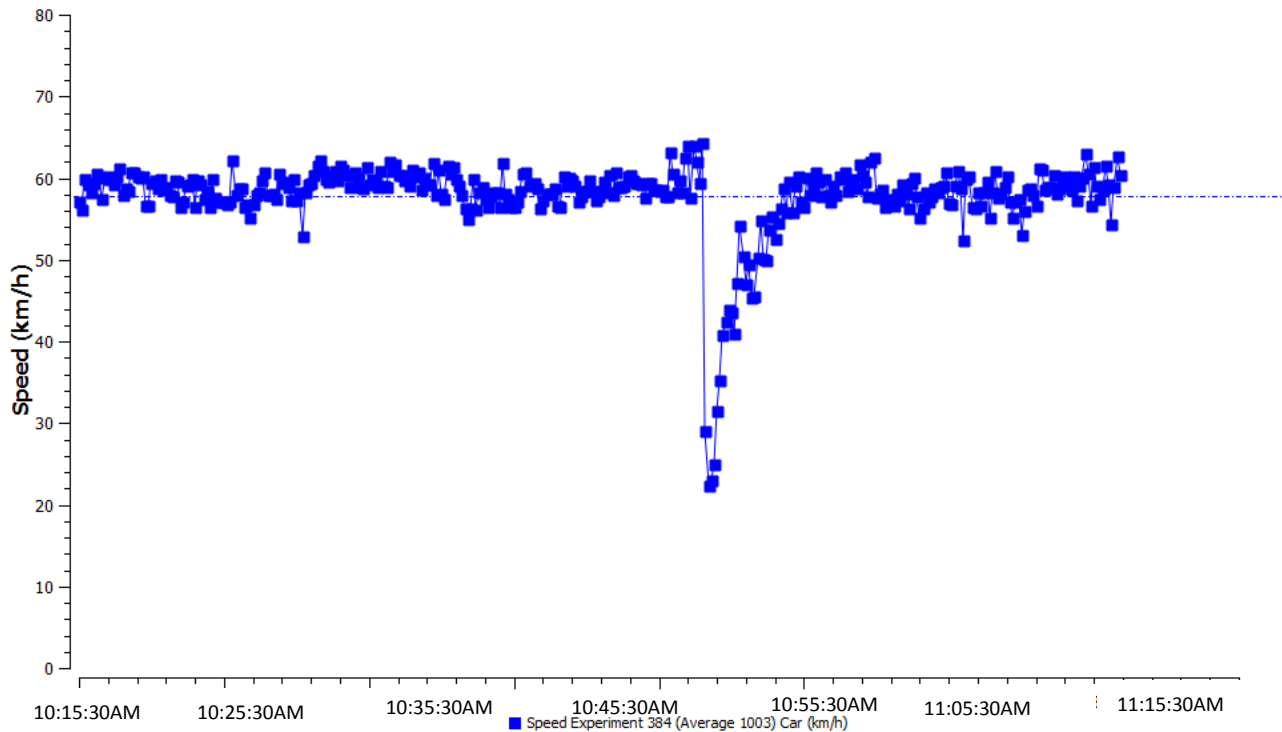


Figure 3.6 Change in Speed of Vehicles Travelling through Capricorn Highway / Opal Street intersection – With 40km/h Train, Future Year 2024 Off-Peak Hour

3.3 Level crossing south of the Capricorn Highway / Selma Road intersection

The AIMSUN traffic simulation results for this site are summarised in Table 3.4.

Table 3.4 Summary of impacts at level crossing adjacent to Capricorn Highway / Selma Road intersection

Scenario	Maximum Queue Length – Without Trains (veh)	Mean Queue Length – With 40km/h Train (veh)	Maximum Queue Length – With 40km/h Train* (veh)	Maximum LOS ^A With 40km/h Train	Maximum Queue Length – With 60km/h Train (veh)
AM Peak (7:45 – 8:45am)					
Base year 2014	3 [18m] at south approach	2	12 [72m]	A	10 [60m]
Future year 2024	6 [36m] at south approach	3	13 [78m]	A	11 [66m]
Off-Peak (12:00 – 1:00pm)					
Base year 2014	3 [18m] at south approach	1	6 [36m]	A	6 [36m]
Future year 2024	5 [30m] at south approach	8	12 [72m]	A	11 [66m]
PM Peak (3:30 – 4:30pm)					
Base year 2014	3 [18m] at south approach	2	10 [60m]	A	6 [36m]
Future year 2024	6 [36m] at south approach	3	12 [72m]	A	8 [48m]

*Refer Figure 3.7 showing indicative location of maximum queues for the year 2024 scenario

^ALOS = Level of Service, presented on a scale A – F where A represents free-flowing conditions with minimal delays, F represents heavy congestion

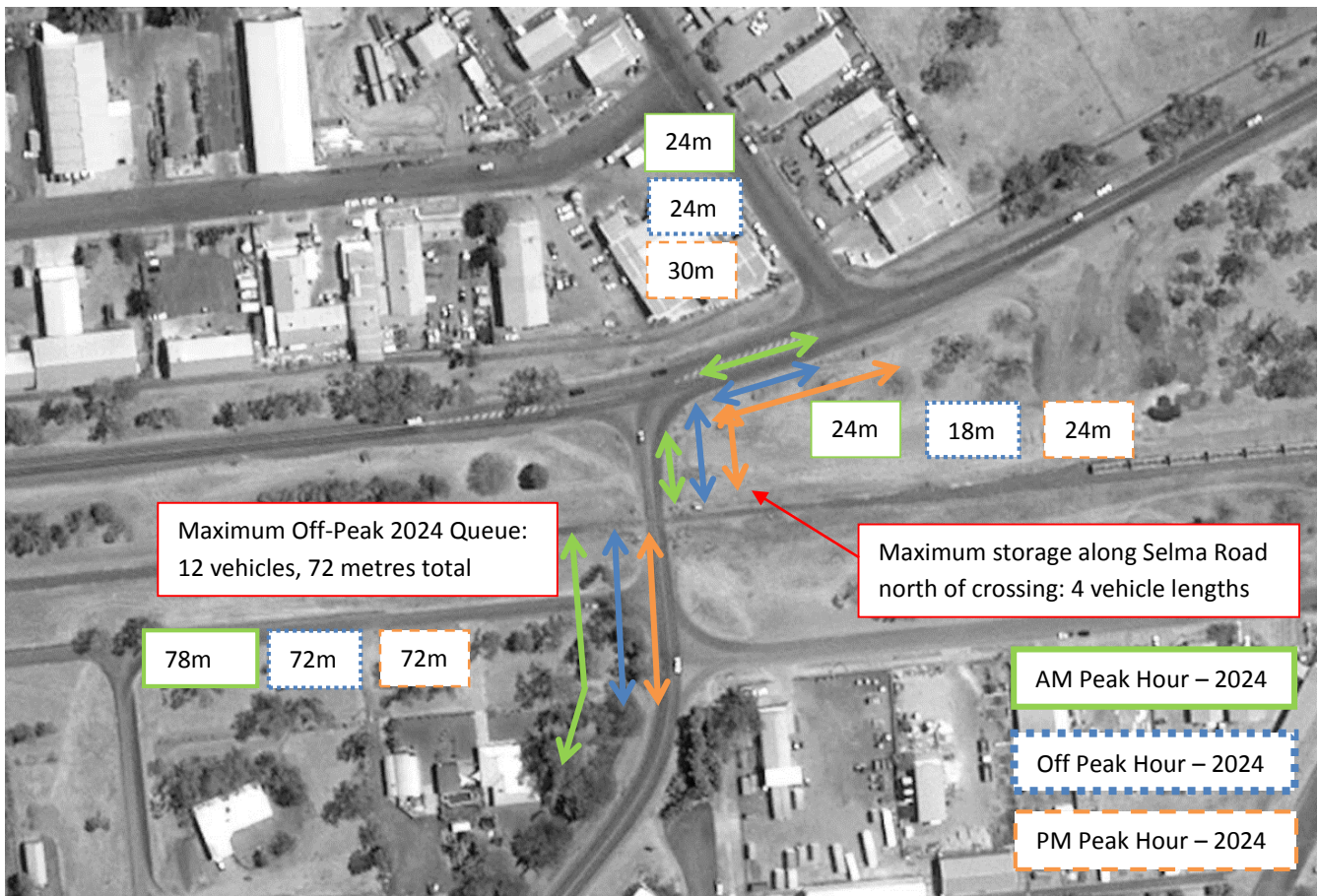
Figure 3.7 below indicatively represents the maximum queues observed under year 2024 conditions for the slowest train speed of 40km/h. As per Figure 3.7, up to 4 vehicle storage lengths are able to queue immediately north of the railway crossing along Selma Road without impact to traffic movements along the Capricorn Highway. Queues longer than 4 vehicle lengths however continue to queue along the Capricorn Highway, generally within the turn lanes along the Capricorn Highway.

The AIMSUN modelling shows that the worst queues at the intersection are anticipated to occur at the southern approach of the intersection site. This is due to the high volume of cars turning right from Selma Road towards the town centre of Emerald during all time periods. The results from sensitivity testing show that the southern approach of the intersection is particularly sensitive to the presence of rail traffic due to the high proportion of right turning vehicles from Selma Road. The queueing of vehicles along the southern intersection approach during all time periods modelled in future year 2024 extends through the intersection located further to the south. Further, the results also indicate that there is anticipated to be queueing back along the northern section of Selma Road and within the westbound lane of the Capricorn Highway (refer Figure 3.7). However queueing along the east approach of the Capricorn Highway is not anticipated to have any negative impact on the intersection located further east. The disruption to through-flowing traffic along the Capricorn Highway is not anticipated to be very significant as the eastern approach of the intersection is flared which allows through-traffic to safely overtake queued left-turning vehicles.

The off-peak queues are not significant. The maximum queue length during the future year 2024 off-peak hour was 12 vehicle lengths of 72 metres. The mean queue length during the future year 2024 off-peak hour was 8 vehicle lengths or 48 metres. Following a train event the intersection recovers quickly, within 60 seconds of the train departing the site. Refer Figure 3.8 and Figure 3.9 below. The traffic simulation models show that the operation of trains during the worst off-peak hour are not anticipated to cause unreasonable queues at the intersection. From a

traffic operations perspective, it is recommended that rail traffic be restricted to operate during off-peak periods only, as this will result in no significant impacts at this intersection.

Figure 3.7 Aerial Image showing indicative location of maximum queues obtained from modelling future year 2024 – Capricorn Highway / Selma Road
(Image: Google Earth)



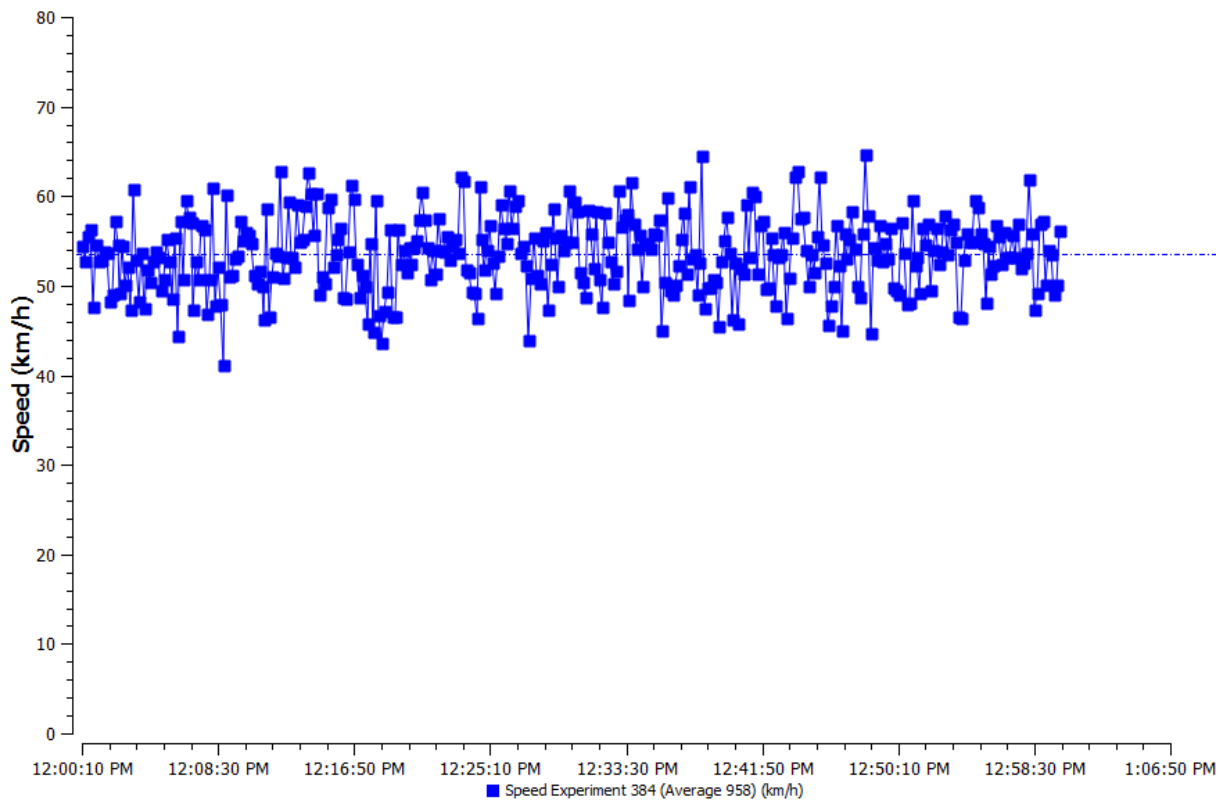


Figure 3.8 Change in Speed of Vehicles Travelling through Capricorn Highway / Selma Road intersection – No Train, Future Year 2024 Off-Peak Hour

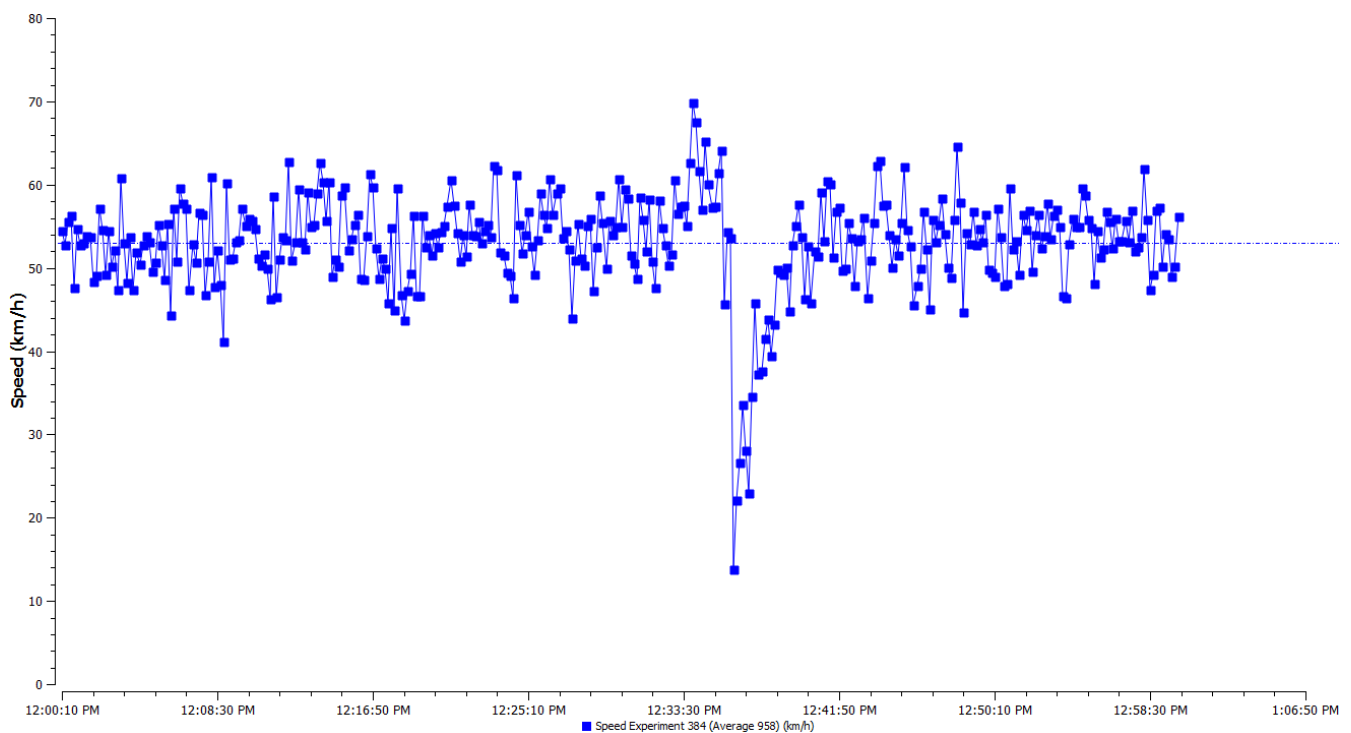


Figure 3.9 Change in Speed of Vehicles Travelling through Capricorn Highway / Selma Road intersection – With 40km/h Train, Future Year 2024 Off-Peak Hour

4. Recommendations

It is recommended that all rail traffic operate outside of the morning and evening peak hours of the existing road network. The operation of rail traffic during off-peak periods only (between 9am to 2.30pm, and between 6pm to 6am) is anticipated to result in minimal impact per train event. AIMSUN simulation modelling shows that at the worst location, the intersection recovers from a train event within 90 seconds of the train departure. This occurs at the Opal Street rail crossing. The worst-case off-peak queueing is also anticipated to occur at the Opal Street rail crossing, estimated at around 22 vehicle lengths or 132 metres. This is the worst anticipated impact across all of the three existing railway crossings examined. The off-peak results are also considered to be conservative, since the “highest” off-peak hour traffic volumes and slowest train speed were utilised in the AIMSUN simulation models.

5. Disclaimer

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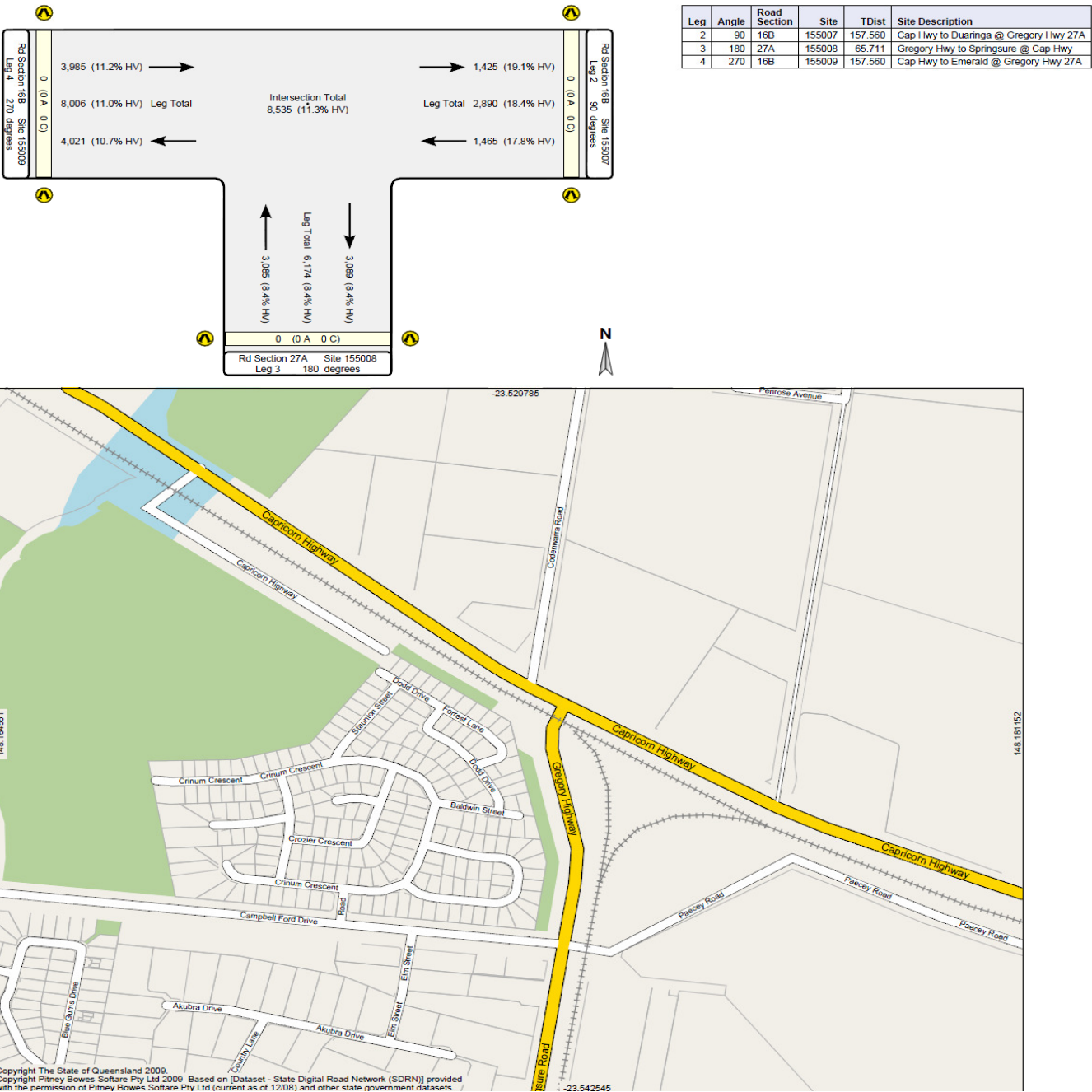
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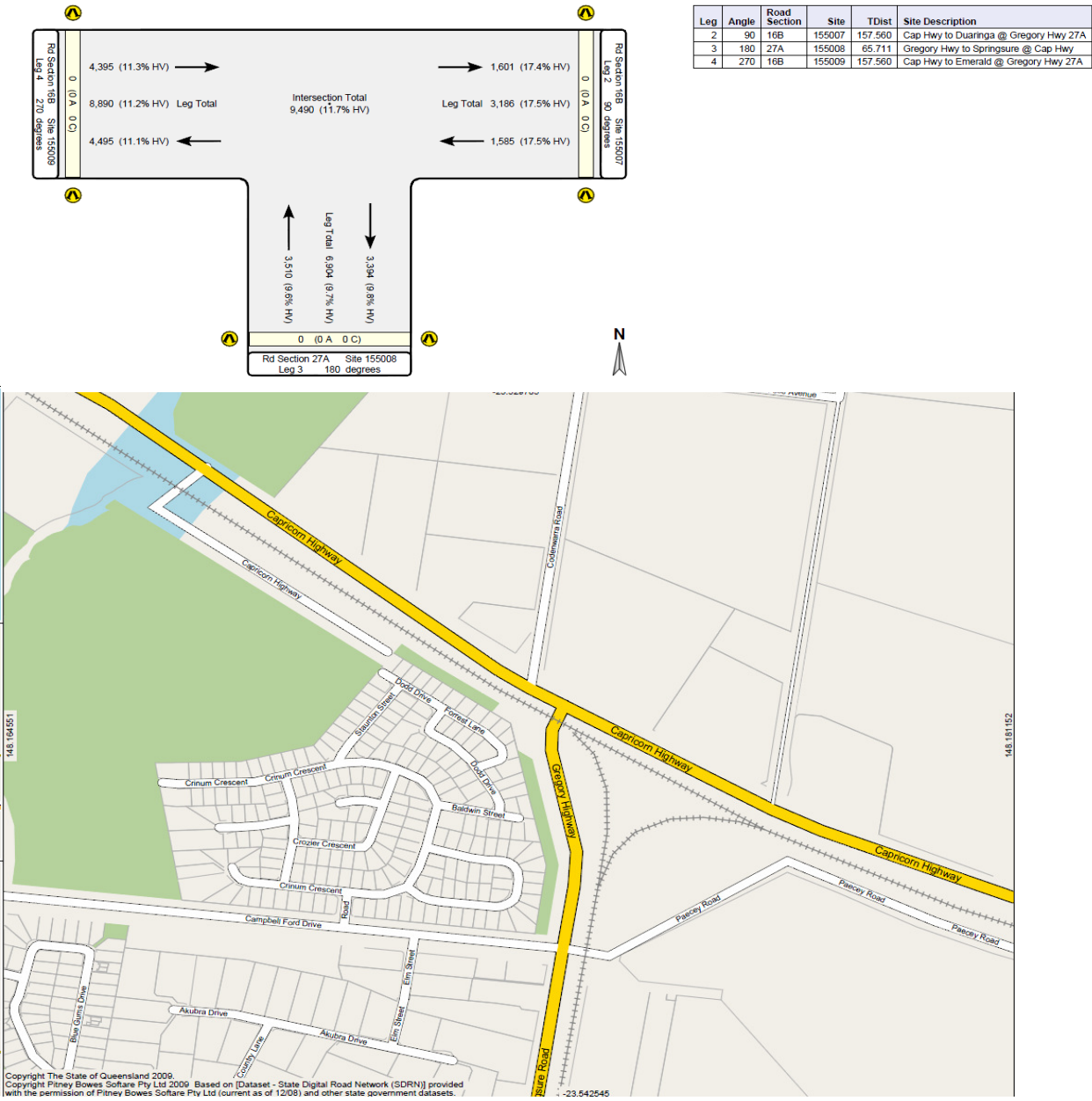
Appendix A Traffic Survey Information

Summary

Leg 2		Leg 3		Leg 4		Total	
Time	Left	Through	Left	Right	Through	Right	
06:00-06:15		8 11		22 10		31 20	
06:15-06:30		2 9		22 11		27 15	
06:30-06:45		4 8		40 13		26 25	
06:45-07:00		5 22		29 1		28 37	
07:00-07:15		5 9		24 11		21 21	
07:15-07:30		6 11		37 14		18 36	
07:30-07:45		2 29		49 9		25 36	
07:45-08:00		7 22	93	66 6	221	24 44	231
08:00-08:15		7 38	125	92 4	284	30 29	248
08:15-08:30		4 28	140	122 5	362	28 69	292
08:30-08:45	10	29	149	122 10	438	23 51	305
08:45-09:00	3	18	140	103 9	479	28 64	330
09:00-09:15	7	23	125	42 3	426	17 36	324
09:15-09:30	1	23	117	39 2	338	23 45	294
09:30-09:45	3	23	104	48 6	258	20 50	290
09:45-10:00	2	36	121	50 5	200	14 60	272
10:00-10:15	2	29	122	44 4	203	22 46	287
10:15-10:30	1	28	127	55 4	221	20 56	295
10:30-10:45	3	15	119	53 5	226	21 41	287
10:45-11:00	4	27	112	44 5	219	30 56	299
11:00-11:15	5	26	112	62 4	238	20 53	304
11:15-11:30	2	31	116	47 5	231	31 61	321
11:30-11:45	3	33	134	50 9	232	28 55	342
11:45-12:00	6	27	136	50 2	235	19 68	343
12:00-12:15	2	23	130	53 2	223	14 67	352
12:15-12:30	3	28	128	36 2	209	27 59	345
12:30-12:45	7	27	126	54 2	206	17 48	327
12:45-13:00	4	19	116	49 2	205	30 76	346
13:00-13:15	5	21	117	62 8	220	24 67	357
13:15-13:30	8	14	108	50 4	237	33 58	362
13:30-13:45	5	20	98	57 4	242	30 74	402
13:45-14:00	5	19	99	95 3	290	20 67	382
14:00-14:15	1	28	103	48 5	273	24 55	370
14:15-14:30	10	30	121	59 4	282	31 61	371
14:30-14:45	8	26	130	64 2	287	30 63	360
14:45-15:00	2	27	135	74 5	268	21 66	360
15:00-15:15	5	28	139	96 5	317	28 73	382
15:15-15:30	7	29	135	82 7	343	32 78	401
15:30-15:45	7	27	135	80 4	362	31 94	434
15:45-16:00	9	33	149	55 3	340	20 61	427
16:00-16:15	14	36	166	87 6	332	22 81	429
16:15-16:30	9	23	162	67 6	316	20 69	408
16:30-16:45	7	36	171	64 4	299	23 86	392
16:45-17:00	10	26	165	61 2	304	33 79	423
17:00-17:15	6	30	151	60 6	277	18 111	450
17:15-17:30	12	34	165	46 6	255	23 80	464
17:30-17:45	9	23	154	58 1	246	26 74	455
17:45-18:00	17	29	164	61 5	249	19 94	456

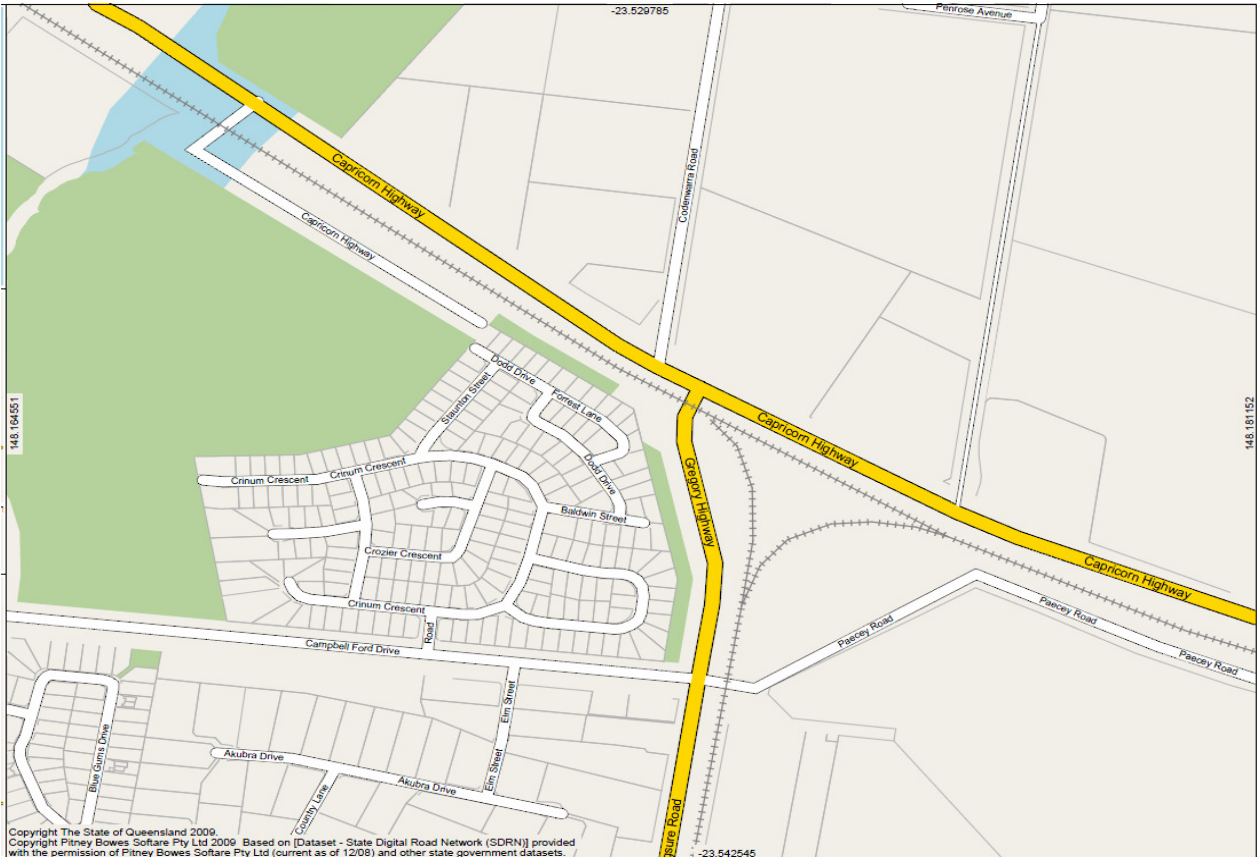
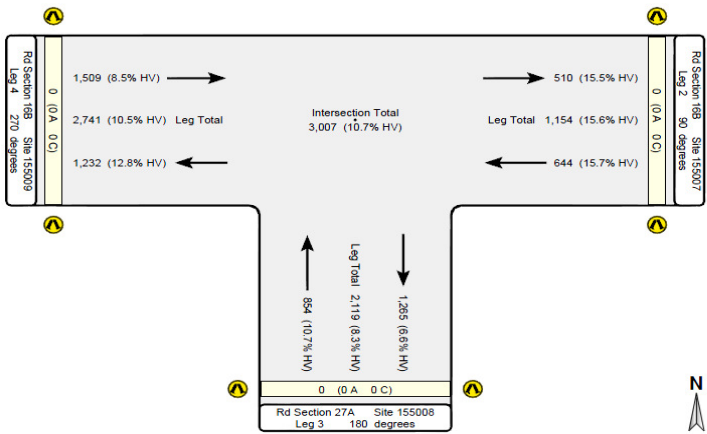


		Leg 2		Leg 3		Leg 4		Total	
Time	Time	Left	Through	Left	Right	Through	Right		
starting	ending								
6:00	6:15		0 9		46 5		24 25		
6:15	6:30		4 14		26 15		28 27		
6:30	6:45		9 20		56 7		19 30		
6:45	7:00		5 19		63 8		22 41		
7:00	7:15		9 13		55 11		22 47		
7:15	7:30		2 24		73 10		25 49		
7:30	7:45		1 26		67 11		39 31		
7:45	8:00		10 38	129	75 6	324	38 48	314	767
8:00	8:15		5 34	147	101 10	371	27 42	314	832
8:15	8:30		10 51	184	135 6	432	30 55	326	941
8:30	8:45		4 26	187	137 7	501	16 62	334	1022
8:45	9:00		3 26	167	107 8	537	27 60	335	1039
9:00	9:15		5 25	158	71 10	505	33 51	351	1014
9:15	9:30		4 21	120	59 2	421	34 69	370	911
9:30	9:45		6 22	118	57 11	341	19 35	345	804
9:45	10:00		5 35	129	53 5	282	22 58	337	748
10:00	10:15		5 34	139	78 4	283	20 60	333	754
10:15	10:30		6 29	149	57 3	282	19 52	299	730
10:30	10:45		6 30	158	50 4	267	19 56	321	746
10:45	11:00		3 25	145	50 5	264	22 57	320	729
11:00	11:15		2 11	118	65 6	252	27 36	303	672
11:15	11:30		4 21	107	68 6	267	24 68	325	699
11:30	11:45		5 25	101	63 4	281	25 59	334	715
11:45	12:00		3 33	109	44 3	272	25 57	337	719
12:00	12:15		2 24	123	46 4	250	24 67	367	740
12:15	12:30		7 12	117	50 4	229	26 70	371	717
12:30	12:45		6 34	127	59 5	226	27 57	371	724
12:45	13:00		4 28	123	59 4	243	21 65	375	741
13:00	13:15		1 16	113	62 1	256	39 53	376	746
13:15	13:30		6 17	118	51 4	257	39 69	389	764
13:30	13:45		7 23	107	42 6	241	27 63	395	743
13:45	14:00		10 22	107	50 6	233	14 49	371	711
14:00	14:15		7 18	116	49 3	222	19 54	351	688
14:15	14:30		5 25	123	62 8	237	31 60	333	693
14:30	14:45		10 26	129	72 3	266	21 84	349	744
14:45	15:00		8 21	126	117 5	335	24 70	381	843
15:00	15:15		4 34	140	67 10	361	29 91	431	932
15:15	15:30		7 21	138	78 7	377	38 72	451	966
15:30	15:45		8 26	136	66 4	372	30 80	456	963
15:45	16:00		5 29	141	76 7	331	31 85	479	951
16:00	16:15		8 22	132	61 6	320	31 90	480	933
16:15	16:30		11 46	163	80 2	317	27 82	479	959
16:30	16:45		15 46	191	60 4	311	31 102	503	1005
16:45	17:00		9 29	195	80 8	316	37 94	519	1031
17:00	17:15		10 37	213	77 9	336	44 132	577	1126
17:15	17:30		21 43	221	64 4	321	38 107	615	1157
17:30	17:45		11 30	200	66 3	327	28 111	621	1147
17:45	18:00		11 36	209	69 7	314	28 103	621	1144



	Leg 2		Leg 3		Leg 4		Total	
Time	Left	Through	Left	Right	Through	Right		
06:00-06:15								
06:15-06:30								
06:30-06:45								
06:45-07:00								
07:00-07:15	13	38	36	6	32	45		
07:15-07:30	6	22	42	9	40	42		
07:30-07:45	6	32	59	7	26	33		
07:45-08:00	6	48	180	83	18	273	27	37
08:00-08:15	8	41	178	72	25	331	34	55
08:15-08:30	10	37	198	132	7	423	31	58
08:30-08:45	4	41	205	127	4	492	18	65
08:45-09:00	8	36	194	114	10	516	25	67
09:00-09:15			143			414		277
09:15-09:30			94			268		184
09:30-09:45			46			130		97
09:45-10:00			0			0		0
10:00-10:15			0			0		0
10:15-10:30			0			0		0
10:30-10:45			0			0		0
10:45-11:00			0			0		0
11:00-11:15			0			0		0
11:15-11:30			0			0		0
11:30-11:45			0			0		0
11:45-12:00			0			0		0
12:00-12:15			0			0		0
12:15-12:30			0			0		0
12:30-12:45			0			0		0
12:45-13:00			0			0		0
13:00-13:15			0			0		0
13:15-13:30			0			0		0
13:30-13:45			0			0		0
13:45-14:00			0			0		0
14:00-14:15			0			0		0
14:15-14:30			0			0		0
14:30-14:45			0			0		0
14:45-15:00			0			0		0
15:00-15:15	6	40	48	72	10	86	29	72
15:15-15:30	7	38	96	58	5	152	41	89
15:30-15:45	10	31	139	58	5	219	33	72
15:45-16:00	10	25	175	60	11	293	39	69
16:00-16:15	12	33	174	77	14	303	47	76
16:15-16:30	12	49	191	66	8	314	28	80
16:30-16:45	14	42	207	19	6	274	40	84
16:45-17:00	17	50	241	68	8	279	33	103
17:00-17:15	22	50	269	60	11	258	34	95
17:15-17:30	14	34	255	73	5	263	32	117
17:30-17:45	23	39	262	88	8	337	39	115
17:45-18:00	25	41	261	61	3	325	21	121

Summary



Capricorn Highway & Opal Street
Thursday 12-Sept-2013

1 years growth
2.50% growth pa

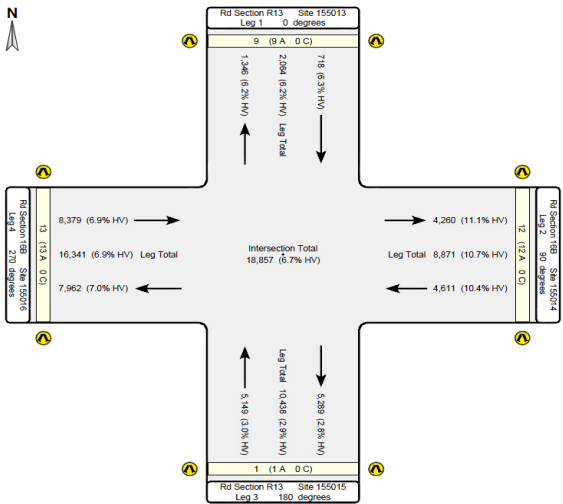
Leg 1				Leg 2				Leg 3				Leg 4				Total
Start	Time	End	Left	Left	Through	Right		Left	Right		Left	Through	Right			
	6:00	6:15	8		0	16	3		77	6		8	35	35		
	6:15	6:30	8		7	27	3		72	8		8	35	30		
	6:30	6:45	12		5	33	1		74	2		9	33	27		
	6:45	7:00	7		9	50	3		96	7		9	53	58		
	7:00	7:15	12		10	28	2		68	2		14	61	45		
	7:15	7:30	15		4	48	3		89	2		14	45	35		
	7:30	7:45	12		3	54	3		92	7		22	32	36		
	7:45	8:00	19	59	28	63	7	259	136	4	410	25	51	74	465	1194
	8:00	8:15	11	58	14	86	11	332	164	5	511	25	59	93	524	1426
	8:15	8:30	20	64	28	69	7	382	211	7	642	24	73	86	615	1703
	8:30	8:45	22	74	26	89	6	445	205	5	755	39	61	91	719	1993
	8:45	9:00	17	72	18	86	6	457	131	8	754	36	94	112	813	2096
	9:00	9:15	18	79	17	57	10	429	121	7	712	16	57	68	776	1997
	9:15	9:30	22	81	13	64	4	406	77	5	573	18	74	43	727	1787
	9:30	9:45	18	77	21	55	5	365	70	6	436	26	77	54	692	1569
	9:45	10:00	9	69	21	71	5	352	79	7	381	27	79	68	622	1424
	10:00	10:15	12	63	26	61	4	359	89	5	346	24	73	83	662	1430
	10:15	10:30	17	57	20	49	10	357	73	7	344	23	82	88	722	1480
	10:30	10:45	7	46	17	63	11	367	97	16	382	23	87	85	761	1556
	10:45	11:00	8	45	30	83	2	385	101	7	405	31	76	88	782	1617
	11:00	11:15	11	44	23	76	4	398	75	10	396	28	75	81	786	1624
	11:15	11:30	14	41	24	63	5	411	56	6	377	25	62	74	753	1583
	11:30	11:45	14	48	24	73	7	424	75	6	344	17	70	67	711	1528
	11:45	12:00	18	58	35	58	7	409	87	10	333	27	64	79	686	1486
	12:00	12:15	14	62	27	83	3	419	82	9	339	32	82	101	718	1538
	12:15	12:30	20	68	20	76	8	432	87	5	370	18	74	73	722	1591
	12:30	12:45	15	69	20	71	2	420	79	5	373	28	53	79	728	1590
	12:45	13:00	12	63	27	87	12	447	91	5	372	18	71	70	716	1598
	13:00	13:15	15	64	25	65	5	428	92	8	381	29	82	98	710	1584
	13:15	13:30	11	54	27	64	13	428	79	6	374	25	80	66	716	1573
	13:30	13:45	17	56	36	85	4	461	70	4	364	17	66	77	716	1598
	13:45	14:00	11	55	23	70	6	434	109	12	390	37	63	79	737	1615
	14:00	14:15	15	55	26	77	6	448	95	8	393	26	72	61	686	1582
	14:15	14:30	13	57	23	66	6	439	106	3	417	28	58	54	654	1567
	14:30	14:45	12	52	25	59	2	399	106	1	451	20	78	76	668	1570
	14:45	15:00	22	64	39	78	4	421	115	0	445	21	57	117	685	1614
	15:00	15:15	25	74	38	88	9	448	186	7	537	41	81	182	833	1892
	15:15	15:30	11	72	35	65	4	457	129	10	568	38	73	134	941	2038
	15:30	15:45	18	78	35	66	5	478	100	7	568	23	96	100	987	2110
	15:45	16:00	18	74	45	67	6	475	116	5	574	21	78	101	992	2115
	16:00	16:15	18	67	37	63	3	442	72	9	459	14	70	110	879	1847
	16:15	16:30	16	72	44	62	6	450	116	4	440	18	65	111	827	1789
	16:30	16:45	10	64	32	64	5	445	95	3	431	17	74	115	814	1753
	16:45	17:00	23	69	57	70	2	456	133	6	449	15	88	138	856	1830
	17:00	17:15	24	75	68	58	13	493	91	2	461	17	90	142	912	1941
	17:15	17:30	19	78	51	55	5	492	102	4	447	17	69	139	944	1961
	17:30	17:45	15	83	39	73	6	509	97	2	448	13	77	114	942	1982
	17:45	18:00	13	73	20	62	9	470	103	3	414	22	54	110	886	1843



Queensland
Government
26-Aug-2014 09:02

Traffic Analysis and Reporting System
Intersection Analysis Report
Road Section 168 - Capricorn Highway (Duaranga - Emerald)
Intersection 86 - Capricorn Hwy & Opal St (L&RHS)
Thursday 12-Sep-2013 06:00 - 18:00

TARS
Page 2 of 31 (2 of 32)

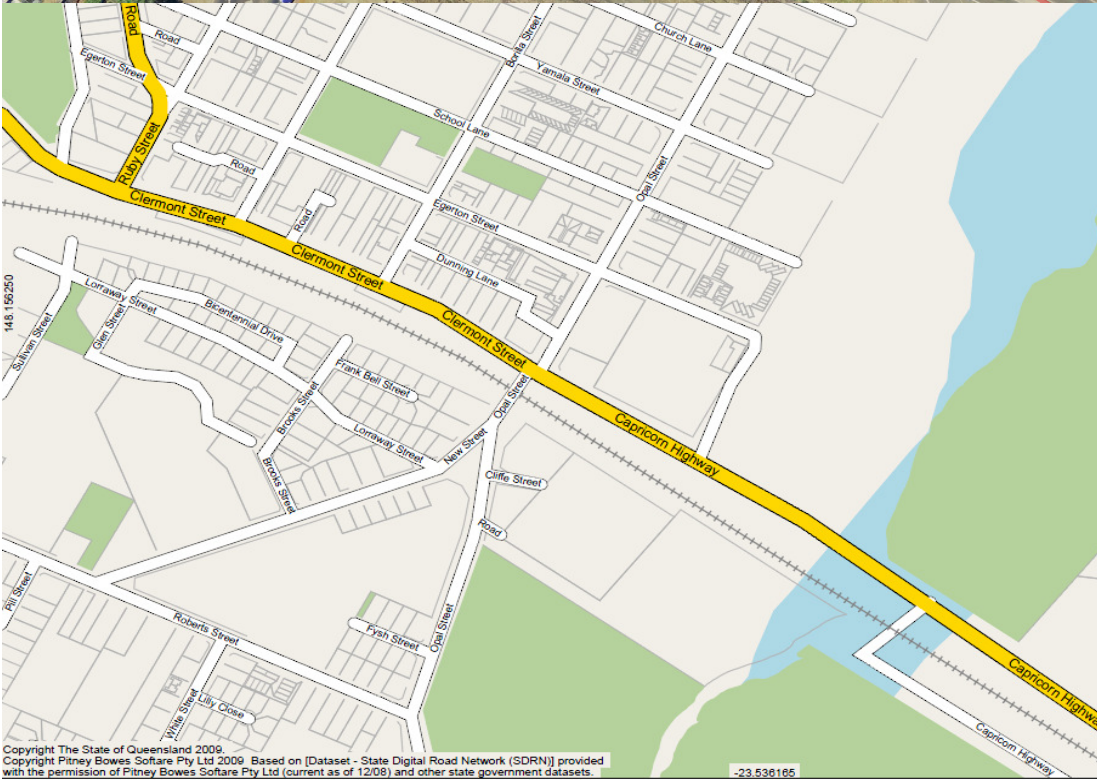


Leg	Angle	Road Section	Site	TDist	Site Description
1	0	R13	155013	0.000	Opal St @ Capricorn Hwy
2	90	168	155014	158.950	Capricorn Hwy to Duaringa @ Opal St
3	180	R13	155015	0.000	Opal St @ Capricorn Hwy
4	270	168	155016	158.950	Capricorn Hwy to Emerald @ Opal St

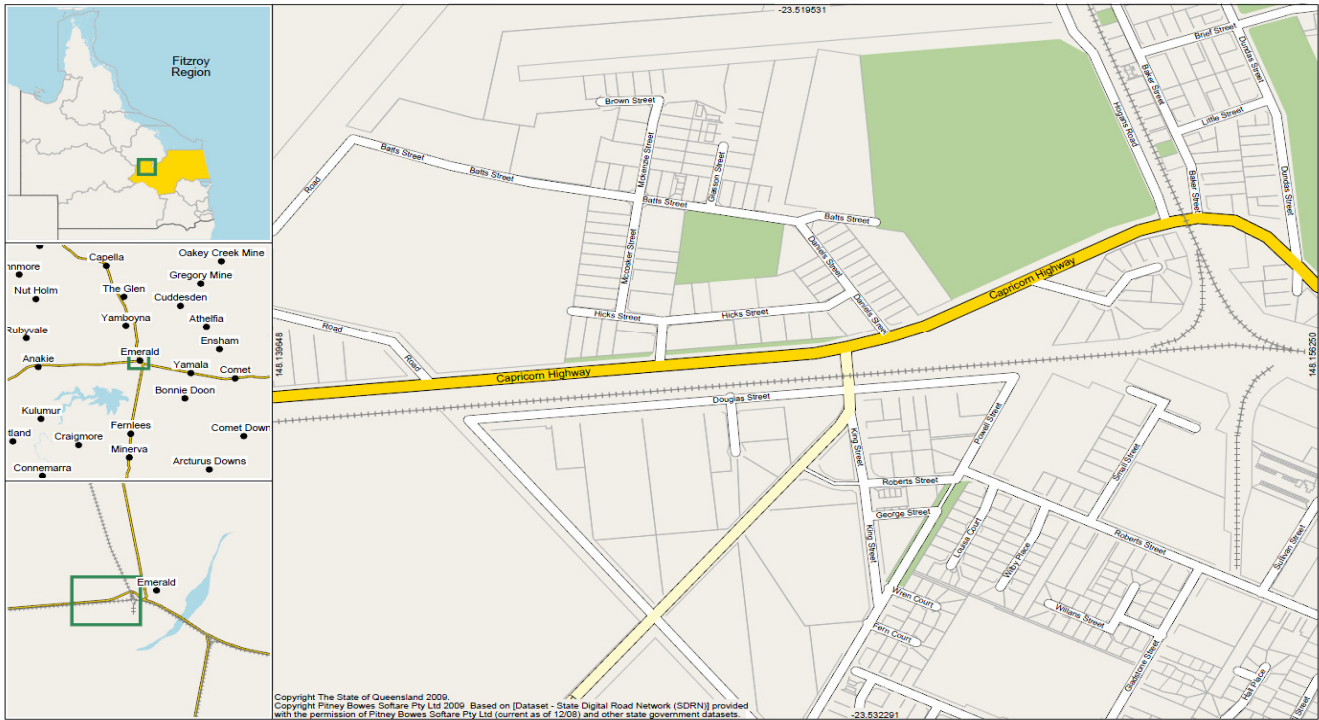
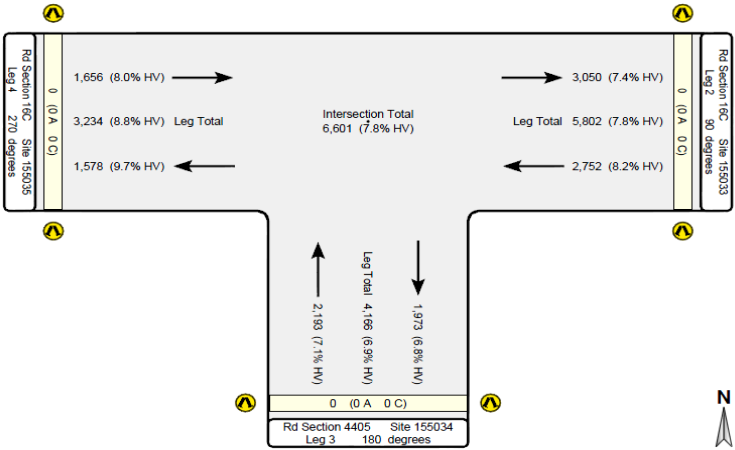
Capricorn Highway & Opal Street
Wednesday 20-Jun-2012

2 years growth
2.50% growth pa

	Leg 1				Leg 2				Leg 3				Leg 4				Total
Time	Left		Through	Right	Left		Through	Right	Left		Through	Right	Left	Through	Right		
06:00-06:15																	
06:15-06:30																	
06:30-06:45																	
06:45-07:00	74	269	91	368	38	1812	624	19	2338	126	296	296				2498	
07:00-07:15	12		55	4	0		73	4		15	48	42					
07:15-07:30	12		9	39	6		74	2		14	43	43					
07:30-07:45	6		7	65	6		82	2		22	29	43					
07:45-08:00	20	53	15	85	5	311	121	6	382	22	52	48				442	1188
08:00-08:15	15	56	16	59	13	341	121	2	431	28	56	49				472	1300
08:15-08:30	14	58	30	83	7	411	172	6	538	32	70	74				552	1558
08:30-08:45	17	69	21	112	7	476	152	4	614	22	76	76				636	1794
08:45-09:00	24	74	20	96	9	497	149	6	643	38	80	83				719	1932
09:00-09:15		58				404			514							579	1555
09:15-09:30		43				278			327							394	1042
09:30-09:45		25				131			163							211	531
09:45-10:00		0				0			0							0	0
10:00-10:15		0				0			0							0	0
10:15-10:30		0				0			0							0	0
10:30-10:45		0				0			0							0	0
10:45-11:00		0				0			0							0	0
11:00-11:15		0				0			0							0	0
11:15-11:30		0				0			0							0	0
11:30-11:45		0				0			0							0	0
11:45-12:00		0				0			0							0	0
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12:15-12:30		0				0			0							0	0
12:30-12:45		0				0			0							0	0
12:45-13:00		0				0			0							0	0
13:00-13:15		0				0			0							0	0
13:15-13:30		0				0			0							0	0
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13:45-14:00		0				0			0							0	0
14:00-14:15		0				0			0							0	0
14:15-14:30		0				0			0							0	0
14:30-14:45		0				0			0							0	0
14:45-15:00		0				0			0							0	0
15:00-15:15	23	24	52	96	4	160	99	2	106	22	81	152				268	558
15:15-15:30	23	48	35	75	15	291	131	6	250	35	95	143				555	1144
15:30-15:45	22	71	33	71	3	403	86	9	350	28	69	110				772	1597
15:45-16:00	17	89	53	74	3	540	102	5	462	40	78	92				993	2084
16:00-16:15	15	81	38	77	7	509	86	9	456	34	91	85				946	1991
16:15-16:30	16	74	36	73	6	498	106	7	431	25	64	101				858	1861
16:30-16:45	14	65	45	57	4	497	101	8	445	20	87	97				855	1863
16:45-17:00	18	66	48	65	11	491	125	8	473	30	78	103				856	1886
17:00-17:15	28	80	54	81	8	513	105	2	485	42	95	151				938	2016
17:15-17:30	22	86	58	61	5	522	113	6	492	31	95	143				1021	2121
17:30-17:45	23	96	65	73	7	563	113	3	499	24	105	127				1076	2234
17:45-18:00	18	96	57	70	2	568	111	4	480	18	86	143				1114	2258



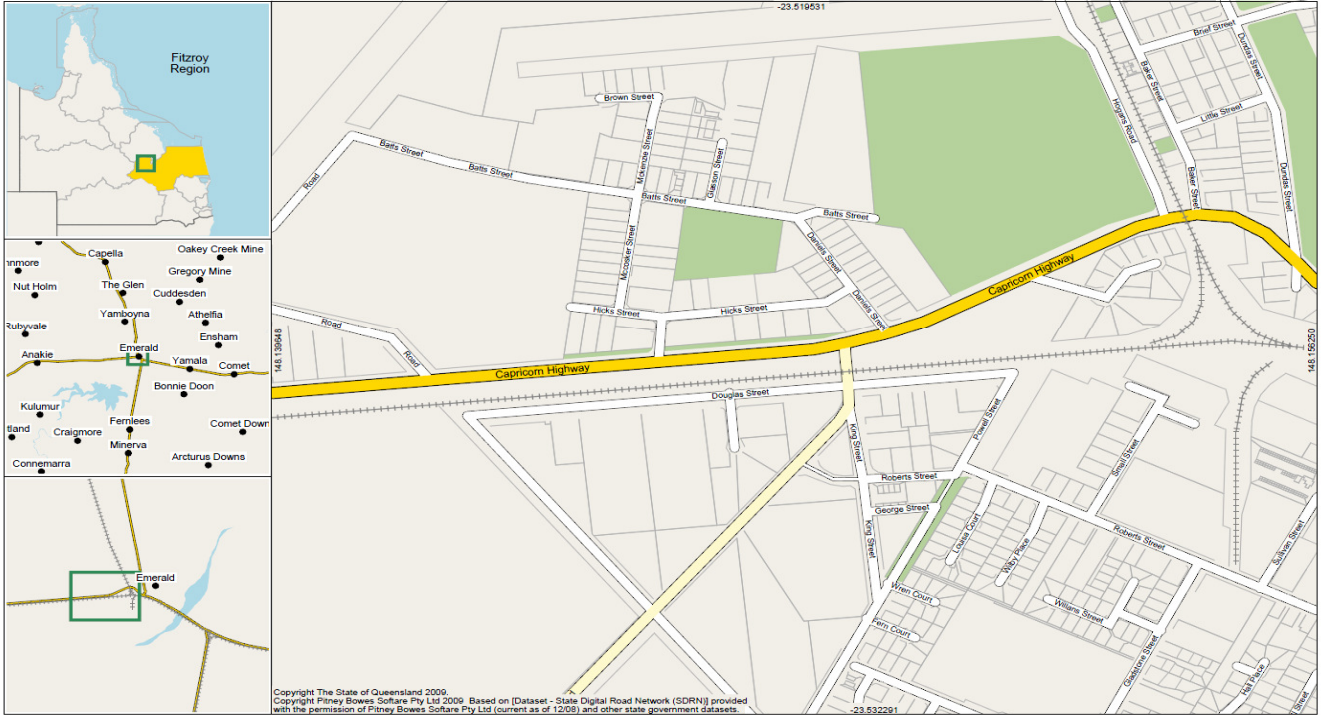
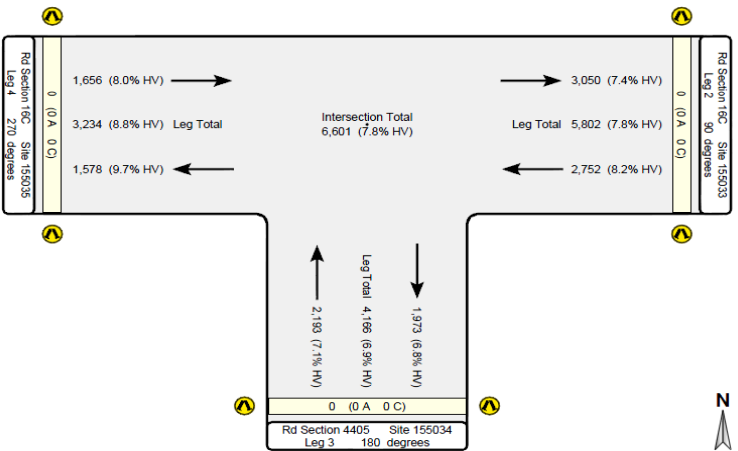
	Leg 2		Leg 3		Leg 4		Total
Time	Left	Through	Left	Right	Through	Right	
06:00-06:15		7 21	3	21	0	2	
06:15-06:30		10 12	4	16	7	0	
06:30-06:45		16 10	4	15	14	3	
06:45-07:00		14 16	18	40	11	8	
07:00-07:15		14 11	11	23	16	5	
07:15-07:30		18 10	4	40	16	0	
07:30-07:45		29 32	16	29	21	3	
07:45-08:00		30 43	191.7	27 45	200	28 9	100
08:00-08:15		29 20	216.3	12 47	226	27 12	119
08:15-08:30		46 22	257.3	11 78	272	36 9	149
08:30-08:45		30 13	238.8	17 91	336	31 9	165
08:45-09:00		31 29	225.5	9 59	332	27 6	161
09:00-09:15		20 21	217.3	12 44	329	36 9	167
09:15-09:30		23 25	196.8	6 35	280	39 6	167
09:30-09:45		29 30	213.2	6 41	217	46 3	176
09:45-10:00		30 24	207.1	7 37	193	39 10	193
10:00-10:15		25 29	220.4	5 36	177	34 1	182
10:15-10:30		34 33	239.9	10 33	179	38 7	182
10:30-10:45		35 24	239.9	3 44	179	35 5	173
10:45-11:00		24 26	235.8	2 28	165	30 4	158
11:00-11:15		31 29	241.9	6 32	162	19 6	148
11:15-11:30		28 24	226.5	3 31	153	24 5	131
11:30-11:45		27 26	220.4	3 31	139	28 4	123
11:45-12:00		41 28	239.9	10 27	147	25 4	118
12:00-12:15		42 31	253.2	9 31	149	51 22	167
12:15-12:30		30 30	261.4	8 34	157	26 10	174
12:30-12:45		33 32	273.7	11 47	181	23 10	175
12:45-13:00		32 21	257.3	11 33	189	31 6	183
13:00-13:15		37 36	257.3	6 33	188	20 12	141
13:15-13:30		32 40	269.6	9 31	186	24 9	138
13:30-13:45		36 22	262.4	9 40	176	24 7	136
13:45-14:00		23 34	266.5	13 42	188	22 10	131
14:00-14:15		33 24	250.1	7 45	201	21 10	130
14:15-14:30		29 33	239.9	5 35	201	31 5	133
14:30-14:45		42 40	264.5	10 46	208	23 7	132
14:45-15:00		59 32	299.3	7 29	189	22 12	134
15:00-15:15		47 24	313.7	6 48	191	35 9	148
15:15-15:30		30 35	316.7	14 41	206	31 8	151
15:30-15:45		33 23	290.1	7 29	186	22 10	153
15:45-16:00		40 16	254.2	7 36	193	24 13	156
16:00-16:15		34 13	229.6	9 32	179	27 20	159
16:15-16:30		37 26	227.6	2 39	165	18 15	153
16:30-16:45		58 21	251.1	7 37	173	41 13	175
16:45-17:00		36 23	254.2	4 40	174	24 29	192
17:00-17:15		75 14	297.3	9 36	178	28 17	190
17:15-17:30		58 15	307.5	7 23	167	14 7	177
17:30-17:45		32 17	276.8	2 32	157	23 12	158
17:45-18:00		36 27	280.9	3 40	156	16 5	125



Capricorn Highway & Selma Road
Thursday 20-Sept-2012

2 years growth
2.50% growth pa

		Leg 2		Leg 3		Leg 4		Total	
Time		Starting	Ending	Left	Through	Left	Right	Through	Right
6:00	6:15				8		8		
6:15	6:30			17	13		4	18	
6:30	6:45			16	14		11	22	
6:45	7:00			20	21		12	42	
7:00	7:15			20	17		16	29	
7:15	7:30			15	29		22	30	
7:30	7:45			15	31		9	29	
7:45	8:00			30	44	211	32	55	233
8:00	8:15			31	25	231	30	40	260
8:15	8:30			38	31	257	28	81	319
8:30	8:45			47	30	290	9	87	380
8:45	9:00			39	29	284	18	47	357
9:00	9:15			31	16	274	10	47	344
9:15	9:30			31	29	265	9	42	283
9:30	9:45			19	14	219	9	37	230
9:45	10:00			27	25	202	7	35	206
10:00	10:15			21	31	207	11	42	202
10:15	10:30			39	36	223	6	37	193
10:30	10:45			30	39	261	8	25	180
10:45	11:00			44	35	289	4	22	163
11:00	11:15			30	30	297	10	29	148
11:15	11:30			27	25	273	4	19	127
11:30	11:45			20	37	261	8	29	131
11:45	12:00			38	42	262	3	16	124
12:00	12:15			33	29	264	9	36	130
12:15	12:30			30	34	276	5	33	146
12:30	12:45			34	31	285	15	24	148
12:45	13:00			31	36	271	21	36	188
13:00	13:15			33	31	273	7	35	185
13:15	13:30			36	33	278	6	23	175
13:30	13:45			19	30	262	11	26	173
13:45	14:00			26	22	242	11	37	164
14:00	14:15			30	32	240	12	41	175
14:15	14:30			29	25	224	6	33	186
14:30	14:45			40	39	255	13	41	204
14:45	15:00			45	28	282	6	32	193
15:00	15:15			38	37	295	11	64	216
15:15	15:30			43	37	323	15	39	232
15:30	15:45			30	37	310	9	38	225
15:45	16:00			23	23	282	5	32	224
16:00	16:15			37	33	276	15	32	194
16:15	16:30			33	35	264	8	46	194
16:30	16:45			50	16	263	7	44	199
16:45	17:00			39	28	285	11	40	213
17:00	17:15			48	24	287	8	32	206
17:15	17:30			61	27	308	8	34	193
17:30	17:45			56	14	312	2	30	173
17:45	18:00			42	23	310	3	34	159



One Hour Peak Periods

Base year 2014 volumes shown

Yellow highlighted counts represent "peak of the peak" hours used for modelling purposes

	AM PEAK	COUNT	PM PEAK	COUNT	OFF PEAK	COUNT
Gregory Highway & Capricorn Highway						
Wednesday 18-Sep-2013	8:00 - 9:00	949	2:45- 3:45	931	13:45-14:00	772
Tuesday 16-Oct-2012	8:00 - 9:00	1039	4:30 - 5:30	1157	12:30-13:30	764
Wednesday 20-Jun-2012	8:00 - 9:00	1081	4:45 - 5:45	1196	Data not available	
Capricorn Highway & Opal Street						
Thursday 12-Sept-2013	8:00 - 9:00	2096	3:00 - 4:00	2115	10:15-11:15	1624
Wednesday 20-Jun-2012	8:00 - 9:00	1932	5:00 - 6:00	2258	Data not available	
Capricorn Highway & Selma Road						
Thursday 18-Jul-2013	7:45 - 8:45	740	4:15 - 5:15	673	12:30-12:45	630
Thursday 20-Sept-2012	7:45 - 8:45	851	3:30 - 4:30	745	12:00-13:00	675