Chapter 27

Traffic and Transport

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27. TRAFFIC AND TRANSPORT

27.1 Introduction

This chapter provides details of the proposed use of the existing and planned infrastructure by traffic generated by the Byerwen Coal Project (the project). It describes existing infrastructure and addresses the impacts and potential mitigation strategies for transport generated over the life of the project.

The information presented in this chapter is based on the Byerwen Coal Project Transport Impact Assessment Report prepared by Lambert & Rehbein and provided in **Appendix 26**.

The transport impact assessment (TIA) was carried out in accordance with the Department of Transport and Main Roads (DTMR) *Guideline for Assessment of Road Impacts of Development, 2006*. It addresses the demands generated by the project on surrounding State controlled roads during the construction and operational phases and associated potential impacts on road infrastructure.

The TIA includes a detailed review of potential traffic generation associated with the project to determine the distribution of all vehicles travelling to and from the site for each phase of the project as follows:

- Construction South Phase (the first construction phase in Year -2 and Year -1)
- Construction and Operation South Phase (overlap of the first construction phase and commencement of operations in the south in Year 1)
- Operation South Phase (operations in the south in Year 2 to Year 14)
- Operation South/Construction North Phase (operations in the south and construction in the north in Year 15 to 17)
- Operations South and North Phase (operations in the south and north in Year 18 to end of project operations).

Traffic generation modelling methodology and detailed distribution assumptions for each phase are presented in the TIA.

27.2 Scope of the Assessment

The traffic and transport assessment covers:

- transport of material and equipment by road between estimated origin in Queensland and the project site
- transport of construction phase material and equipment through eastern seaboard ports of Brisbane, Gladstone, and Mackay
- transport of personnel by road between the nearest regional centre (Mackay) and project accommodation in Glenden
- transport of personnel by road between project accommodation in Glenden and the project site
- transport of construction and operational personnel by air through Mackay Airport terminals

- transport of product coal by rail along the project's northern and southern train loading facilities (TLFs) comprising rail spur connected to the Goonyella to Abbot Point (GAP) rail line, rail loop and train loading bin.

The location and design principles for the project's rail spurs and connections to the GAP rail line are described in **Chapter 7** (**Section 7.8.2**).

As described in **Chapter 3**, the project is interrelated with a number of other projects across the region and the state. Although project timing and success may be dependent on these other projects, approvals for these projects are not being sought by the proponent and do not form part of this EIS. These interrelated projects include the:

- Goonyella to Abbot Point expansion (GAPE) project, including the Northern Missing Link railway and upgrades to the existing Newlands Rail System
- Abbot Point Coal Terminal, including any planned expansions.

The Coordinator-General approved the GAPE project in 2006. Construction of the GAP rail line has been completed. The operation of trains along the GAP rail line, including those resulting from transport of product coal from the Byerwen Coal Project were assessed as part of the GAPE project approvals and are not considered in this EIS. Construction and operation of the project's train loading facilities is described in **Chapters 5, 6** and **7**.

Import of construction materials is anticipated to be through the following ports:

- Port of Brisbane - (Port of Brisbane Pty Ltd)
- Port of Gladstone - (Gladstone Ports Corporation Ltd)
- Port of Mackay - (North Queensland Bulk Ports Corporation Ltd).

Potential impacts to port capacity are assessed in **Section 27.7.3.**

The Ports Corporation of Queensland (PCQ) is the proponent for the expansion of Abbot Point Coal Terminal to a capacity of 50 million tonnes per annum (Mtpa). Byerwen Coal Pty Ltd has secured capacity for 5 Mtpa of coal product to be exported from Abbot Point Coal Terminal and negotiations are underway to secure an additional 5 Mtpa capacity.

Any additional upgrades to Abbot Point Coal Terminal will be undertaken by the respective proponent and do not form part of this EIS. Similarly any impacts associated with the shipping of the project's product coal will be assessed by the respective proponents for those activities and do not form part of this EIS.

27.3 Consultation

Representatives from Lambert & Rehbein met with relevant officers from the Department of Transport and Main Roads (DTMR) Mackay/Whitsunday region in November 2011. Relevant information, data requirements and input from DTMR was sought including:

- traffic data and growth rates
- pavement rehabilitation and maintenance requirements and rates
- crash history data

- current pavement data
- proposed works and upgrades in the area.

This report and assessment is based on the information provided by DTMR at the time. Telephone and email correspondence was conducted with Queensland Resource Council (in particular from the Community Development and Environment area) with regards to population reports, growth outlook studies and workforce transportation.

27.4 Existing Road Infrastructure

27.4.1 Road Network Proposed for Use

The project is located on Collinsville-Elphinstone Road (DTMR Road 5307) approximately 20 km to the west of the town of Glenden. Access to the project from the Collinsville-Elphinstone Road will be via two new proposed at grade intersections, one located to access the northern end of the site and the second to access the southern end of the site (refer **Figure 27-1**).

The traffic generated by the project will use a number of other roads in the region to access the site and will include construction, service, delivery, and workforce vehicles. **Figure 27-2** demonstrates the anticipated routes to be used during the construction and operation phases to and from Mackay, Townsville, Bowen, Glenden and Brisbane.

The descriptions of key roads to be used by project traffic are provided below.

27.4.1.1 Peak Downs Highway

Peak Downs Highway (33A & 33B) is a State controlled road with a posted speed limit of 100 km/h. This road falls within the jurisdiction of the Mackay/Whitsunday region of DTMR and currently provides access from Mackay to a number of coal mines located in the region.

The road is generally a 7.0 m formation (3.0 m lane with 0.5 m shoulders) with a sealed surface. There is pavement patching that has occurred across the length, but generally the pavement and markings are in a satisfactory condition.

There are a number of floodways along the length of the Peak Downs Highway, which are clearly marked.

27.4.1.2 Suttor Developmental Road

Suttor Developmental Road (82A) is a State controlled road with a posted speed limit of 100 km/h. This road falls within the jurisdiction of Mackay/Whitsunday regional office of DTMR. Suttor Developmental Road provides an east-west link between the Peak Downs Highway and Collinsville-Elphinstone Road.

The road is generally a 7.0 m formation (3.0 m lanes with 0.5 m shoulders) with a sealed surface. The pavement and markings are in reasonable condition across the length of the road.

27.4.1.3 Collinsville-Elphinstone Road

Collinsville-Elphinstone Road (5307) is a State controlled road with a posted speed limit of 100 km/h. This road falls within the jurisdiction of the Mackay/Whitsunday regional office of DTMR. The road is generally a 9.0 m formation (3.5 m lanes with 1.0 m shoulders) with a sealed surface. It is considered generally the pavement and markings are in reasonable condition across the length of road. In addition,

there are sections of the road between Xstrata's Newlands mine and Bowen Developmental Road that have been re-surfaced.

27.4.1.4 Bowen Developmental Road

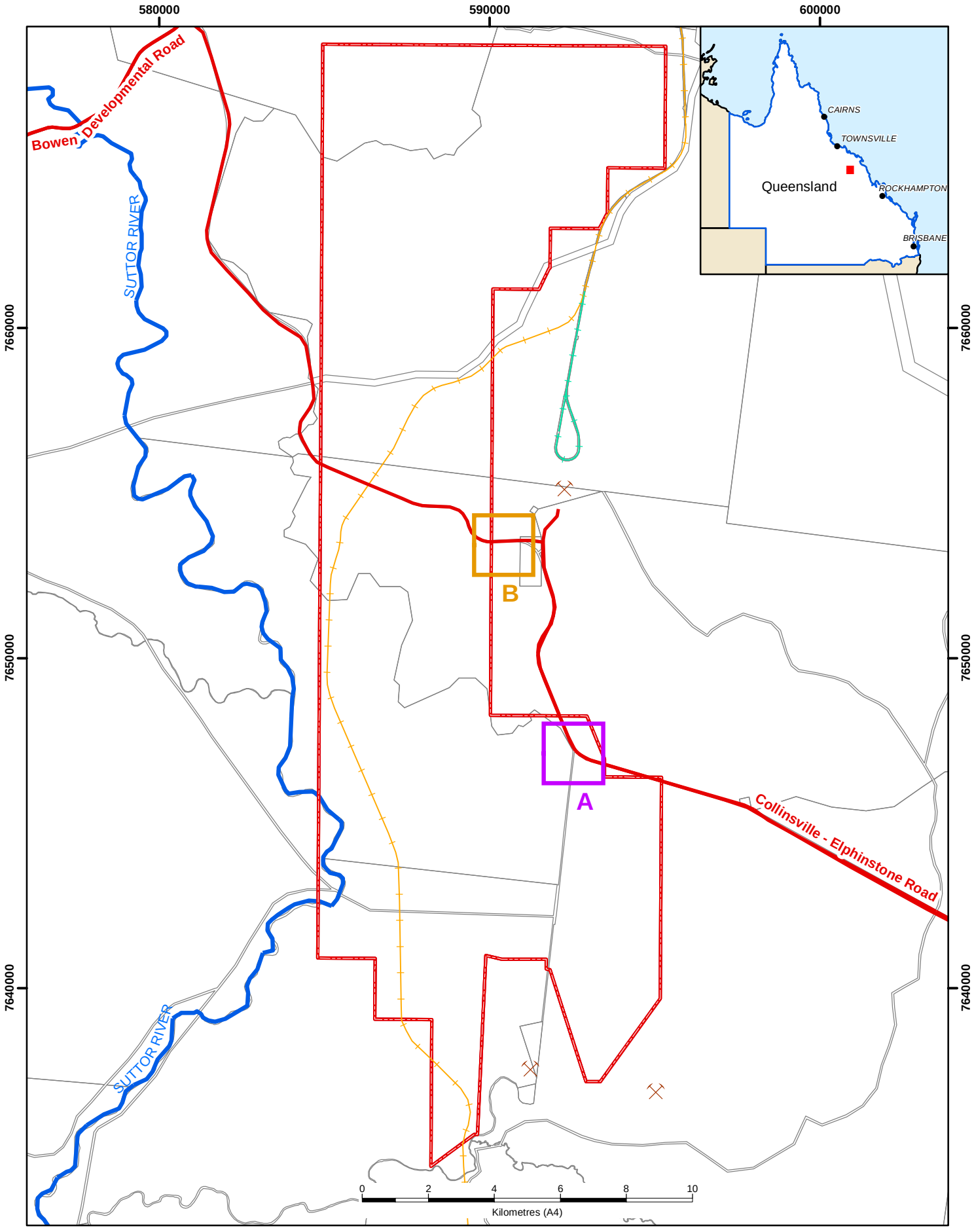
Bowen Developmental Road (88B) is a State controlled road with a posted speed limit of 100 km/h. This road falls within the jurisdiction of the Mackay/Whitsunday regional office of DTMR. The road is generally an 8.0 m formation (3.5 m lanes with 0.5 m shoulders) with a sealed surface. Generally the pavement and markings are in reasonable condition across the length of road.

27.4.1.5 Local Roads

The transport of goods and personnel will, for the major part, be moved on the State controlled road network. The project site access roads can be accessed from the Collinsville-Elphinstone Road without utilising local roads. It is expected there may be very small sections of the local council road network that may be used by vehicles (e.g. in and around Glenden), though these impacts would be considered insignificant due to the low number of movements. The local road network would only be used occasionally to provide a connection to the State controlled road network.

27.4.1.6 Vulnerable Bridges

No vulnerable bridges and structures have been identified along proposed transport routes. The proponent will continue to work with DTMR and local road authorities to identify vulnerable bridges and structures, if any.



Legend

- Project Area
- Cadastre
- Main Road
- Existing Mine Site
- GAP Rail Line
- Newlands Mine Rail Loop
- Suttor River
- Southern Area Site Access
- Northern Area Site Access

Project Road Access	QCOAL GROUP
Figure 27-1	**Byerwen Coal Project**
Date: *31/01/2013*	**Author:** emma.lewis
	Map Scale: 1:150,000
Revision: R1	**Coordinate System:** GDA 1994 MGA Zone 55
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Legend

- Project Area
- Vehicle Routes

Vehicle Routes To/From the Project		QCOAL GROUP
Figure 27-2	**Byerwen Coal Project**	elp environmental and licensing professionals pty ltd
Date: *14/12/2012*	**Author:** samuel.ferguson	
	Map Scale: 1:1,600,000	
Revision: R1	**Coordinate System:** GDA 1994 MGA Zone 55	
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27.4.2 Scheduled Road Improvement Projects

As a result of relatively recent flooding and cyclone events across Queensland, there has been a significant amount of damage to the transport network and infrastructure. DTMR has been focusing on, as a minimum, re-instating the damaged transport network to pre-disaster conditions. This work has commenced and includes over 250 km of roads in the Mackay/Whitsunday region.

In addition, DTMR outlines proposed road improvement projects in the *Roads Implementation Program 2009-2010 to 2013-2014* (RIP) for a number of sections of the road network expected to be used by the Byerwen Coal Project traffic. This program was prepared in 2008 and some of these projects may have already been completed.

A number of these road improvement projects in the region include:

- Localised intersection improvements
- Driver fatigue management
- Pavement rehabilitation and widening
- Pavement regrading
- Bridge replacements and upgrades
- Sealing shoulders.

27.5 Current Road Use

Existing (year 2010) Annual Average Daily Traffic (AADT) volumes were sourced from DTMR from the Traffic Analysis and Reporting System (TARS), for traffic movements on roads adjacent to and key links around the project site. The two-way total AADT volumes and heavy vehicle (HV) AADT volumes for 2010 have been summarised in **Table 27-1**.

Table 27-1 2010 Annual Average Daily Traffic (AADT) Volumes

Road	Link	AADT (total volume)	% Heavy vehicles
Collinsville-Elphinstone Road (north west of development) (5307)	Bowen Developmental Road to Site	286	17%
Bowen Developmental Road (88B)	Collinsville to Aerodrome Road	811	11%
	Aerodrome Road to Collinsville-Elphinstone Road	307	15%
Bowen Developmental Road (88A)	Five Mile Creek to Collinsville	904	15%
Bruce Highway (north to Ayr) (10K)	WIM site Guthalunga	2799	NA
Collinsville - Elphinstone Road (south east of development) (5307)	Site to Glenden	1111	12%
	Glenden to Isaac River	595	19%
Suttor Developmental Road (82A)	Peak Downs Highway to Collinsville-Elphinstone Road	1047	22%

Road	Link	AADT (total volume)	% Heavy vehicles
Peak Downs Highway (east to Mackay) (33B)	Nebo to Hazledean	3893	15%
	Hazledean to Eton	4859	15%
Peak Downs Highway (south to Brisbane) (33A)	Nebo to Fitzroy Developmental Road	612	20%

NA – Volume data not available

27.5.1 Forecast Traffic Volumes

As described in **Section 27.4.1** count data was sourced from DTMR, which included historical count data and annual growth rates. Correspondence with DTMR officers resulted in discussions regarding the most appropriate rates to be utilised in predicting future year traffic volumes. **Table 27-2** summarises the information gathered from historic growth rates and the rates agreed with DTMR to be utilised in the assessment.

Table 27-2 Traffic Growth Rate Summary

DTMR Road No.	Road description	5 year growth			Exponential growth rate (Yr 19)	DTMR agreed rate
		G	A	B	AADT	B
33B	Peak Down Highway	5.58%	5.24%	5.41%	5.74%	5.50%
88A	Bowen Developmental Road - nth of Collinsville	8.75%	8.28%	8.51%	8.71%	8.50%
88B	Bowen Developmental Road - south of Collinsville	22.62%	19.16%	20.92%	24.88%	8.50%
5307	Collinsville-Elphinstone Road	11.74%*	7.78%*	9.78%*	NA	10.00%
10H	Bruce Highway - Mackay to Proserpine	2.89%	3.20%	3.04%	3.36%	3.00%
10J	Bruce Highway - Proserpine to Bowen	3.45%	3.36%	3.41%	3.67%	3.00%
10K	Bruce Highway - Bowen to Ayr	2.98%	2.27%	2.63%	3.00%	3.00%
33B	Peak Down Highway	5.58%	5.24%	5.41%	5.74%	5.50%
82A	Suttor Developmental Road	9.60%	6.62%	8.10%	5.78%	6.00%

*Segment growth rate for 1 year only

G - Gazettal direction

A - Against gazettal direction

B - Both directions

The above growth rates have been applied to the existing background traffic volumes to predict 2014 AADT volumes. This year will be the initial year used for assessment and comparison.

27.5.2 Existing Road Crash Data

DTMR has provided crash statistics between January 2005 and December 2009 for the relevant road sections. This data has been reviewed and **Table 27-3** provides a summary of the data provided and a brief discussion of each key road used by project traffic.

Table 27-3 Crash Statistics Summary

Road section	Fatality		Injury		Property damage		Total
	Number	% of total	Number	% of total	Number	% of total	
Collinsville-Elphinstone Road Between Suttor Developmental Road and Bowen Developmental Road	2	18%	8	73%	1	9%	11
Bowen Developmental Road Between Collinsville-Elphinstone Road to the Bruce Highway	1	2%	40	78%	10	20%	51
Peak Downs Highway Between North Eton Road to Suttor Developmental Road	5	6%	41	49%	37	45%	83
Suttor Developmental Road Between Peak Downs Highway to Collinsville-Elphinstone Road	3	23%	6	46%	4	31%	13

Collinsville-Elphinstone Road

All 11 crashes were single vehicle accidents. The significant contributing factors included fatigue and speed of the vehicle. In addition, 73% of the crashes occurred at mid-block locations (which may indicate that there was driver error based on the contributing factors). There were no trends relating to the time of day for crashes. The trends of these crashes are generally consistent with a rural road environment.

Bowen Developmental Road

The crash statistics indicate that 71% of the crashes were a single vehicle crash and 86% occurred at a mid-block location. The major contributing factor for a quarter of the crashes was fatigue. The crashes were generally spread across all hours of the day. The trends of these crashes are generally consistent with a rural road environment.

Peak Downs Highway

The crash statistics indicate that 74% of the crashes were a single vehicle crash and 95% occurred at a mid-block location. The three major contributing factors to the crashes were fatigue, speed and rain/wet roads. The crashes were generally spread across all hours of the day however 27% occurred between 4pm-8pm. The trends of these crashes are generally consistent with a rural road environment.

Suttor Developmental Road

The crash statistics indicate that 69% of the crashes were a single vehicle crash and 77% occurred at a mid-block location. The major contributing factor of 31% of all crashes was fatigue. The crashes were generally spread across all hours of the day. The trends of these crashes are generally consistent with a rural road environment.

No clear weekly patterns were observed in the crash data. The crash data generally reflects trends that would be attributed to a normal rural environment.

27.5.3 Road Rest Areas

Table 27-4 identifies the motorist rest areas, driver reviver sites, heavy vehicle rest areas, and heavy vehicle stopping places between Mackay and Glenden.

Table 27-4 Driver Road Rest Areas

Rest Area	Location	Longitude	Latitude
Motorist Rest Area -Lake Elphinstone - (Suttor Development Road)	3.5km SW of Elphinstone	148.234	-21.5352
Heavy Vehicle Stopping Place - (Peak Downs Highway (70))	13km N of Nebo	148.7424	-21.59506
Heavy Vehicle Stopping Place - (Peak Downs Highway (70))	20km N of Nebo	148.7669	-21.53426
Heavy Vehicle Stopping Place - (Peak Downs Highway (70))	22km N of Nebo	148.7787	-21.52059
Heavy Vehicle Stopping Place - (Peak Downs Highway (70))	22.5km N of Nebo	148.7809	-21.51841
Heavy Vehicle Stopping Place - (Peak Downs Highway (70))	26km N of Nebo	148.8039	-21.49603
Heavy vehicle rest area - Simila Dog Pad (Peak Downs Highway (70))	2km SW of Hazledean	148.942	-21.3897
Heavy Vehicle Stopping Place - (Peak Downs Highway (70))	5.2km S of Eton	148.9361	-21.2954
Motorist Rest Area - (Peak Downs Highway (70))	Town of Eton	148.976	-21.2626
Motorist Rest Area - Lagoons Pk (Broadsound Road (A1))	City Gates of Mackay	149.1548	-21.16519

Source - Road Rest Areas: http://www.tmr.qld.gov.au/Interactive-Map.aspx?region=Mackay/Whitsunday&showcat=RA,DR,HV,HVSP,RAHV,RADR

27.5.4 Public Transport

Based on the research and investigation undertaken, no bus routes or school bus routes were identified in the areas surrounding the project (i.e. along the Collinsville-Elphinstone Road and any linked local roads). There are bus routes that operate from Nebo and a school bus route that operates on Bowen Developmental Road.

There are no other known public transport or pedestrian and cycle networks along roads in the vicinity of the project.

The proponent will provide bus transport to and from regional centres, which will include provision for transport of workers with a disability.

27.6 Project Traffic Generation and Distribution

27.6.1 Traffic Assumptions

The traffic generated by the project was based on assumptions about the workforce and the quantity of materials and equipment predicted to be transported to the project site (refer **Chapter 7**).

Assumptions used to estimate the traffic generated by the project are listed below:

- The workforce profile is as described in **Chapter 6** and **Chapter 7**.
- The construction staff will work a 12 hour daylight shift, expected to be the hours of 6:00am to 6:00pm, 7 days on/7 days off. The workforce would be expected to arrive in the hour prior to the start time and leave the hour following the finishing time.
- A maximum number of 210 construction staff (during the first construction phase) will be rostered on at any one daylight shift.
- The administrative staff will work on a 5 days on/2 days off roster.
- The operational mine workforce will work a 12-hour day or night time shift (24-hour operation), 7-days on/7 days off. Therefore, the mine workforce could work one of 4 possible shifts across a two week period.
- 100% of the construction/operation workforce will be accommodated in Glenden.
- The maximum number of workforce during the southern operation phase is 495 people. There will be two worker types on site during this period including administrative staff and operational workforce.
- The maximum number of administrative staff workforce during the operation phases is 75 people.
- Buses will be used to transport all workforce to/from Glenden accommodation to/from site and will be able to transport a total of 50 passengers per bus.
- Administration staff will travel by private car, with an occupancy of one person per vehicle.
- In regards to the movement of workers between Glenden and other regional centres:
  - all workers are assumed to travel to or transit through Mackay
  - 30% of operational workers will reside in Glenden and will commute to Mackay six times per year
  - 100% of construction workers and 70% of operations workers work on a shift roster and commute to and from Mackay at the end of each shift
  - buses with a 20 person capacity will transfer workers to and from Mackay, with 50% of workers electing to travel by private vehicle.
- In regards to movements of project personnel through Mackay Airport:
  - 50% of non-resident (in Glenden) workers returning to Mackay reside in Mackay and 50% transit through Mackay airport
  - 50% of Glenden permanent residents transit through Mackay airport once per annum.

- The delivery of materials, equipment, and consumables will occur across a seven day period. Ten percent of the daily totals of these deliveries will occur during each of the peak hour periods.
- Construction materials and equipment, such as steel, platework, fuel, concrete, mining plant, fixed plant, and general store products will be sourced from Glenden, Mackay, Townsville, and the Brisbane/southern region.
- The majority of deliveries and support services will occur outside of the start and end times of shifts (i.e. between 5:30am - 6:30am and 5:30pm – 6:30pm).
- "Over-dimension" vehicles will enter the site during night periods and the necessary permits will have been obtained.
- During the construction period 'non-mining waste' identified in **Chapter 26** will be removed from site, with the bulk of this being and be transported to Mackay or Glenden.
- The extent of specific construction/operations activities have not been considered, therefore all activities are assumed to occur over the entire duration of the corresponding project phase period.

The quantities of materials/items and workforce personnel estimated for each project phase have been summarised for the number of vehicle trips in the following sections. A detailed traffic generation and distribution review has been undertaken to determine the origin and destination of each of the trips associated with the project across the five project phases.

The following sections tabulate the generation and distribution assumptions for each of the project phases. These tables detail the origin of the trips and the route assumed to be taken by the specific vehicle to arrive at the project site. A percentage distribution factor has been applied to each of the routes contained within a specific task type.

27.6.2 Construction South Phase Traffic

Construction activities are expected to commence in 2014 with an expected duration of 18 months. A summary of the traffic volumes and transport routes associated with the construction south phase is provided in **Table 27-5**.

Table 27-5 Construction South Phase Generated Traffic

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips
			Type	Payload	Trips*		
Workforce	Glenden	via Collinsville-Elphinstone Road	Light Vehicles	1 person	18000	100%	50
			Buses	50 people	3600	100%	10
Steel	Mackay	via Peak Downs Highway	Semi	26.5 ton	38	30%	0.10
	Townsville	via Bruce Hwy	Semi	26.5 ton	38	30%	0.10
	Brisbane/ South	via Burnett Hwy and	Semi	26.5 ton	50	40%	0.14

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips
			Type	Payload	Trips*		
	region	Fitzroy Dev. Road					
Platework	Mackay	via Peak Downs Highway	Semi	26.5 ton	47	30%	0.13
	Townsville	via Bruce Hwy	Semi	26.5 ton	47	30%	0.13
	Brisbane/ South region	via Burnett Hwy and Fitzroy Dev. Road	Semi	26.5 ton	62	40%	0.17
Fuel	Mackay	via Peak Downs Highway	Tanker	25,000 L	20	25%	0.06
	Townsville	via Bruce Hwy	Tanker	25,000 L	60	75%	0.17
Concrete	Glenden	via Collinsville-Elphinstone Road	Mixer	5.5 m3	1338	100%	3.72
Mining & Fixed Plant	Mackay	via Peak Downs Highway	Semi	26.5 ton	7	15%	0.02
	Townsville	via Bruce Hwy	Semi	26.5 ton	7	15%	0.02
	Brisbane/ South region	via Burnett Hwy and Fitzroy Dev. Road	Semi	26.5 ton	32	70%	0.09
General Store	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	210	50%	0.58
	Mackay	via Peak Downs Highway	Semi	26.5 ton	105	25%	0.29
	Townsville	via Bruce Hwy	Semi	26.5 ton	105	25%	0.29
Waste	Mackay	via Peak Downs Highway	Semi	26.5 ton	6	100%	0.02
	Mackay	via Peak Downs	Rigid Truck	10 ton	4	100%	0.01

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips
			Type	Payload	Trips*		
		Highway					
	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	1600	100%	4.44
	Glenden	via Collinsville-Elphinstone Road	Rigid Truck	10 ton	100	100%	0.28
Potable Water	Glenden	via Collinsville-Elphinstone Road	Small Tanker	0.04 ML	333	100%	0.93
Visitors	Proserpine	via Bruce Hwy	Light Vehicles	1	1080	50%	3
	Mackay	via Peak Downs Highway	Light Vehicles	1	540	25%	1.50
	Townsville	via Bruce Hwy	Light Vehicles	1	540	25%	1.50

*Vehicle trips are 2-way volumes including the loaded and unloaded directions per year

27.6.3 Construction and Operation South Phase Traffic

This phase covers a period of 12 months when the first construction phase (construction south phase) will run concurrently with the operation phase (operation south phase). A summary of the traffic volumes and transport routes associated with construction and operation south phase is provided in **Table 27-6**.

Table 27-6 Construction and Operation South Phase Generated Traffic

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
Workforce	Glenden	via Collinsville-Elphinstone Road	Light Vehicles	1 person	12857	100%	36
			Buses	50 people	1440		4
Fuel	Mackay	via Peak Downs Highway	Tanker	25,000 L	14	25%	0.04
	Townsville	via Bruce Hwy	Tanker	25,000 L	42	75%	0.12

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
Explosives	Mackay	via Peak Downs Highway	B-Double	38 ton	2632	100%	7.31
Concrete	Glenden	via Collinsville-Elphinstone Road	Mixer	5.5 m3	201	100%	0.56
Reagents	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	151	100%	0.42
Mining & Fixed Plant	Mackay	via Peak Downs Highway	Semi	26.5 ton	15	15%	0.04
	Townsville	via Bruce Hwy	Semi	26.5 ton	15	15%	0.04
	Brisbane /South region	via Burnett Hwy and Fitzroy Dev. Road	Semi	26.5 ton	69	70%	0.19
General Store	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	50	50%	0.14
	Mackay	via Peak Downs Highway	Semi	26.5 ton	25	25%	0.07
	Townsville	via Bruce Hwy	Semi	26.5 ton	25	25%	0.07
Waste	Mackay	via Peak Downs Highway	Semi	26.5 ton	156	100%	0.43
	Mackay	via Peak Downs Highway	Rigid Truck	10 ton	34	100%	0.09
	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	1600	100%	4.44
	Glenden	via Collinsville-Elphinstone Road	Rigid Truck	10 ton	134	100%	0.37
Potable	Glenden	via Collinsville-Elphinstone	Small	0.04 ML	250	100%	0.69

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
Water		Road	Tanker				
Visitors	Proserpine	via Bruce Hwy	Light Vehicles	1 person	2880	50%	8
	Mackay	via Peak Downs Highway	Light Vehicles	1 person	1440	25%	4
	Townsville	via Bruce Hwy	Light Vehicles	1 person	1440	25%	4

*Vehicle trips are 2-way volumes including the loaded and unloaded directions

27.6.4 Operation South Phase

Once the first construction phase has ended this operation south phase will run for an estimated 13 years before the second phase of construction begins. A summary of the traffic volumes and transport routes associated with operation south phase is provided in **Table 27-7**. Based on the 15-year design horizon recommended in the DTMR guideline, the worst case scenario (based on workforce numbers) will occur in approximately year eight (2027). This year has been used to assess the worst case scenario for impacts on the road network.

Table 27-7 Operation South Phase Generated Traffic

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
Workforce	Glenden	via Collinsville-Elphinstone Road	Light Vehicles	1 person	38571	100%	107
			Buses	50 people	2160		6
Fuel	Mackay	via Peak Downs Highway	Tanker	25,000 L	400	25%	1.11
	Townsville	via Bruce Hwy	Tanker	25,000 L	1200	75%	3.33
Explosives	Mackay	via Peak Downs Highway	B-Double	38 ton	2632	100%	7.31
Concrete	Glenden	via Collinsville-Elphinstone Road	Mixer	5.5 m^3	6	100%	0.02
Reagents	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	611	100%	1.70

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
Ancilary Equipment - 40T Excavator	Bowen	via Bowen Developmental Road	Semi	26.5 ton	100	100%	0.28
Ancillary Equipment - Service Truck	Bowen	via Bowen Developmental Road	Small Truck	6.5 ton	200	100%	0.56
General Store	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	210	50%	0.58
	Mackay	via Peak Downs Highway	Semi	26.5 ton	105	25%	0.29
	Townsville	via Bruce Hwy	Semi	26.5 ton	105	25%	0.29
Waste	Mackay	via Peak Downs Highway	Semi	26.5 ton	150	100%	0.42
	Mackay	via Peak Downs Highway	Rigid Truck	10 ton	30	100%	0.08
	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	0	100%	0.00
	Glenden	via Collinsville-Elphinstone Road	Rigid Truck	10 ton	34	100%	0.09
Visitors	Proserpine	via Bruce Hwy	Light Vehicles	1 person	3600	50%	10
	Mackay	via Peak Downs Highway	Light Vehicles	1 person	1800	25%	5
	Townsville	via Bruce Hwy	Light Vehicles	1 person	1800	25%	5

*Vehicle trips are 2-way volumes including the loaded and unloaded directions

27.6.5 Construction North and Operation South Phase Traffic

This stage is anticipated to generate the most traffic of the five project phases with a full construction and operational workforce in year 16 of 780 people. A summary of the traffic volumes and transport routes associated with construction north and operation south phase is provided in **Table 27-8**.

Table 27-8 Construction North and Operation South Phase Generated Traffic

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
Workforce	Glenden	via Collinsville-Elphinstone Road	Light Vehicles	1 person	38571	100%	107
			Buses	50 people	5040		14
Steel	Mackay	via Peak Downs Highway	Semi	26.5 ton	19	30%	0.05
	Townsville	via Bruce Hwy	Semi	26.5 ton	19	30%	0.05
	Brisbane /South region	via Burnett Hwy and Fitzroy Dev. Road	Semi	26.5 ton	25	40%	0.07
Platework	Mackay	via Peak Downs Highway	Semi	26.5 ton	23	30%	0.06
	Townsville	via Bruce Hwy	Semi	26.5 ton	23	30%	0.06
	Brisbane/ South region	via Burnett Hwy and Fitzroy Dev. Road	Semi	26.5 ton	31	40%	0.09
Fuel	Mackay	via Peak Downs Highway	Tanker	25,000 L	420	25%	1.17
	Townsville	via Bruce Hwy	Tanker	25,000 L	1260	75%	3.50
Explosives	Mackay	via Peak Downs Highway	B-Double	38 ton	2632	100%	7.31
Concrete	Glenden	via Collinsville-Elphinstone Road	Mixer	5.5 m3	669	100%	1.86
Reagents	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	762	100%	2.12
-Mining & Fixed Plant	Mackay	via Peak Downs Highway	Semi	26.5 ton	8	15%	0.02

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
	Townsville	via Bruce Hwy	Semi	26.5 ton	8	15%	0.02
	Brisbane/ South region	via Burnett Hwy and Fitzroy Dev. Road	Semi	26.5 ton	39	70%	0.11
Ancillary Equipment - 40T Excavator	Bowen	via Bowen Developmental Road	Semi	26.5 ton	100	100%	0.28
Ancillary Equipment - Service Truck	Bowen	via Bowen Developmental Road	Small Truck	6.5 ton	200	100%	0.56
General Store	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	420	50%	1.17
	Mackay	via Peak Downs Highway	Semi	26.5 ton	210	25%	0.58
	Townsville	via Bruce Hwy	Semi	26.5 ton	210	25%	0.58
Waste	Mackay	via Peak Downs Highway	Semi	26.5 ton	156	100%	0.43
	Mackay	via Peak Downs Highway	Rigid Truck	10 ton	34	100%	0.09
	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	1600	100%	4.44
	Glenden	via Collinsville-Elphinstone Road	Rigid Truck	10 ton	134	100%	0.37
Visitors	Proserpine	via Bruce Hwy	Light Vehicles	1 person	5400	50%	15
	Mackay	via Peak Downs Highway	Light Vehicles	1 person	2700	25%	7.50

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
	Townsville	via Bruce Hwy	Light Vehicles	1 person	2700	25%	7.50

*Vehicle trips are 2-way volumes including the loaded and unloaded directions

27.6.6 Operation South and North Phase Traffic

This phase will be the stage at which both the north and south mining areas are contributing to the total coal production. A summary of the traffic volumes and transport routes associated with operation south and north phase is provided in **Table 27-9**.

Table 27-9 Operation South and North Phase Generated Traffic

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
Workforce	Glenden	via Collinsville-Elphinstone Road	Light Vehicles	1 person	38571	100%	107
			Buses	50 people	2160		6
Fuel	Mackay	via Peak Downs Highway	Tanker	25,000 L	400	25%	1.11
	Townsville	via Bruce Hwy	Tanker	25,000 L	1200	75%	3.33
Explosives	Mackay	via Peak Downs Highway	B-Double	38 ton	2632	100%	7.31
Concrete	Glenden	via Collinsville-Elphinstone Road	Mixer	5.5 m3	3	100%	0.01
Reagents	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	981	100%	2.73
Ancillary Equipment - 40T Excavator	Bowen	via Bowen Developmental Road	Semi	26.5 ton	100	100%	0.28
Ancillary Equipment -	Bowen	via Bowen Developmental	Small Truck	6.5 ton	200	100%	0.56

Task type	Origin	Route	Vehicles (p.a.)			Trip distribution %	Avg daily trips*
			Type	Payload	Trips*		
Service Truck		Road					
General Store	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	420	50%	1.17
	Mackay	via Peak Downs Highway	Semi	26.5 ton	210	25%	0.58
	Townsville	via Bruce Hwy	Semi	26.5 ton	210	25%	0.58
Waste	Mackay	via Peak Downs Highway	Semi	26.5 ton	300	100%	0.83
	Mackay	via Peak Downs Highway	Rigid Truck	10 ton	60	100%	0.17
	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	0	100%	0
	Glenden	via Collinsville-Elphinstone Road	Rigid Truck	10 ton	68	100%	0.19
Visitors	Proserpine	via Bruce Hwy	Light Vehicles	1 person	7200	50%	20
	Mackay	via Peak Downs Highway	Light Vehicles	1 person	3600	25%	10
	Townsville	via Bruce Hwy	Light Vehicles	1 person	3600	25%	10

27.7 Potential Impacts and Mitigation Measures

27.7.1 Proposed Alterations or New Transport Related Infrastructure and Services

The project and the project's personnel will make use of the following existing transport infrastructure and services:

- product coal transported along the GAP rail line to the Port of Abbot Point.
- materials and equipment imported through various ports described in **Section 27.2**
- personnel, material and equipment transported on various state and local roads as described in **Section 27.4**
- personnel movements through Mackay Airport.

As described in **Section 27.2**, the proponent has secured capacity for the transport of product coal along the GAP rail line and through the Port of Abbot Point. This infrastructure has been the subject of separate approvals processes and hence the project's use of this infrastructure is not described further in this EIS. The project will have negligible impact on the operating capacity of the GAP rail line.

Potential impacts on port capacity and operations, from the import of materials and equipment, are described in **Section 27.7.3.**

Potential impacts on Mackay Airport's capacity and operations are described in **Section 27.7.2**.

New transport infrastructure or alterations to existing transport infrastructure and services will comprise:

- two mine site access road intersections with the Collinsville-Elphinstone Road (refer **Section 27.7.6**)
- two TLFs, comprising train loading bin, rail loop and rail spur to connect the project's product coal stockpiles to the GAP rail line.
- potential crossings of the GAP rail line and Collinsville-Elphinstone Road by project infrastructure such as haul roads.

The location and design of the two TLFs is described in **Chapter 7, Section 7.8** and shown in **Figure 7-15 and Figure 7-16**.

Haul roads are not considered to be "transport related infrastructure" as they are purely for use by the proponent in mining operations. The interaction of haul roads with third party transport related infrastructure is described in **Section 27.7.8**. Haul roads are included in the project footprint and impacts associated with constructing and operating haul roads are described in the relevant chapters of the EIS.

27.7.1.1 Temporary Access Routes

Road and rail infrastructure will be constructed so that any temporary access routes required for the construction of those elements will be incorporated into the final alignments for operations and therefore decommissioning of any temporary access routes will not be required.

27.7.2 Personnel Movements through Mackay Airport

Mackay Airport is a medium sized regional airport with a revenue passenger throughput[1] of around 1,077,065 passengers for the year ended January 2012. It is anticipated that the peak combined (construction and operational) workforce occurring in year 16 is 780 people. Such a workforce may result in around 15,000 additional airport movements (less than a 1.5% increase) per annum at Mackay Airport under the assumptions set out in **Section 27.6**. The anticipated increase in Mackay Airport traffic is expected to result in negligible impacts to the Airport capacity and operations.

27.7.3 Impacts to Port Capacity and Operations from Imports

Import of project materials and equipment will be undertaken by the relevant suppliers contracted by the proponent. It is expected that suppliers will make port arrangements as necessary for any given cargoes. For the purposes of this assessment it has been assumed that construction phase imports will be via one or more of the following facilities:

- Port of Brisbane - (Port of Brisbane Pty Ltd)
- Port of Gladstone - (Gladstone Ports Corporation Ltd)
- Port of Mackay - (North Queensland Bulk Ports Corporation Ltd).

Equipment and materials required for the project are described in **Chapter 6, Section 6.7**. Not all equipment and materials will be imported from overseas. For the purposes of estimating the tonnes of material and equipment that is imported, it is conservatively assumed that all equipment and all steel will be imported. Other materials such as concrete and road base will be sourced from within Australia. Approximately 15,000 t of equipment and material will be imported for the project over its life.

The historical throughputs[2] for the ports through which the project may import equipment and materials are summarised below.

- Port of Brisbane - total import (2010/2011) was 17,415,186 t
- Port of Gladstone - total import (2010/2011) was 16,970,730 t
- Port of Mackay - total import (2010/2011) was 1,157,063 t.

In combination these ports had a throughput of imports of 35 542,979 t in 2010/2011.

The total project imports over the life of the project represent less than 0.05% of the amount imported by the above ports in 2010/2011. Assuming all imports were through a single port, the project's imports represent less than 0.1% of the Port of Brisbane and Port of Gladstone capacity and less than 1.5% of the Port of Mackay capacity. The project's impacts on port capacity and operation, vessel traffic management, navigational aids and ship sourced pollution, from importing materials and equipment, are therefore considered to be negligible. It is anticipated that any vessels importing material and equipment for the project will abide by Maritime Safety Queensland guidelines.

[1] Airport Traffic Data Source: http://www.bitre.gov.au/publications/ongoing/files/WebMonthlyAirportJanuary2013.xls

[2] Data Source: http://www.tmr.qld.gov.au/~/media/busind/Transport%20sectors/Ports/Trade%20statistics/2011%20trade%20stats%20docs/Current%20trade%20stats%20doc%202011/TradeStatisticsforQueenslandPorts2011revised280312.pdf

27.7.4 Traffic Generation Impact Considerations

In general, DTMR does not consider a development's impacts to be significant on the road network unless there is a variation in traffic volumes of more than 5% on the existing, or expected levels. This criterion has been used as the starting point for determining the impacts. Both existing and expected levels have been determined based on existing AADT volumes and growth rates provided by DTMR.

The total volume of traffic in the network across the assessment years has been determined by adding the traffic volume generated by the project and the background traffic volumes travelling on the road network.

As defined in DTMR's *Guide for Assessment of Road Impacts of Development* (the Guide), for traffic operation assessment and safety review, a design horizon of 10 years after the opening of the development should apply. The project will be staged over a period greater than 5 years, therefore as stated in the Guide it is preferable to avoid time horizons beyond 15 years due to the certainty of traffic volume predictions.

Based on the design horizons defined in the Guide, years 2027 (15 years post existing) and 2014 (the first year of the construction phase) will be reviewed.

The future background traffic volumes and project development traffic volumes for both the total AADT and HV AADT have been summarised in **Table 27-10** for the relevant transport routes. The project generated traffic has been compared to the background traffic to determine the percentage impact of the development and summarised in **Table 27-11**.

Note the AADT traffic volumes shown as decimal values are the result of annual traffic volumes being averaged to formulate daily volumes. Rounding up or down and recalculating annual traffic volumes will result in significant errors hence the decimal values have been used for accuracy.

Based on the comparisons shown in **Table 27-11**, the only link in the road network that meets the DTMR criterion of "equal to or greater than 5% of the AADT" is Collinsville-Elphinstone Road south of the project to Glenden. The project's impacts on traffic volumes on regional roads are negligible to minor other than for the Collinsville-Elphinstone Road south of the project to Glenden, where impacts are moderate.

The pavement impact of this road link has been investigated and is discussed in **Section 27.7.9.** Additionally the mine access intersection is reviewed in **Section 27.7.5**.

Table 27-10 Assessment Year Daily Traffic Volumes

Road segment	DTMR Road Section	DTMR agreed annual growth rate	2014 Background traffic	2014 Background HV	2014 Project traffic	2014 Project HV	2014 With project traffic	2027 Back-ground traffic	2027 Back-ground HV	2027 Project traffic	2027 Project HV	2027 With project traffic
Collinsville - Elphinstone Road (north of development)												
Bowen Developmental Road to Site	5307	10.0%	419	72	5.2	0.7	424	1446	248	19.5	4.5	1465
Bowen Developmental Road												
Collinsville to Aerodrome Road	88B	8.5%	1124	124	5.2	0.7	1129	3246	357	19.5	4.5	3265
Aerodrome Road to Collinsville-Elphinstone Road	88B	8.5%	425	65	5.2	0.7	431	1229	188	19.5	4.5	1248
Bowen Developmental Road												
Five Mike Creek to Collinsville	88A	8.5%	1253	184	5.2	0.7	1258	3618	532	19.5	4.5	3638
Bruce Highway (north to Ayr)												
WIM site Guthalunga	10K	3.0%	3150	NA	2.2	0.7	3153	4626	NA	9.5	4.5	4636
Collinsville - Elphinstone Road (south of development)												
Site to Glenden	5307	10.0%	1627	200	72.5	21.0	1699	5616	691	129.7	17.6	5745
Glenden to Isaac River	5307	10.0%	871	170	42.5	3.0	914	3007	586	45	10	3052
Suttor Developmental Road												

Road segment	DTMR Road Section	DTMR agreed annual growth rate	2014 Background traffic	2014 Background HV	2014 Project traffic	2014 Project HV	2014 With project traffic	2027 Back-ground traffic	2027 Back-ground HV	2027 Project traffic	2027 Project HV	2027 With project traffic
Peak Downs Highway to Collinsville-Elphinstone Road	82A	6.0%	1322	288	42.5	3.0	1364	2819	615	45	10	2864
Peak Downs Highway (east to Mackay)												
Nebo to Hazledean	33B	5.5%	4823	726	42.1	2.6	4865	9673	1456	45	10	9718
Hazledean to Eton	33B	5.5%	6019	880	42.1	2.6	6062	12074	1766	45	10	12119
Peak Downs Highway (south to Brisbane)												
Nebo to Fitzroy Developmental Road	33A	5.0%	744	151	0.4	0.4	744	1403	284	0.0	0.0	1403

Table 27-11 Comparison Between Background and Project Generated Volumes

Road segment	DTMR Road Section	Impact				
		% Increase to 2014	% Increase to 2027	% Increase in HV to 2014	% Increase in HV to 2027	Impact >5%
Collinsville - Elphinstone Road (north of development)						
Bowen Developmental Road to Site	5307	1.2%	1.3%	1.0%	1.8%	No
Bowen Developmental Road						
Collinsville to Aerodrome Road	88B	0.5%	0.6%	0.6%	1.2%	No
Aerodrome Road to Collinsville-Elphinstone Road	88B	1.2%	1.6%	1.1%	2.4%	No
Bowen Developmental Road						
Five Mile Creek to Collinsville	88A	0.4%	0.5%	0.4%	0.8%	No
Bruce Highway (north to Ayr)						
WIM site Guthalunga	10K	0.1%	0.2%	NA	NA	No
Collinsville-Elphinstone Road (south of development)						
Site to Glenden	5307	4.5%	2.3%	**10.5%**	2.5%	Yes
Glenden to Isaac River	5307	4.9%	1.5%	1.8%	1.7%	No
Suttor Developmental Road						
Peak Downs Highway to Collinsville-Elphinstone Road	82A	3.2%	1.6%	1.0%	1.6%	No
Peak Downs Highway (east to Mackay)						
Nebo to Hazledean	33B	0.9%	0.5%	0.4%	0.7%	No
Hazledean to Eton	33B	0.7%	0.4%	0.3%	0.6%	No
Peak Downs Highway (south to Brisbane)						
Nebo to Fitzroy Developmental Road	33A	0.1%	0.0%	0.3%	0.0%	No

27.7.5 Minimising Project Traffic

The project will transport all workers between Glenden accommodation and the mine site by bus (other than administration workers) and approximately half of all non-resident (in Glenden) workers between Glenden and Mackay by bus. This reduces the number of vehicles on the road, improving safety for workers and other road users, and decreasing pavement impacts.

27.7.6 Mine Access Intersections

There are two proposed access intersection locations for the mine site on Collinsville-Elphinstone Road. Given that the project area is divided by Collinsville-Elphinstone Road, there will be one access to service the southern tenement area and a second access to service the northern tenement area of the mine.

The southern access intersection will be required first, when the construction south phase of the project begins. The second mine access intersection will be constructed later when the northern construction phase begins (approximately year 16 or 2030).

The location of these intersections will be selected based on minimising the impact on the safety, operation, and efficiency of the road network. In particular, the location will be selected to optimise the sight distance provision.

Given the rural nature of Collinsville-Elphinstone Road and the surrounding road network, an operational assessment of the southern access intersection has not been completed. A turn lane warrant assessment has been undertaken to determine the form of the intersection and this is detailed in **Appendix 26**.

The through background vehicle movements have been calculated from the 2014 and 2027 AADT gazettal and against gazettal volumes contained in the data provided by DTMR. The development traffic is based on the assumptions detailed in **Section 27.6**. The peak hour traffic volumes have been calculated by assuming they equate to 10% of the AADT.

The turn lane warrant assessment (refer **Appendix 26**), based on both 2014 AADT volumes (and that the peak is approximately 10% of the daily volume) indicates that the vehicle movements do not warrant further upgrade to the intersection. Based on the 2027 AADT volumes (and that the peak is approximately 10% of the daily volume) the intersection requires an auxiliary left (AUL(S)) turn lane treatment for the left turn movements into the site.

A concept layout has been developed for the mine access intersections using the DTMR *Road Planning and Design Manual* and Austroads *Guide to Road Design* and is included in **Appendix 26**. Based on the traffic volumes on Collinsville-Elphinstone Road and the potential traffic generated from the mine, the turn lane warrants suggest a short left turn auxiliary lane is the only upgrade required. However, the concept design has made an allowance for a channelised right turn treatment (CHR) and an AUL(S) designed to the appropriate standards. The CHR has been recommended so that a vehicle travelling past the mine access location is unlikely to be impeded by a vehicle turning into the site, thereby improving the safety of the intersection.

The concept layout package includes the general arrangement, typical cross sections, signage, and swept path assessments for B-double movements into and out of the site. The drawings in **Appendix 26** have been provided as an indication of the access intersection layout.

The intersection geometry of the concept design is based on the DTMR *Road Planning and Design Guidelines – Chapter 13*, using the following assumptions:

- design speed of 110 km/h for Collinsville-Elphinstone Road (design speed is 10 km/h higher than posted speed as specified in the geometric design section of the DTMR *Road Planning and Design Manual*)

- design speed of 60 km/h for the mine access road
- turning movements for a B-Double.

When determining the ultimate location of the two access intersections, consideration will be given to achieving the safe intersection sight distance (SISD) of 285 m in accordance with the Austroads, *Guide to Design – Part 4A*.

The upgrade of intersections to access the project site is the only upgrade of public road infrastructure within the jurisdiction of the DTMR proposed for the project. The proponent will contribute towards maintenance of public roads as described in **Section 27.7.9**.

The natural environment in the vicinity of the proposed intersection upgrades is generally characterised by cleared areas for pastoral or mining activities. The extent of impact on the natural environment from intersection upgrades within the jurisdiction of the DTMR is negligible in the context of the project footprint (approximately 1 ha out of a total disturbance of approximately 7,000 ha). Intersections will occur within the boundaries of the project's mining leases and hence any disturbance to the natural environment will be conditioned through the project's environmental authority.

The limited upgrades of public roads (i.e. intersection upgrades) will not alter overland flows. The impact that project activities may have on the interaction of overland flows with public roads is described in **Chapter 8**. Only the local Wollombi Road will be affected by drainage diversions for the project. These will be designed to mimic overland flow to their pre-development conditions.

27.7.7 Road Link Assessment

A road link performance criterion is generally measured against Level of Service (LOS). LOS is a qualitative measure that defines the operational performance of a road link within a traffic stream. These measures may include speed, travel time and degree of saturation (DOS) during a given time period. There are six levels of LOS ranging from LOS A (highest level or free flow traffic condition) to LOS F (forced flow).

Based on the daily volumes as determined in **Table 27-10** and assuming that the peak traffic volumes are approximately 10% of the AADT, the LOS has been determined for roads in **Table 27-11** (refer **Appendix 26**). The LOS on all roads is A, B or C (majority are LOS A) other than one section of the Peak Downs Highway (LOS D) due to the high existing and future predicted background traffic volumes on this section.

The additional traffic generated by the project is minimal when compared to the background traffic volumes (refer **Table 27-11**). The project is expected to have a negligible impact on the road link performance based on the LOS measurement criteria.

27.7.8 Interaction of Project Roads with Rail Lines and Linear Infrastructure

ROM coal and waste rock haul roads will cross the following linear infrastructure:

- the GAP rail line and Alpha Coal Project rail line between the South Pits and their associated out of pit waste rock dumps
- Xstrata's mining lease for transport.

The central infrastructure corridor (containing the project site access road to the northern area) will cross GAP rail line, Alpha Coal Project rail line and the Collinsville-Elphinstone Road.

The crossing of the GAP rail line will be designed in accordance with the relevant standards and guidelines. Any assessment including an Australian Level Crossing Assessment Model will be undertaken as part of the permit requirements for the level crossing through Queensland Rail.

The intersection of the haul roads with Xstrata's mining lease for transport will be designed in accordance with the relevant design guidelines and standards including turn paths/swept path of the appropriate vehicles and ensure that appropriate sight lines and distances are provided to ensure safe operation of the intersection.

27.7.9 Pavement Impacts

DTMR has provided the following contribution rates adopted by the region in which the project is situated for estimating the maintenance and rehabilitation costs attributable to developments:

- maintenance cost of $3,500/km
- rehabilitation cost of $1.2M/km

DTMR considers a development's pavement impacts to be insignificant if the development generates an increase in equivalent standard axels (ESAs) on the State-controlled road network of no more than 5% of the existing/background levels; or if the pavement life is reduced by less than 5% of its design life.

Based on the above criteria, DTMR considers the following two types of contribution:

- The maintenance contribution is determined on a year by year basis, and is only required when loadings from the generated traffic of the proposed development (ESAs/yr) is greater than 5% of the background traffic.
- The rehabilitation contribution is only required when the impacts produced by the traffic generated by the proposed development reduce the pavement life by more than 5% of the pavements design life (i.e. 1 year for a 20 year pavement design life).

Table 27-12 illustrates the comparison between project generated ESAs and background traffic ESAs across each of the mine phases. There are four sections of road where the project ESAs increased the expected background traffic ESAs by more than the DTMR 5% criteria (shown in red in **Table 27-12**) including:

- Collinsville-Elphinstone Road north of the project site to Bowen Developmental Road
- Collinsville Elphinstone Road between the project site and Glenden
- Collinsville-Elphinstone Road between Glenden and Suttor Developmental Road
- Suttor Developmental Road between Elphinstone and the Peak Down Highway.

The above four road sections have been assessed for both maintenance and rehabilitation contributions.

Table 27-12 Daily ESA Comparison across Each Stage of the Project

Road	Road description	Construction Sth	2014 Comparison Year	% Diff.	Construction sth & Operation sth	2016 Comparison year	% Diff.	Operation sth	2020 Comparison year	% Diff.	Operation sth & Construction nth	2030 Comparison year	% Diff.	Operation sth & Operation nth	2033 Comparison year	% Diff.
5307 nth	Collinsville-Elphinstone Road north of the project site	1.8	106.8	1.7%	0.6	129.3	0.4%	10.8	189.3	**5.7%**	12.3	491.0	2.5%	11.5	653.5	1.8%
88B	Bowen Developmental Road (Collinsville to Aerodrome Road)	1.8	186.6	1.0%	0.6	219.7	0.3%	10.8	304.4	3.5%	12.3	688.3	1.8%	11.5	879.2	1.3%
88A	Bowen Developmental Road (Five Mile Creek to Collinsville)	1.8	259.6	0.7%	0.6	305.6	0.2%	10.8	423.5	2.5%	12.3	957.5	1.3%	11.5	1223.0	0.9%
5307 sth	Collinsville-Elphinstone Road south of the project site to Glenden	40.2	265.6	**15.1 %**	547.8	321.4	**14.9 %**	43.2	470.6	**9.2%**	75.0	1220.6	**6.1%**	49.4	1624.7	3.0%

Road	Road description	Construction Sth	2014 Comparison Year	% Diff.	Construction sth & Operation sth	2016 Comparison year	% Diff.	Operation sth	2020 Comparison year	% Diff.	Operation sth & Construction nth	2030 Comparison year	% Diff.	Operation sth & Operation nth	2033 Comparison year	% Diff.
5307 sth Glenden	Collinsville-Elphinstone Road south of Glenden	5.5	241.8	2.3%	26.6	292.5	9.1%	30.0	428.3	7.0%	34.3	1110.9	3.1%	32.2	1478.6	2.2%
82A	Suttor Developmental Road	5.5	418.0	1.3%	26.6	469.7	5.7%	30.0	593.0	5.1%	34.3	1062.0	3.2%	32.2	1264.8	2.5%
33B	Peak Downs Highway (Nebo to Hazeldean)	4.5	1059.2	0.4%	26.1	1178.9	2.2%	30.0	1460.5	2.1%	33.6	2494.7	1.3%	32.2	2929.4	1.1%
33A	Peak Downs Highway (south to Brisbane)	1.0	211.1	0.5%	0.5	232.7	0.2%	0.0	282.8	0.0%	0.7	460.7	0.1%	0.0	533.3	0.0%

27.7.9.1 Maintenance Contribution

An assessment has been undertaken to determine the maintenance contribution, utilising DTMR's *Road Planning and Design Manual* (DTMR, 2002), and the estimated AADT volumes to determine background and development generated ESAs. This assessment has been undertaken for each of the four separate road sections identified above in both the gazettal and against gazettal directions for the loaded and unloaded direction of vehicle movements to the mine. The detailed calculations involved in the assessment are provided in **Appendix 26**.

The maintenance contribution required the following formula has been adopted:

C = M x I x L

Where:

C = Contribution (dollars)

M = Maintenance cost per km per lane (dollars)

I = Percentage increment (%)

L = Length of road used (km)

As per information supplied by DTMR, the road section assessed has a routine maintenance cost per km for both lanes of $3,500 per year for 2010 (this equates to twice of the M value in the above formula). A 5% inflation rate has also been provided by DTMR and adopted to forecast the maintenance cost per km for the subsequent years.

The total maintenance costs for each of the four sections of road is provided in **Table 27-13**.

Table 27-13 Total Maintenance Costs

Year	Collinsville-Elphinstone Road north of the project site	Collinsville-Elphinstone Road south of the project site to Glenden	Collinsville-Elphinstone Road south of Glenden	Suttor Developmental Road
2014	$-	$3,779	$-	$-
2015	$-	$10,089	$-	$-
2016	$-	$8,188	$4,562	$825
2017	$410	$7,066	$4,916	$1,077
2018	$391	$6,745	$4,693	$1,066
2019	$373	$6,438	$4,480	$1,056
2020	$356	$6,146	$4,276	$-
2021	$340	$5,866	$4,082	$-
2022	$325	$5,600	$3,896	$-
2023	$-	$5,345	$3,719	$-
2024	$-	$5,102	$-	$-
2025	$-	$4,870	$-	$-

Year	Collinsville-Elphinstone Road north of the project site	Collinsville-Elphinstone Road south of the project site to Glenden	Collinsville-Elphinstone Road south of Glenden	Suttor Developmental Road
2026	$-	$4,649	$-	$-
2027	$-	$-	$-	$-
2028	$-	$-	$-	$-
2029	$-	$-	$-	$-
2030	$-	$6,682	$-	$-
2031	$-	$6,378	$-	$-
2032	$-	$-	$-	$-
2033	$-	$-	$-	$-
Total contribution	$2,196	$92,945	$34,623	$4,025
Annualised (Over 50 Yr Operation)	$43.91	$1,858.90	$692.47	$80

Based on the contribution cost estimate applied, a maintenance contribution of $133,789 ($2,196 + $92,945 + $34,623 + 4,025) is applicable across the life of the mine.

27.7.9.2 Rehabilitation Contribution

Using the roughness count data supplied by DTMR, the background traffic volume ESAs and the proposed generated ESAs, an assessment has been undertaken to determine if a rehabilitation contribution is warranted. The detailed assessment calculations for each of the four sections of road identified in **Section 27.7.9** are provided in **Appendix 26**. It has been assumed that the pavement has a design life of 20 years therefore the 5% trigger equates to 1 year of the design life.

The reduced pavement years for each of section of road have been calculated as 0.01 years and 0.31 years. The rehabilitation assessment demonstrates that the pavement life will be reduced by less than 1 year across the remaining life and therefore no rehabilitation contribution is required.

27.7.10 Dust and Noise Management

Dust, noise and vibration will be generated by vehicles that are travelling to the site and by vehicles moving around the project site.

Dust generated from project activities, including coal dust from operation of the project's TLFs, is described in **Chapter 22**, including measures to mitigate dust emissions. All public road access routes to the mine site are along sealed roads which will limit dust emissions. Load covers will be required on any heavy vehicles carrying material that has the potential to generate dust along public roads to

or from the project site. The hazards and risks associated with dust emissions are described in **Chapter 32**.

Noise and vibration impacts on residents along the Collinsville-Elphinstone Road are described in **Chapter 24**. There are no residents that will experience noise or vibration levels above project limits.

27.7.11 Driver Fatigue Management

The effective management of driver fatigue relies on more than just the driver. Adequate standard operating procedures, roster control and fatigue management guidelines will be developed in accordance with the *Coal Mine Safety and Health Act 1999* and assist in minimising and reducing the risk of driver fatigue. These will be in addition to the statutory guidelines set by DTMR for Queensland.

Driver fatigue management procedures will be implemented for all workers travelling to and from regional centres. In order to minimise the number of project personnel driving to and from regional centres, the proponent will provide bus transport.

Driver road rest areas are identified in **Table 27-4.** The transport fatigue management procedures, particularly the use of buses, are expected to reduce the demand for rest area facilities from project workers.

DTMR's Road Planning and Design Manual (DTMR, 2002) specifies that the benchmark spacing for rest areas is 110 km for motorist rest areas, 100 km for heavy vehicle rest areas, 15 km for motorist stopping places and 45 km for heavy vehicle stopping places. However the Road Planning and Design Manual states that "these spacings may need to be varied to suit the particular circumstances of a route and the location of centres generating significant traffic". Between Mackay and the project area, the greatest distance between:

- two rest areas, or a rest area and a town, is 59 km
- two stopping places, or a stopping place and a town, is 84 km.

The number and spacings of potential rest areas, stopping places and towns along the route between Mackay and the project area is broadly in the line with the guidelines in DTMR's Road Planning and Design Manual. The proponent considers that these existing rest areas and stopping places will provide adequate opportunity to manage fatigue in project workers and drivers of vehicles transporting materials, equipment and personnel to the project area. The proponent does not propose to construct or upgrade any additional rest areas or stopping places.

27.7.12 Transport of Dangerous Good and Hazardous Materials

The transport of dangerous goods and hazardous materials will require certain permits and conditions to be able to move these goods on the State-controlled road network. There are a number of requirements such as licenses, safety equipment and incident response plans that must be approved prior to the transportation of these goods.

The Australian Dangerous Goods Code identifies the requirements for transporting dangerous goods by both road and rail. The latest version of this document is Version 7, produced by the National Transport Commission in 2007. The code identifies a number of provisions required in the transport of dangerous goods including:

- classification
- provisions and quantity exceptions
- packing requirements
- consignment procedures

- stowage, segregation and restraint
- bulk transfer
- documentation
- safety equipment requirements for road vehicles.

The materials required for the project which may be dangerous or hazardous include (but are not limited to):

- fuel
- explosives
- waste materials.

The proponent will comply with all requirements for the transport of dangerous goods and hazardous materials, including requirements under the *Transport Operations (Road Use Management – Dangerous Goods) Regulation 2008* and the *Transport Infrastructure (Dangerous Goods by Rail) Regulation 2008*.

27.7.13 Risk of Spillage

A spillage action plan and procedure (for hazardous and dangerous goods) will be developed for the project site to minimise potential health and safety implications from exposure and to mitigate and reduce the potential impact on the surrounding environment. This procedure would be applicable to all employees and contractors that visit the site including all deliveries made. This action plan would provide general guidance for all substances used on the site.

Similar action plans would be developed for the transport of goods and equipment to the site. It would be expected based on the crash assessment and rates observed that there would be a relatively low likelihood on this occurring.

27.7.14 Safety and Security

Security controls will be installed on the site access roads to the northern and southern project areas and fencing will be provided at necessary locations adjacent to roadways and rail corridors. There is existing fencing along Collinsville-Elphinstone Road that will be maintained. In addition, signage will be installed to discourage access from public roads to the project area.

Car parking within the site will be designed to accommodate parking for cars/private vehicles, buses and commercial vehicles.

There are a number of pieces of infrastructure that traverse, travel through or travel adjacent to the project area including:

- GAP rail line
- Alpha Coal Project rail line
- gas pipeline
- Burdekin to Moranbah water pipeline
- powerlines.

All of the infrastructure will potentially have a gated maintenance track in place to ensure that access can be gained for maintenance activities. All maintenance crews will be required to comply with the mine health and safety requirements.

The proponent will consult emergency services about appropriate design of site access roads. The project will not alter any public roads (other than site access intersections) and therefore access to the site along public roads by emergency services will not be altered.

27.7.15 Road Use Management Plan

The road use management plan will be formulated in the later stages of the development process. It is expected that this document will be dynamic and continually updated during stages such as, detailed design, construction and operation.

The road use management plan will be developed to minimise the impacts of the mine on the State-controlled road network. This document will include:

- objectives
- strategies (e.g. dangerous goods or over dimension vehicle transportation)
- monitoring required throughout the project life
- corrective actions required
- continual report and updating.

Heavy loads, wide loads and over-dimensional/indivisible loads will be identified during construction and operations and all required traffic controls will be implemented for these traffic movements.

27.8 Conclusion

It is expected that project personnel will increase the existing passenger numbers through Mackay airport by less than 1.5% of current passenger throughput, which is considered to be negligible.

Other than supply of product coal by rail, and of materials and equipment via eastern seaboard ports - the project will use road transport for the supply of material and equipment and transport of workers to and from accommodation in Glenden. It is estimated that imports of materials and equipment for the project will result in less than 0.05% increase in port throughput, which is considered to be negligible.

The project area is intersected by the State-controlled Collinsville-Elphinstone Road which is linked to other regional highways and which will be the primary access routes to the project.

Current road use levels of State-controlled roads surrounding the project are low (e.g. Collinsville-Elphinstone Road has annual average daily traffic volumes of between 286 and 1,111). Traffic volumes on State-controlled roads surrounding the project are expected to increase by between 3% and 10% over five years.

The impact of the project on traffic volumes was estimated for five project phases over the life of the project corresponding to various construction and operations periods. Traffic estimates include the supply of all equipment and materials and the movement of workers between Glenden accommodation and the project site and between the regional centre of Mackay and Glenden.

The project will transport all workers between Glenden accommodation and the mine site by bus (other than administration workers) and approximately half of all non-resident (in Glenden) workers between Glenden and Mackay by bus. This reduces the number of vehicles on the road, improving safety for workers and other road users, and decreasing pavement impacts.

The only link in the road network that meets the DTMR criterion of “equal to or greater than 5% of the AADT” is Collinsville-Elphinstone Road south of the project to Glenden. The project’s impacts on traffic volumes on regional roads are negligible to minor other than for the Collinsville-Elphinstone Road south of the project to Glenden, where impacts are moderate.

The additional traffic generated by the project is minimal when compared to the background traffic volumes. The project is expected to have a negligible impact on the road link performance based on the level of service measurement criteria.

The only road upgrades within the jurisdiction of the DTMR required for the project are two intersection upgrades for the intersection of the northern and southern area site access roads with the Collinsville-Elphinstone Road.

Project haul roads and access roads will intersect other linear infrastructure such as the GAP rail line. Crossings will be designed to minimise safety risks and impacts to third party infrastructure.

Pavement impacts are determined on the basis of equivalent standard axels (ESAs). There are four sections of road where the project's estimated ESAs increased the expected road ESAs by 5%:

- Collinsville-Elphinstone Road north of the project site to Bowen Developmental Road
- Collinsville Elphinstone Road between the project site and Glenden
- Collinsville-Elphinstone Road between Glenden and Suttor Developmental Road
- Suttor Developmental Road between Elphinstone and the Peak Down Highway.

A maintenance contribution of $133,789 was estimated across the life of the mine for the pavement impacts on these roads.

The proponent will comply with all relevant traffic and transport regulations and establish project specific procedures for road safety, road use management, transport of dangerous goods and hazardous substances and traffic management.