



# Appendix 26

## Traffic Impact Assessment Report



**LAMBERT & REHBEIN**  
ENGINEERS • MANAGERS • SCIENTISTS

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# Byerwen Coal Project - Transport Impact Assessment Report For Byerwen Coal Pty Ltd

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## **APPENDIX A**

CONCEPT INTERSECTION LAYOUTS

## **APPENDIX B**

PAVEMENT MAINTENANCE ASSESSMENT

## **APPENDIX C**

PAVEMENT REHABILITATION ASSESSMENT

**Document Control Page**

Revision	Date	Description	Author	Signature	Verifier	Signature	Approver	Signature
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## 1.0 INTRODUCTION

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### 1.1 PROJECT BACKGROUND

Byerwen Coal Pty Ltd (the Proponent) proposes the development of approximately 10 million tonnes per annum (Mtpa) product coal open-cut mine located on Collinsville-Elphinstone Road, approximately 20 km west of the township of Glenden. The coal mine will be supported by privately owned port and rail facilities. The coal will be mined and transported by rail to the Abbot Point port facility for export.

This report has been prepared to formulate the Road Impact Assessment (RIA) for the proposed project. In accordance with the Department of Transport and Main Roads (TMR) *Guidelines for Assessment of Road Impacts of Development* this RIA comprises a traffic impact assessment (TIA) and a pavement impact assessment (PIA) component. To meet the requirements of the Environmental Impact Statement (EIS) this report has been prepared to address and quantify the potential impact that the proposed development may place on the existing transport infrastructure.

Lambert & Rehbein (L&R) was commissioned by the Proponent in October 2011 to undertake the RIA to provide input to the EIS and subsequent supporting information for submission to the relevant statutory authorities.

### 1.2 REPORT SCOPE

This report identifies and addresses the impacts of the proposed mine on the surrounding state-controlled road network only. This report identifies the following:

- Project profile including the various stages through the life of the mine;
- Existing condition of the surrounding road network including existing traffic volumes;
- Crash statistics on the surrounding road network;
- Forecast traffic volumes and the growth rates assumed;
- Project traffic generation and distribution;
- Traffic impact assessment;
- Assessment of the future road network performance; and
- Pavement impact assessment including maintenance and rehabilitation contributions.

The following specific tasks were identified and addressed in this report in order to respond to the EIS Terms of Reference (TOR):

- Prepare a concept layout for the accesses to the mine from Collinsville-Elphinstone Road;

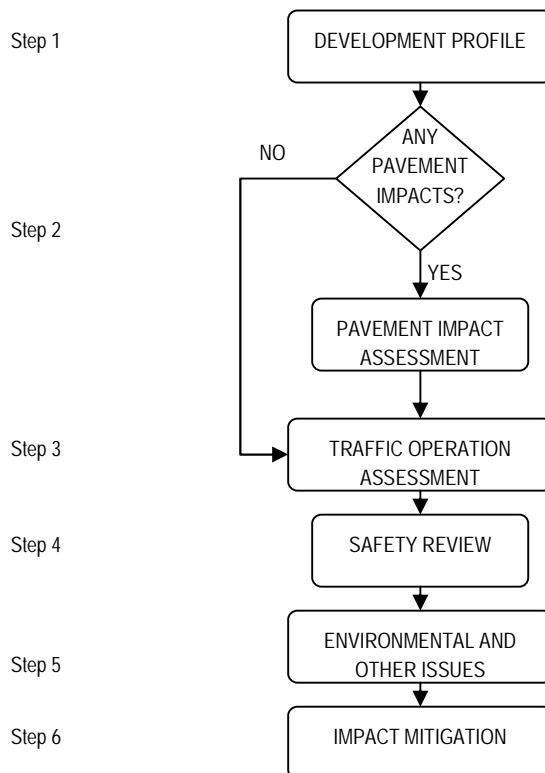
- Review and assess the schedules for the construction and operational stages/phases of the project;
- Review the number, distribution and mix of vehicles accessing the area during the mine construction and operation periods, determining the routes used by those vehicles and the likely impact on roads connecting to Collinsville-Elphinstone Road;
- Review the traffic safety and impacts on Collinsville-Elphinstone Road; and
- Conduct a desktop safety review and obtain crash data for the region from TMR.

The project impacts on the air, rail and sea port facilities have not been addressed in this report and would be assessed by the private entities responsible for this infrastructure. None the less, commentary has been provided on these facilities.

### 1.3 LEGISLATIVE REQUIREMENTS AND GUIDELINES

This TIA has been carried out in accordance with the TMR *Guidelines for Assessment of Road Impact of Development* (2006).

While not mandatory, the guideline suggests a process methodology to conduct a RIA as shown in **Figure 1-1**. The guideline recommends a methodology for the “with” and “without” development scenarios which requires the prediction of traffic volumes, road needs, pavement impacts, and mitigation measures.



**Figure 1-1 RIA Assessment flowchart**

**Source:** TMR Guidelines for Assessment of Road Impacts of Development (2006).

## 2.0 PROJECT PROFILE

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This section outlines the available information and assumptions made in preparing this RIA, including the proposed phases of the mine life.

### 2.1 SITE LOCATION

The Byerwen Coal Project is located on Collinsville-Elphinstone Road (TMR Road 5307) approximately 20 km to the west of the town of Glenden which is the closest town to the site and approximately 2.5 hours drive west of Mackay. Current land uses in the area surrounding the site includes mining leases and farming land. The project comprises six mining leases: MLA 10355, MLA 10356, MLA 10357, MLA 70434, MLA 70435 and MLA 70436.

The project is located immediately to the west of the Xstrata owned Newlands Mine and to the north of the Xstrata Wollombi and Suttor Creek Mines. The site is split over two local government areas (LGAs) being Whitsunday Regional Council in the north and Isaac Regional Council in the south.

Glenden was originally built to service the Newlands Mine in 1982. Glenden falls within the Isaac Regional Council LGA and has a population of approximately 1,300 people. The site location and the regional context of the proposed development are displayed in **Figure 2-1**.





**Figure 2-1 Byerwen Coal Project location**

(Base plan source: TMR Mackay/Whitsunday Regional Road Plan)

## 2.2 PROJECT DESCRIPTION

The proposed development, that is the subject of this EIS, involves the construction and operation of open-cut pits which will produce approximately 10 Mtpa product coal. The mine will have a life of up to 50 years, inclusive on construction, operation and decommissioning and rehabilitation.

The project consists of six mining leases located primarily in a cleared cattle grazing area. The area contained within the lease boundary is approximately 22,697 hectares.

The road access to the mine will occur through Collinsville-Elphinstone Road 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. The concept intersection layouts have been designed in accordance with current standards as outlined in **Section 5**.

Two proposed train loading facilities (including rail spur and balloon loop) will be constructed off the Goonyella to Abbott Point (GAP) rail line which intersects the project.

The traffic generated by the development will vary through the stages of the mine operation and construction. The proponent anticipates that the workforce will reside in Glenden.

## **2.3 PROJECT STAGES**

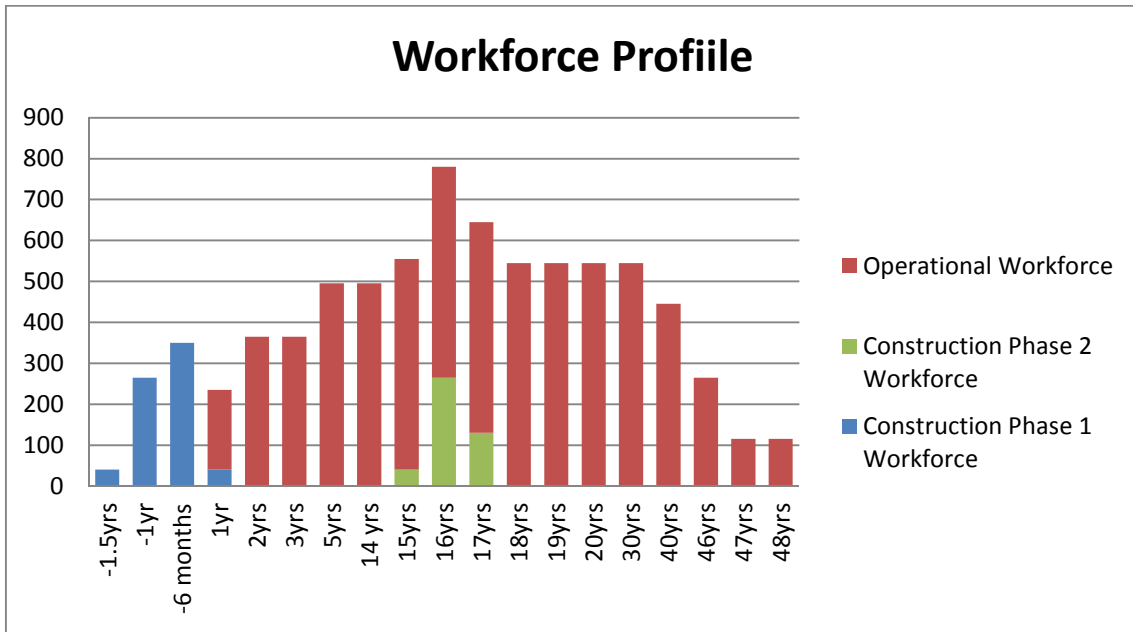
The proposed development has been assessed across a number of stages including:

- Construction south (1.5 years);
- Construction and operation south (1 year overlap period);
- Operation south (13 years);
- Operation south and construction north (3 years overlap period);
- Full operation of south and north (29 years); and
- Rehabilitation and decommissioning (2 years).

It is anticipated that the construction will commence in 2014 and will have a duration of approximately 18 months. The operation stage of the mine will commence in 2015, with an overlap period of approximately 12 months, where both construction and operation activities will occur concurrently. The development traffic used in this assessment consists of both workforce and support services relating to the mine construction and operation.

## **2.4 HOURS OF OPERATION**

As describes above in **Section 2.3** there will be five phases across the life of the mine. A workforce profile has been prepared across the life of the project and has been graphed in **Figure 2-2**.



**Figure 2-2 Workforce Profile**

During the construction phase of the project it is expected that at the peak, there will be a maximum workforce of 350 persons during any one month. The construction workforce will work a seven day, daylight shift. A maximum of 210 construction staff will be rostered on at any one daylight shift. It is expected, as advised by the proponent, that all construction staff will be driven by bus from Glenden to site under all circumstances.

The operational workforce will comprise approximately 10% office/administrative/managerial staff who will work a 5 days on/2 days off roster, while the remainder of the operational staff will be split into two shifts working a 7 days on/7 days off roster. The operational workforce will work a 12-hour day or night time shift (24-hr operation).

It is expected during the operational phases that office/administrative/managerial staff will travel to site using a private vehicle with single occupancy. All other operational workforce will be driven to site by bus from Glenden to site under all circumstances, as is the case for the other mines controlled or proposed by the proponent in the area.

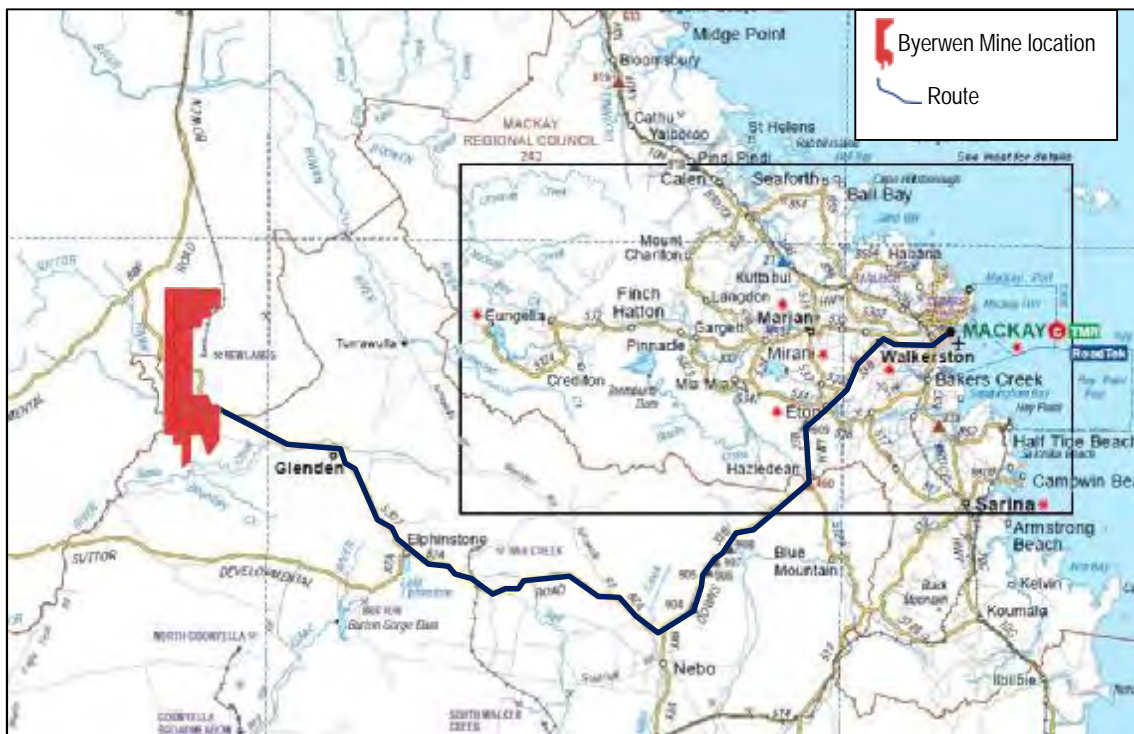
## 3.0 EXISTING CONDITIONS

### 3.1 SURROUNDING REGIONAL ROAD NETWORK AND TRANSPORT ROUTES

There are several coal mines currently in operation in this area however the predominate land use is farming. Due to these developments the adjacent road network infrastructure in this area is well developed due to the current activity. The mine site access will exclusively be via two site access roads connecting to Collinsville-Elphinstone Road at the mine access locations.

The traffic generated by the development will use a number of other roads in the region to access the site and will include construction, service, delivery, and workforce vehicles. The following figures demonstrate the anticipated routes to be used during the construction and operation stages including:

- To/from site to Mackay (**Figure 3-1**);
- To/from site to Townsville (**Figure 3-2**);
- To/from site to Bowen (**Figure 3-3**);
- To/from site to Glenden (**Figure 3-4**); and
- To from site to Brisbane (**Figure 3-5**).



**Figure 3-1 Vehicle routes to/from Mackay**

(Base plan source: TMR Mackay/Whitsunday Regional Road Plan (2006))

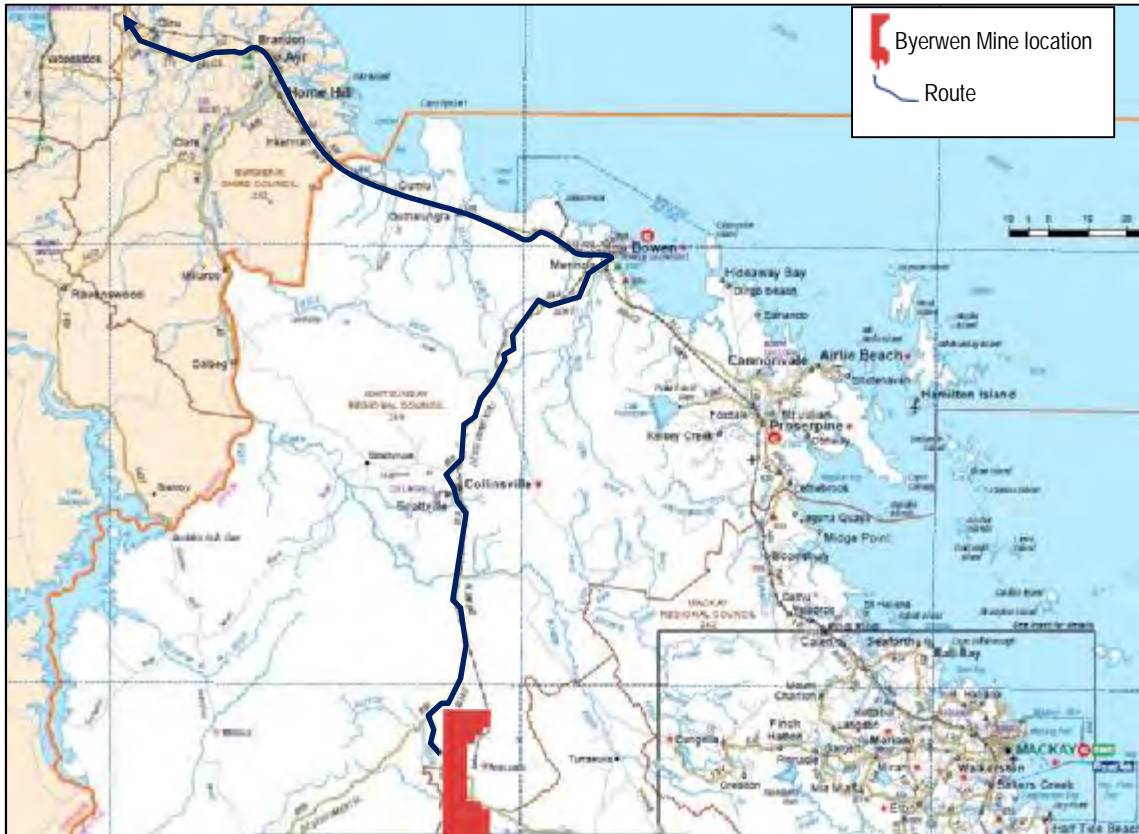


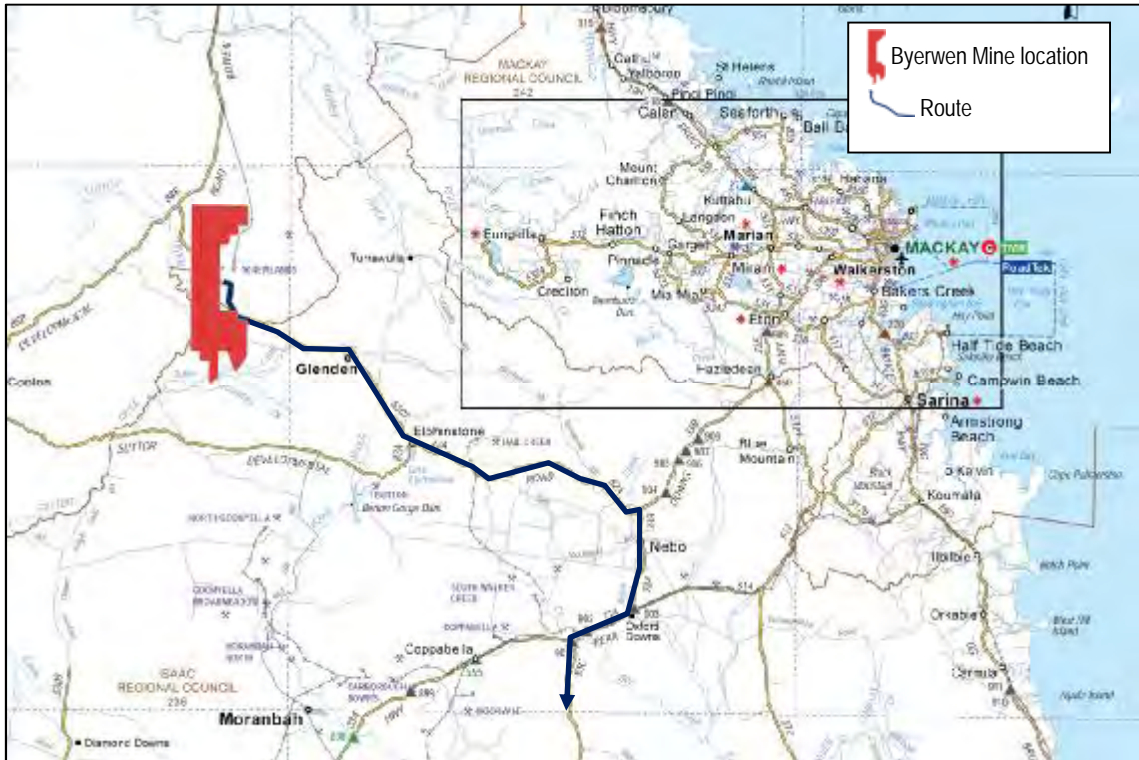
Figure 3-2 Vehicle routes to/from Townsville



Figure 3-3 Vehicle routes to/from Bowen



Figure 3-4 Vehicle Routes to/from Glenden



**Figure 3-5 Vehicle routes to/from Brisbane**

### 3.2 MACKAY/WHITSUNDAY REGION RECONSTRUCTION

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. TMR has been focusing on, as a minimum, re-instating the damaged transport network to pre-disaster conditions. This work has commenced and includes over 250km of roads in the Mackay/Whitsunday region.

**Figure 3-6** demonstrates the scope of this work being undertaken within the region.



**Figure 3-6 Mackay/Whitsunday region reconstruction plan**

### 3.3 KEY ROAD NETWORK

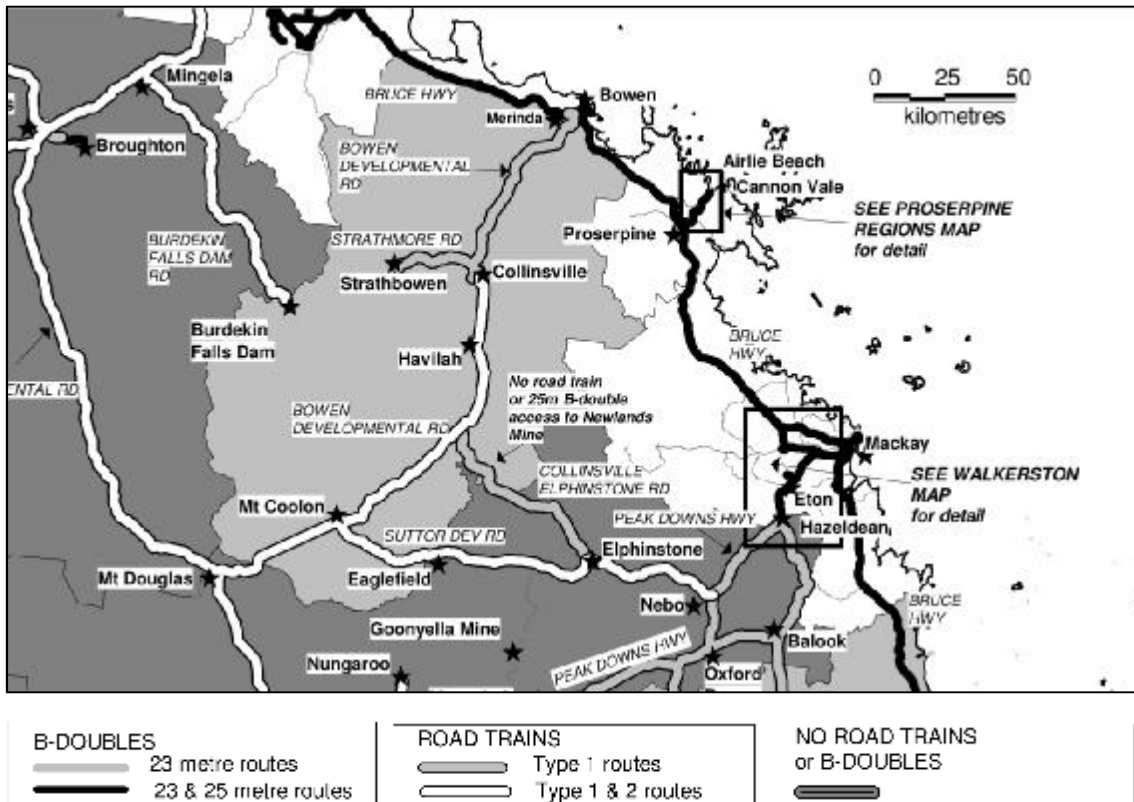
A site inspection was undertaken in November 2011 to understand the land uses, road conditions and intersection characteristics within the project area. The purpose of the site visit was to assess the existing conditions, make broad observations, and collect information regarding the transport network and safety characteristics. The focus was mainly on issues that that would potentially influence the proposed development and have an impact of the road network and key roads.

The assumptions provided by the proponent regarding the type of vehicles used for delivery of materials to the site include tankers, B-Doubles, semi-trailers, and small trucks. **Figure 3-7** illustrates the TMR B-Double and Road Train routes on the surrounding road network to Byerwen.

In the event that an “over-dimension” vehicle is required as defined in the Australian Road Rules (ARR), there is the option of using Bowen Developmental Road or Suttor Developmental Road to access the site with the appropriate permits in place.

The transport of goods and personnel will, for the major part, be moved on the State-controlled road network. It is expected, there may be very small sections of the local council road network that may be used by these vehicles, 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.





**Figure 3-7 Multi-Combination Routes Queensland**

Source: TMR Section 10 for Multi-Combination Routes Queensland

### 3.3.1 PEAK DOWNS HIGHWAY

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

The road is generally a 7.0m formation (3.0m lane with 0.5m shoulders) with a sealed surface. **Figure 3-8** shows the current cross section of the Peak Downs Highway. 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.



**Figure 3-8 Typical Peak Downs Highway cross section**

### **3.3.2 SUTTOR DEVELOPMENTAL ROAD**

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

The road is generally a 7.0m formation (3.0m lanes with 0.5m shoulders) with a sealed surface. **Figure 3-9** shows the current cross section of Suttor Developmental Road. Based on Lambert & Rehbein observations, it is considered generally that the pavement and marking are in reasonable condition across the length of the road.



**Figure 3-9 Suttor Developmental Road cross section**

### **3.3.3 COLLINSVILLE—ELPHINSTONE ROAD**

Collinsville-Elphinstone Road (5307) is a state-controlled road with a posted speed limit of 100km/h. This road falls within the jurisdiction of the Mackay/Whitsunday regional office of TMR. The road is generally a 9.0m formation (3.5m lanes with 1.0m shoulders) with a sealed surface.

**Figure 3-10** shows the current cross-section of Collinsville-Elphinstone Road. Based on Lambert & Rehbein observations, 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 Newlands and Bowen Developmental Road that have been re-surfaced.



**Figure 3-10 Collinsville-Elphinstone Road cross section**

#### **3.3.4 BOWEN DEVELOPMENTAL ROAD**

Bowen Developmental Road (88B) is a state-controlled road with a posted speed limit of 100km/h. This road falls within the jurisdiction of the Mackay/Whitsunday regional office of TMR. The road is generally an 8.0m formation (3.5m lanes with 0.5m shoulders) with a sealed surface. **Figure 3-11** shows the current cross-section of Bowen Developmental Road. Based on our observations, generally the pavement and markings are in reasonable condition across the length of road.



**Figure 3-11 Bowen Developmental Road cross section**

### **3.4 PUBLIC TRANSPORT**

Based on the research and investigation undertaken, no bus routes or school bus routes were identified in the direct surrounding areas.

There are bus routes that operate from Nebo and a school bus route that operates on Bowen Developmental Road.

### **3.5 EXISTING ROAD CRASH DATA**

TMR has provided crash statistics between January 2005 and December 2009 for the relevant road sections. This data has been reviewed and **Table 3-1** provides a summary of the data provided and a brief discussion of each road follows.

**Table 3-1 Crash statistics summary**

Road Section	Fatality		Injury		Property Damage		Total
	Number	% of total	Number	% of total	Number	% of total	
<b>Collinsville-Elphinstone Road</b> Between Suttor Developmental Road and Bowen Developmental Road	2	18%	8	73%	1	9%	11
<b>Bowen Developmental Road</b> Between Collinsville-Elphinstone Road to the Bruce Highway	1	2%	40	78%	10	20%	51
<b>Peak Downs Highway</b> Between North Eton Road to Suttor Developmental Road	5	6%	41	49%	37	45%	83
<b>Suttor Developmental Road</b> 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 which may indicate that there was driver error based on the contributing factors. 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 which may indicate that there was driver error based on the contributing factors. 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 which may indicate that there was driver error based on the contributing factors. 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, i.e. single vehicle crashes at mid-block locations.

## **3.6 SCHEDULED ROAD IMPROVEMENT PROJECTS**

As described in **Section 3.2**, there is significant reconstruction activity in the region following the flooding and cyclone events of 2011 which have translated into a number of Mackay/Whitsunday reconstruction projects.

In addition, TMR 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 project traffic. This program was prepared in 2008 and some of these projects may have already been completed.

A number of these projects in the region include:

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

## **3.7 CONSULTATION SUMMARY**

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

- Traffic data and growth rates;
- Pavement rehabilitation and maintenance requirements and rates;
- Crash history data;
- Current pavement data; and

- Proposed works and upgrades in the area.

This report and assessment is based on the information provided by TMR 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.



## 4.0 TRAFFIC VOLUMES

### 4.1 EXISTING TRAFFIC VOLUMES

Existing (year 2010) AADT traffic volumes were sourced from TMR 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 for 2010 have been summarised in **Table 4-1**.

**Table 4-1 2010 Annual Average Daily Traffic Volumes (AADT)**

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%
Peak Downs Highway (east to Mackay) (33B)	Nebo to Hazledean	3893	15%
	Hazleton to Eton	4859	15%
Peak Downs Highway (south to Brisbane) (33A)	Nebo to Fitzroy Developmental Road	612	20%

NA – Volume data not available

## 4.2 FORECAST TRAFFIC VOLUMES

As described in **Section 4.1**, count data was sourced from TMR which included historical count data and annual growth rates. Correspondence with TMR officers resulted in discussions regarding the most appropriate rates to be utilised in predicting future year traffic volumes. **Table 4-2** summarises the information gathered from historic growth rates and the rates agreed with TMR to be utilised in the assessment.

**Table 4-2 Traffic growth rate summary**

TMR Road No.	Road Description	5 year growth			Exponential Growth Rate	TMR Agreed rate
		G	A	B	Year 2019	B
					AADT	
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 - sth 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.

It is noted that there is a large growth difference between 88A and 88B on Bowen Developmental Road north and south of Collinsville. The larger growth may potentially be attributed to mine activity and in addition the traffic volumes south of Collinsville are a third of the volumes north of Collinsville (i.e. a small volume increase may represent a large growth that may not be sustained). TMR has indicated that the appropriate growth rate for both 88A and 88B be 8.5%.

## 4.3 TRAFFIC VOLUME SCENARIOS

The proponent has supplied an inventory used to determine the traffic volumes for the construction and operation stages of the mine. This inventory includes a workforce profile and an

amount of material/item to be brought to site across each of the phases. Each of the five phases has been reviewed for the worst case traffic impact scenario.

In addition, the movement of workforce between Mackay and Glenden has been considered based on the workforce profile provided by the proponent.

**Table 4-3** shows the year for each of the mine phases.

**Table 4-3 Traffic Volume years for each phase of the mine**

Year	Traffic Pattern/Phase
2014	Peak traffic volume during construction south phase
2015	Peak traffic volume during the overlap period of construction south and operation south phase
2024	10 year post opening design horizon – Peak traffic during operation south phase
2030	Peak traffic volume during the overlap period of operation south and construction north phase
2044	Peak traffic volume during the overlap period of operation south and operation north phase

## 4.4 WORKFORCE OPERATIONS

Works on the site for the construction phase will generally be a 12 hour daylight shift, where occasional night works may occur for some construction activities. The mine operation phase will comprise approximately 10% administrative/office staff that will work a 5 day on/ 2 day off roster. The remainder of the operational staff will be split into two shifts working 7days on/ 7 days off, of 12 hours each (i.e. day shift and night shift).

### 4.4.1 GLENDEN TO MACKAY WORKFORCE TRAFFIC

As identified by the proponent, it is expected that 100% of the workforce will be accommodated in Glenden. The proponent has provided the following conservative assumptions as the basis to determine specific workforce movements between Mackay and Glenden:

- All construction workforce are non-resident;
- 30% of the operational workforce are residents;
- Resident operation workforce live in Glenden and commute to Mackay six time per year;
- Workforce (for both construction and operation phases) travel to/from Mackay to Glenden by both bus and private car with a 50-50% split;
- Bus movements between Mackay and Glenden have a 20 person capacity;
- All private vehicle movements will have one person per car; and
- The maximum workforce in any phase is used to calculate traffic movements.

**Table 4-4** provides a summary of the maximum workforce per mine phase and the respective vehicle movements between Mackay and Glenden.

**Table 4-4 Summary of workforce and vehicle movements between Mackay and Glenden**

Description	Construction sth phase	Construction sth phase (with operation overlap)	Operation sth phase (with construction overlap)	Operation sth phase	Construction nth phase	Operation sth phase (with construction overlap)	Operation sth & nth
Maximum workforce	350	40	195	495	265	515	545
Non-resident	350	40	137	346	265	360	381
Resident	0	0	59	149	0	155	164
Shift workers at Glenden (non-resident) by bus	175	20	69	173	148	180	191
Workers transported by bus	88	10	34	87	74	90	96
Number of return buses per roster	10	2	4	10	8	10	10
Bus movements p.a.	710	82	178	451	538	470	497
AADT contribution	1.9	0.2	0.5	1.2	1.5	1.3	1.3
Shift workers at Glenden (non-resident) by private vehicle	88	10	34	87	67	90	96
Number of return trips per roster	175	20	68	173	133	180	191
Private vehicle movements p.a.	14194	1623	3559	9021	10788	9386	9934
AADT contribution	38.9	4.4	10	24.7	29.6	25.7	27.2
Resident workers commuting in private vehicles	0	0	59	149	0	155	164
Number of trips to Mackay p.a.	0	0	6	6	0	6	6
Private vehicle trips p.a.	0	0	702	1788	0	1860	1968
AADT contribution	0	0	1.9	4.9	0	5.0	5.4

Based on the figures detailed in **Table 4-4**, an AADT volume has been calculated for both resident and non-resident workforce by mode of transport travelling between Mackay and the Glenden workforce camp. The increase in vehicle movements averaged across a day for the respective phases are:

- Construction south phase – 39 cars, two 20 seat buses;
- Construction south phase (with operation overlap) – 17 cars, one 20 seat bus;
- Operation south phase – 30 cars, two 20 seat buses;
- Construction north phase – 30 cars, two 20 seat buses;
- Operation south phase (with construction overlap) – 31 cars, two 20 seat buses; and
- Operation south and north phases – 34 cars, two 20 seat buses.

There are three main roads that connect Mackay to Glenden including the Peak Downs Highway, Suttor Developmental Road, and Collinsville-Elphinstone Road. Based on the 2010 traffic counts and the growth rates provided by TMR, the 2014 AADT volumes (construction south phase) on these road links are:

- Peak Downs Highway
  - Nebo to Hazledean – 4,823 vehicles (726 HV);
  - Hazledean to Eton – 6019 vehicles (880 HV);
- Suttor Developmental Road
  - Peak Downs Highway to Collinsville-Elphinstone Road – 1322 vehicles (288 HV);
- Collinsville-Elphinstone Road
  - Suttor Developmental Road to Glenden – 871 vehicles (170 HV).

Based on the predicted background volumes and the estimated generated traffic travelling between Mackay and Glenden, there should be minimal impact on the traffic operation. The impact of the additional ESA's generated by the bus movements to Glenden have been assessed and results documented in **Section 6** of this report which considers the cumulative impacts of all heavy vehicle movements on these road links.

#### **4.5 TRAFFIC FROM MINE CONSTRUCTION AND OPERATION PHASES**

Byerwen Coal has been consulted to collaboratively determine the most appropriate assumptions to reflect the five stages of the mine in order to estimate the traffic generation and the distribution through the road network from each phase respectively. The five phases include:

- Construction south;
- Construction south and operation south phase (overlap period);
- Operation south;

- Construction north and operation south phase (overlap period); and
- Full operation (north and south).

The quantities of materials and workforce personnel have been determined for each stage and 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 mine across the five stages.

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

There will be a number of different vehicle types generated by the mine during the construction and operation stages and these have been allocated accordingly.

Note: Average daily trips numbers have been calculated across each of the phases that equates to an Average Annual Daily Traffic (AADT) volume (e.g. administrative staff work a 5 day on/2 day off roster and would therefore equate to 5/7ths of the AADT volume).

#### **4.5.1 CONSTRUCTION SOUTH STAGE TRAFFIC ASSUMPTIONS**

Byerwen Coal proposes to commence the construction activities of the site in 2013/2014 with an expected duration of 18 months. The construction will include but not be limited to the following in the southern tenement area:

- Site preparation activities;
- Coal handling and preparation plants and product stockpile area
- Administration facilities, workshops, servicing facilities, and fuel storage;
- Rail loop, load out, and connection to the existing GAP rail line;
- Mine infrastructure area;
- Haul roads and internal roads;
- Sewage and waste management facilities;
- Explosive storage and preparation facilities; and
- Process water storage and distribution systems.

This construction stage will be the first of two construction stages, with the second to occur well into the operation of the mine (approximately year 15 after commencement) for the northern tenement area. The infrastructure to be constructed will be similar to that constructed for the southern tenement.

The proponent has provided data indicating the predicted quantities and amount of vehicles required to bring the construction materials to site. The corresponding traffic generation has been determined as a result of the construction phase of the project.

The construction staff will work a seven day daylight shift, expected to be the hours of 6:00AM to 6:00PM. The workforce would be expected to arrive in the hour prior to the start time and leave the hour following the finishing time.

It is expected that the majority of deliveries and support services would occur outside of the start and end times of shifts (i.e. between 5:30AM-6:30AM and 5:30PM-6:30PM). In addition, it is expected that the “over-dimension” vehicles will enter the site during night periods and the necessary permits will have been obtained.

### **Workforce**

It is expected that 100% of the workforce will be accommodated in Glenden. Buses will be used to transport all construction workforce to and from site during this phase and will be able to transport a total of 50 passengers per bus. There will be two worker types on site during this period including administrative staff/tradesmen and construction workforce.

Byerwen Coal have advised they anticipate the largest number of workforce assigned to site during the construction south stage will be 350 persons, with a maximum workforce of 210 persons on site at any one time.

The construction workforce will work a seven day, daylight shift. A maximum number of 210 construction staff will be rostered on at any one daylight shift. Byerwen Coal has indicated that all construction workforce working on site will be driven by bus from Glenden to site under all circumstances.

The administrative staff/tradesmen will work on a 5 day on/2 days off roster equating to approximately 10% of workforce numbers (or 35 people). With regards to the mode of travel to site, it is assumed that the administration staff will travel by private car with an occupancy of one person per vehicle.

During this phase there will be a total workforce on site on site at any one time of 245 people.

Consideration has been made in the assessment of workforce traffic movements between Glenden and Mackay for the start and end of shift blocks as detailed in **Section 4.4**.

### **Construction materials and equipment**

The delivery of materials, equipment, and consumables is assumed to occur across a seven day period. Based on the general rule that 10% of AADT volumes occur during the peak hour, it is assumed that 10% of the daily totals of these deliveries will also 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 different areas within the region.

It is expected that these areas will include Glenden, Mackay, Townsville, and the Brisbane/southern region.

### Waste

During the construction period all waste will be removed from site and be transported to Mackay or Glenden. The key waste movements during the construction phase include: timber pallets, putrescible waste, oil and sewage.

A summary of the traffic volumes associated with the expected type and quantity of heavy vehicles and bus movements for the workforce in the construction activities of the south tenement is provided in **Table 4-5**. The impacts of specific construction activities have not been considered, therefore all activities are assumed to occur over the 18 month construction period.

**Table 4-5 Construction south 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 region	via Burnett Hwy and Fitzroy Dev. Road	Semi	26.5 ton	50	40%	0.14
Platwork	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



Task Type	Origin	Route	Vehicles (p.a.)			Trip Distribution %	Avg Daily Trips
			Type	Payload	Trips*		
	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 Highway	Rigid Truck	10 ton	4	100%	0.01
	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

The transport routes to be used by construction vehicles in described in **Table 4-5** above.

#### 4.5.2 CONSTRUCTION AND OPERATION SOUTH STAGE ASSUMPTIONS

As described in **Section 4.3.1** this is the first of two construction stages that will run concurrently with the operation phase for a period of twelve months.

The construction and operation south stage is an important phase to consider, even though this stage has a duration of only twelve months, as there will be increased activity within the site. It is anticipated that there will also be eight visitor trips per day entering the site during this phase.

It is expected that there will be a maximum workforce of 108 (including administration) on site generating traffic during this stage at any one shift. There is a decrease in number of construction workforce, however, the operation workforce will commence during this period.

A summary of the traffic volumes associated with the expected type and quantity of heavy vehicles and workforce vehicles in the construction and operation activities of the south tenement is provided in **Table 4-6**. The impacts of specific construction activities have not been considered, therefore all activities are assumed to occur over the 12 month construction and operation period.

**Table 4-6 Construction and operation south 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
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 Water	Glenden	via Collinsville-Elphinstone Road	Small Tanker	0.04 ML	250	100%	0.69
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

### 4.5.3 OPERATION SOUTH STAGE ASSUMPTIONS

As described in **Section 4.3.2** the mine site will commence operation in the final stages of the first construction phase, with an overlap period of approximately twelve months. The operation phase is planned to commence in 2015.

This operation stage will be the first of two operation stages (on the south and north tenements), with the second operation stage to occur approximately year 16 after the commencement of the south operation phase for the northern tenement area.

It is expected that the majority of deliveries and support services would occur outside of the start and end times of shifts. In addition, it is expected that the “over-dimension” vehicles will enter the site during night periods and the necessary permits will have been obtained.

#### **Workforce**

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 administrative staff will work on a 5 days on/2 days off roster and would be a maximum of 75 people at any one time on site.

There will be an operational mine workforce of 420 people that will work a 12-hour day or night time shift (24-hour operation), 7-days on/7days off. Therefore, the mine workforce could work one of 4 possible shifts across a two week period. Based on the shift times and roster days a total number of mine operational workforce of 105 people at any one time would be on site (i.e. 420/4). This equates to a total workforce on site at any one time during the operation phase of 180 people.

It is expected that all of the workforce will be accommodated in Glenden. Buses will be used to transport all mine workforce to and from site during this phase and will be able to transport a maximum of 50 passengers per bus. It is assumed that the administration staff will travel by private car, with an occupancy of one person per vehicle.

Byerwen Coal has indicated that all operational mine workforce working on site will be driven by bus from Glenden to site under all circumstances as is currently the case for their other mines in the area.

Consideration has been made in the assessment of workforce traffic movements between Glenden and Mackay for the start and end of shift blocks as detailed in **Section 4.4**.

#### **Operation materials and equipment**

The delivery of materials, equipment, and consumables is assumed to occur across a seven day period. Materials and equipment, such as fuel, explosives, concrete, mining plant, fixed plant, and general store products will be sourced from different areas within the region.

It is expected that these areas will include Glenden, Mackay, Townsville, and the Brisbane/southern region.

### Waste

During the operational period, all waste will be removed from site and be transported to Mackay and Glenden. The key waste movements during the construction phase include: putrescible waste, recyclables, oil, and biosolids.

A summary of the traffic volumes associated with the expected type and quantity of heavy vehicles and bus movements for the workforce in the operations activities of the south tenement is provided in **Table 4-7**.

**Table 4-7 Operation south 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	6	100%	0.02
Reagents	Glenden	via Collinsville-Elphinstone Road	Semi	26.5 ton	611	100%	1.70
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	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

Task Type	Origin	Route	Vehicles (p.a.)			Trip Distribution %	Avg Daily Trips*
			Type	Payload	Trips*		
	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

Based on the 15-year design horizon recommended in the TMR 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.

#### 4.5.4 CONSTRUCTION NORTH AND OPERATION SOUTH STAGE ASSUMPTIONS

There will be a second construction phase during the life of the project expected to occur in approximately 2030, to construct the required infrastructure for the northern tenement, including a secondary wash plant to enable the mine to operate at full capacity.

This stage is anticipated to generate the most traffic of the five stages of the mine with a full construction and operational workforce allocated in year 18 of 780 people. There will again be a quantity of steel, platework, concrete, and mining and fixed plant during this stage due to the construction works, in addition to the task required during the operation.

As described previously in the operation south phase, there will be a maximum of 75 administrative staff. There will be 265 construction workforce of which 210 will be on site at any one time. There will be 440 operational workforce allocated during this phase. As illustrated in the operation south phase, there will be an operational mine workforce that will work a 12-hour day or night time shift (24-hour operation), 7-days/on-7days off. Therefore, the mine workforce could work one of 4 possible shifts across a two week period. Based on the shift times and roster days, a total number of mine operational workforce of 110 people at any one time would be on site (i.e. 440/4).

Based on the above the total construction and operational workforce on site at any one time would equate to 395 workforce on site generating traffic during this stage at any one shift.

A summary of the traffic volumes associated with the expected type and quantity of heavy vehicles and workforce vehicles in the construction and operation activities of the south and north

tenement is provided in **Table 4-8**. The impacts of specific construction activities have not been considered, therefore all activities are assumed to occur over the 12 month construction and operation period.

**Table 4-8 Operation south and construction north 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
Platwork	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
	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	Semi	26.5 ton	420	50%	1.17

Task Type	Origin	Route	Vehicles (p.a.)			Trip Distribution %	Avg Daily Trips*
			Type	Payload	Trips*		
		Road					
	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
	Townsville	via Bruce Hwy	Light Vehicles	1 person	2700	25%	7.50

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

#### 4.5.5 OPERATION NORTH AND SOUTH ASSUMPTIONS

This stage will be the stage at which both the north and south mining areas are contributing to the total coal production. The three significant contributors to the traffic generation during this stage are the fuel, explosives, and reagents when comparing this to the earlier stages of the mine.

#### Workforce

The maximum number of workforce during the southern operation phase is 545 people. There will be two worker types on site during this period including administrative staff and operational workforce.

The administrative staff will work on a 5 days on/2 days off roster and would be a maximum of 75 people at any one time on site.

There will be an operational mine workforce of 470 people that will work a 12-hour day or night time shift (24-hour operation), 7-days on/7days off. Therefore, the mine workforce could work one of 4 possible shifts across a two week period. Based on the shift times and roster days a total number of mine operational workforce of 118 people at any one time would be on site (i.e. 470/4). This equates to a total workforce on site at any one time during the operation phase of 193 people.

It is expected that all of the workforce will be accommodated in Glenden. Buses will be used to transport all mine workforce to and from site during this phase and will be able to transport a total

of 50 passengers per bus. It is assumed that the administration staff will travel by private car, with an occupancy of one person per vehicle.

Byerwen Coal has indicated that all operational mine workforce working on site will be driven by bus from Glenden to site under all circumstances.

Consideration has been made in the assessment of workforce traffic movements between Glenden and Mackay for the start and end of shift blocks as detailed in **Section 4.4**.

### Operation materials and equipment

The delivery of materials, equipment and consumables is assumed to occur across a seven day period. Materials and equipment such as fuel, explosives, concrete, mining plant, fixed plant, and general store products will be sourced from different areas within the region.

It is expected that these areas will include Glenden, Mackay, Townsville, and the Brisbane/southern region.

### Waste

During the operational period all waste will be removed from site and be transported to Mackay and Glenden. The key waste movements during the construction phase include putrescible waste, recyclables, oil, and biosolids.

A summary of the traffic volumes associated with the expected type and quantity of heavy vehicles and bus movements for the workforce in the construction activities of the south tenement is provided in **Table 4-9**.

**Table 4-9 Operation south and operation north 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	Bowen	via Bowen Developmental Road	Semi	26.5 ton	100	100%	0.28



Task Type	Origin	Route	Vehicles (p.a.)			Trip Distribution %	Avg Daily Trips*
			Type	Payload	Trips*		
Excavator							
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	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

## 5.0 TRAFFIC IMPACT ASSESSMENT

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### 5.1 TRAFFIC IMPACT CONSIDERATIONS

In general, TMR 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 identified impact areas. Both existing and expected levels have been determined based on existing AADT volumes and growth rates provided by TMR.

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 TMR's *Guide for Assessment of Road Impacts of Development*, for traffic operation assessment and safety review a design horizon of 10 years after the opening of the development should apply. Byerwen Coal 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 for Assessment of Road Impacts of Development*, 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 5-1** 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 5-2**.

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.

**Table 5-1 Assessment year daily traffic volumes**

Road Segment	TMR Road Section	TMR Agreed Annual Growth Rate	2014 Background Traffic	2014 Background HV	2014 Project Traffic	2014 Project HV	2014 With Project Traffic	2027 Background Traffic	2027 Background 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												
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

Road Segment	TMR Road Section	TMR Agreed Annual Growth Rate	2014 Background Traffic	2014 Background HV	2014 Project Traffic	2014 Project HV	2014 With Project Traffic	2027 Background Traffic	2027 Background HV	2027 Project Traffic	2027 Project HV	2027 With Project Traffic
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 5-2 Comparison between background and project generated volumes**

Road Segment	TMR 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

Based on the comparisons shown in **Table 5-1** and **Table 5-2**, the only link in the road network that meets the TMR criterion of “equal to or greater than 5% of the AADT” is Collinsville-Elphinstone Road south of the development to Glenden.

The pavement impact of this road link has been investigated and is discussed in **Section 6**. Additionally, the mine access intersection is reviewed in **Section 5.2** below.

## **5.2 MINE ACCESS INTERSECTION**

There are two proposed access intersection locations for the mine site on Collinsville-Elphinstone Road. Given that the Mine Lease Areas (MLA) are 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 mine 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 need to 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 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 **Section 5.2.1**.

### **5.2.1 TURN LANE WARRANT ASSESSMENT**

Chapter 4.8 of Austroads *Guide to Road Design – Part 4A* (2009) (the Guide) provides warrants for turning facilities at a priority-controlled intersection. **Figure 5-1** shows a copy of the relevant figure from the Guide (Figure 4.9), which has been used for the assessment of the right and left turning lane warrants from the north on Collinsville-Elphinstone Road and the Mine Access intersection. **Figure 5-2** illustrates the calculation of the major road traffic volume parameter  $Q_m$  used in **Figure 5-1**.

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 TMR. The development traffic is based on the assumptions detailed in **Section 4** above. The peak hour traffic volumes have been calculated by assuming they equate to 10% of the AADT, which is considered a reasonable methodology in this regard. The background and project related volumes have been tabulated in **Table 5-3** and **Table 5-4**.

**Table 5-3 Background vehicle movements on Collinsville-Elphinstone Road**

Direction	2014		2027	
	AADT volume	Peak hour volume	AADT volume	Peak hour volume
Gazettal (southbound)	836	84	2886	289
Against gazettal (northbound)	791	79	2729	273

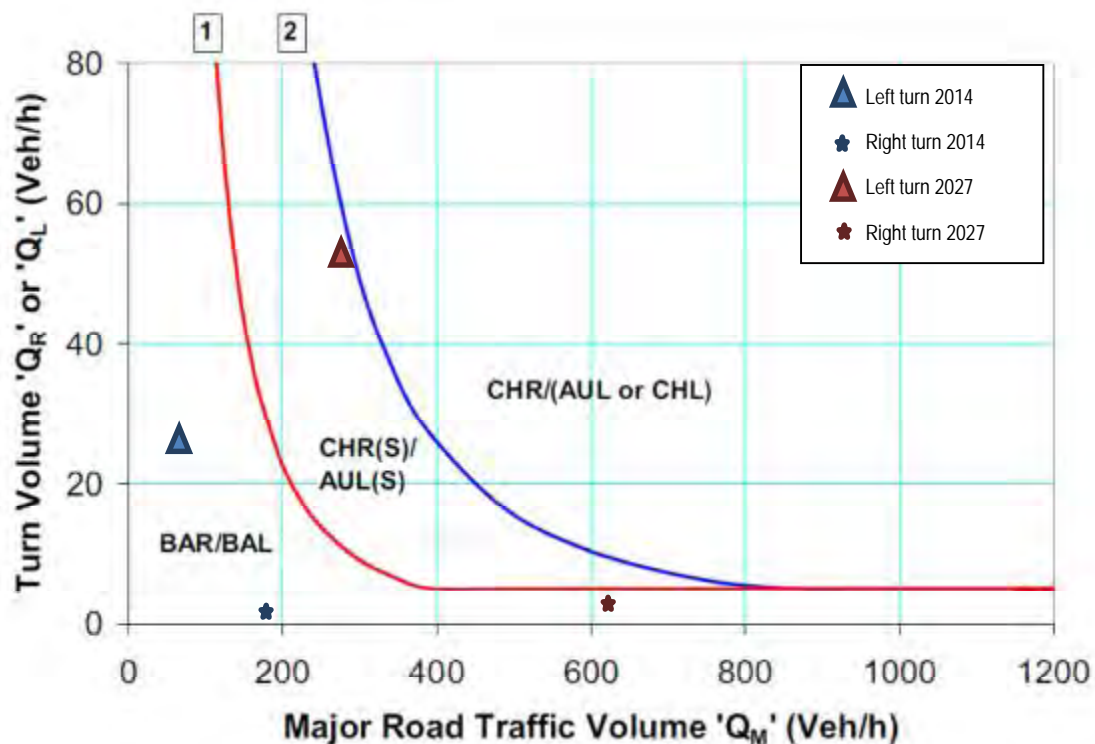
**Table 5-4 Project vehicle movements to site access intersection**

Direction	2014		2027	
	AADT Volume	Peak hour volume	AADT volume	Peak hour volume
Gazettal (southbound- right turn in)	1 HV, 3 cars	1	3 HV, 8 cars	2
Against Gazettal (northbound – left turn in)	11 HV, 26 cars	27 <sup>^</sup>	9 HV, 57 cars	56 <sup>*</sup>

<sup>^</sup>Note 25 (one-way) of the car trips are attributed to workforce and have been assumed to arrive during the peak hour.

<sup>\*</sup>Note 54 (one-way) of the car trips are attributed to workforce and have been assumed to arrive during the peak hour.

**Figure 5-1 Warrants for turn treatments on roads with a design speed  $\geq 100\text{km/h}$**

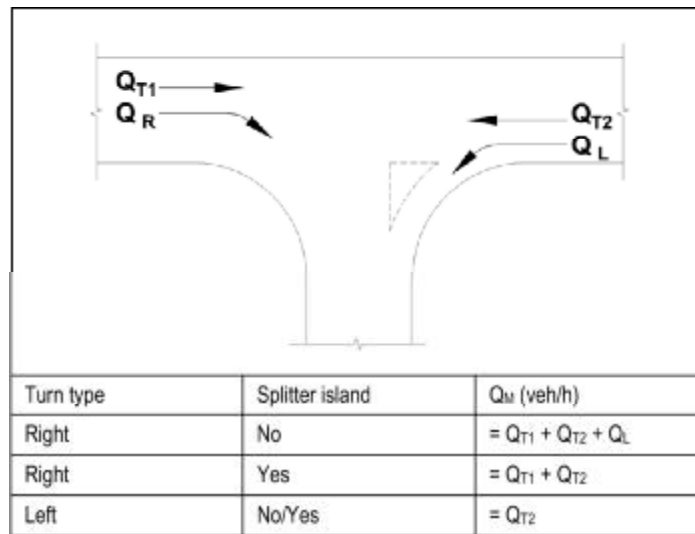


BA- Basic turn treatments

AU – Auxiliary lane turn treatments

CH – Channelised turn treatments

**Figure 5-2 Calculation of the major road traffic volume parameter  $Q_m$**



The turn lane warrant assessment above, 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 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 TMR *Road Planning and Design Manual* and Austroads *Guide to Road Design* and is included in **Appendix A**. 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 (AUL(S)) 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. These drawings have been provided as an indication of the access intersection layout.

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

- Design speed of 110km/h for Collinsville-Elphinstone Road (design speed is 10km/h higher than posted speed as specified in the geometric design section of the TMR *Road Planning and Design Manual*);
- Design speed of 60km/h for the mine access road; and
- 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 285m in accordance with the Austroads, *Guide to Design – Part 4A*.

### 5.3 ROAD LINK ASSESSMENT

As mentioned above, in accordance with the TMR *Guidelines for Assessment of Road Impacts of Development*, impacts on State-controlled roads need to be considered where the traffic generated by the developments are equal to or greater than 5% of the existing AADT.

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).

The TMR guideline states that a LOS C is considered the minimum standard however it should be noted it is not always practical or cost effective to use such a high standard as an intervention level for upgrading a road.

The methodology for determining the capacity of a roadway has been assessed using the Austroads *Guide to Traffic Management Part 3 – Traffic Studies and Analysis*. As per this document, the HCM 2000 describes the different levels of performance in uninterrupted flow conditions as:

- LOS A – A maximum flow rate of 490 pc/h total in both directions;
- LOS B – A service flow rate of 780 pc/h total in both directions;
- LOS C – A service flow rate of 1190pc/h total in both directions;
- LOS D – A service flow rate of 1830pc/h total in both directions;
- LOS E – Defies the capacity of the highway/road link, generally 3200 pc/h total in both directions; and
- LOS F – heavily congested with traffic demand exceeding capacity.

Based on the daily volumes as determined in **Table 5-1** and applying the rule of thumb that the peak traffic volumes are approximately 10% of the AADT, **Table 5-3** has been compiled demonstrating the LOS.

**Figure 5-3 Predicted AADT volumes and corresponding LOS**

Road Link	2014			2027		
	AADT (with development)	Estimated Peak Volume	LOS	AADT (with development)	Estimated Peak Volume	LOS
Collinsville-Elphinstone Road						
between Bowen Developmental Road to Site	424	42	A	1465	147	A
Bowen Developmental Road						
Collinsville to Aerodrome Road	1129	113	A	3265	327	A
Aerodrome Road to Collinsville-Elphinstone Road	431	43	A	1248	125	A
Bowen Developmental Road						
Five Mile Creek to Collinsville	1258	126	A	3638	364	A
Bruce Highway (north to Ayr)						
WIM site Guthalunga	3153	315	A	4636	464	A
Collinsville-Elphinstone Road						
Site to Glenden	1699	170	A	5745	575	B
Glenden to Isaac River	914	92	A	3052	306	A
Suttor Developmental Road						
Peak Downs Highway to Collinsville-Elphinstone Road	1364	137	A	2864	287	A
Peak Downs Highway (east to Mackay)						
Nebo to Hazeldean	4865	487	A	9718	972	C
Hazeldean to Eton	6062	607	B	12119	1212	D
Peak Downs Highway (south to Brisbane)						
Nebo to Fitzroy Developmental Road	744	75	A	1403	141	A

The additional traffic generated by the project is minimal when compared to the background traffic volumes (i.e. no mine generated traffic). The criterion detailed above has been applied to the forecast predicted traffic volumes to determine the LOS. Based on the above the Project is not expected to have significant impact on the road link performance based on the LOS measurement criteria.

## 5.4 MINE LEASE HAUL ROAD TRAFFIC MOVEMENTS

There are two important locations that have been identified when considering the movement of haul vehicles within the site including:

- The crossing of the GAP rail line by internal haul roads; and
- The intersection of Xstrata transport mine lease and the Byerwen haul roads.

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 will be designed in accordance with the relevant design guidelines and standards including relevant 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.

## 6.0 PAVEMENT IMPACT ASSESSMENT

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### 6.1 ASSESSMENT CRITERIA

TMR is the custodian and therefore the entity responsible for maintaining the safety and efficiency of the State-controlled road network. Accordingly, TMR is allocated an annual budget for maintenance and rehabilitation works and has powers under the relevant acts to condition a development proponent to contribute towards additional maintenance costs attributable to their development.

TMR has provided the following contribution rates adopted by this region for estimating the maintenance and rehabilitation costs attributable to developments:

- Maintenance cost of \$3,500/km; and
- Rehabilitation cost of \$1.2M/km

For the purpose of the pavement impact assessment, and in the absence of specific pavement life information for the relevant road sections, TMR has indicated a roughness depreciation rate of 3 counts/km/year and terminal roughness value of 120 counts/km should be used to estimate the year that pavement rehabilitation may be required. The background traffic demand was obtained from TMR for the current year and has been factored up using growth rates agreed with TMR. An average equivalent standard axle (ESAs) per heavy vehicle of 2.8 has been assumed as recommended in the Austroads *Pavement Design Manual*. Also, an inflation rate of 5% has been adopted and a discount rate of 6% has been applied for this assessment.

### 6.2 PAVEMENT IMPACT ASSESSMENT WARRANTS

TMR considers a development's pavement impacts to be insignificant if the development generates an increase in ESA's 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, TMR 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; and
- 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 6-1** illustrates the comparison between project generated ESA's and background traffic ESA's across each of the mine phases. There are four sections of roads that warrant assessment by the TMR 5% criteria 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; and
- 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 6-1 Daily ESA comparison across each stage of the mine**

ESA Comparison in loaded direction																
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%
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%

### 6.3 MAINTENANCE CONTRIBUTION REQUIREMENTS

An assessment has been undertaken to determine the maintenance contribution, utilising TMR's *Road Planning and Design Manual*, and the data provided by Byerwen Coal and TMR regarding AADT volumes to determine background and development generated ESAs.

This assessment has been undertaken for both the gazettal and against gazettal directions for the loaded and unloaded direction of vehicle movements to the mine. In accordance with the TMR road naming convention, the gazettal direction for Collinsville-Elphinstone Road for example is in the direction from Collinsville to Elphinstone. Conversely, the against gazettal direction is in the direction from Elphinstone to Collinsville.

The results of the construction and operation phases for the southern tenement are shown in **Table 6-2** to **Table 6-5**. A separate calculation has been completed for each of the four separate road sections as identified in **Section 6.2**. The full details including breakdown of vehicles has been included in **Appendix B**.

**Table 6-2 Maintenance ESA comparison north of the Project site to Bowen Developmental Road**

VEHICLE TYPE	CONSTRUCTION STH PHASE				CONSTRUCTION & OPERATION PHASE*		OPERATION STH PHASE																	
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
<b>Total Existing ESA's</b>																								
ESA Data/yr (x1,000)	34.42	39.00	37.86	42.90	41.65	47.19	45.81	51.91	50.40	57.10	55.44	62.81	60.98	69.09	67.08	76.00	73.78	83.60	81.16	91.96	89.28	101.16	98.21	111.27
<b>Project Generated ESA's</b>																								
TOTAL ESA INCREASE																								
Byerwen – Bowen Developmental Road (Collinsville - Elphinstone Road)	0.9%	0.1%	1.7%	0.2%	0.5%	0.0%	8.5%	0.8%	7.7%	0.7%	7.0%	0.7%	6.4%	0.6%	5.8%	0.5%	5.3%	0.5%	4.8%	0.4%	4.3%	0.4%	4.0%	0.4%

VEHICLE TYPE	OPERATION STH PHASE								CONSTRUCTION NTH & OPERATION STH PHASE*						OPERATION NTH & STH					
	2026		2027		2028		2029		2030		2031		2032		2033		2034		2035	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
<b>Total Existing ESA's</b>																				
ESA Data/yr (x1,000)	108.03	122.40	118.83	134.64	130.71	148.10	143.79	162.91	158.16	179.20	173.98	197.12	191.38	216.84	210.52	238.52	231.57	262.37	254.72	288.61
<b>Project Generated ESA's</b>																				
TOTAL ESA INCREASE																				
Byerwen – Bowen Developmental Road (Collinsville - Elphinstone Road)	3.6%	0.3%	3.3%	0.3%	3.0%	0.3%	2.7%	0.3%	2.8%	0.3%	2.5%	0.2%	2.3%	0.2%	2.0%	0.2%	1.8%	0.2%	1.6%	0.2%



**Table 6-3 Maintenance ESA comparison the Project site to Glenden**

VEHICLE TYPE	CONSTRUCTION STH PHASE				CONSTRUCTION & OPERATION PHASE*		OPERATION STH PHASE																	
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
<b>Total Existing ESA's</b>																								
ESA Data/yr (x1,000)	107.65	96.96	118.42	106.66	130.26	117.32	143.29	129.05	157.62	141.96	173.38	156.16	190.71	171.77	209.79	188.95	230.76	207.84	253.84	228.63	279.23	251.49	307.15	276.64
<b>Project Generated ESA's</b>																								
TOTAL ESA INCREASE																								
Byerwen - Glenden (Collinsville - Elphinstone Road)	3.0%	7.5%	5.4%	13.6%	2.7%	14.7%	3.0%	12.1%	2.7%	11.0%	2.5%	10.0%	2.3%	9.1%	2.1%	8.2%	1.9%	7.5%	1.7%	6.8%	1.6%	6.2%	1.4%	5.6%

VEHICLE TYPE	OPERATION STH PHASE*								CONSTRUCTION NTH & OPERATION STH PHASE						OPERATION NTH & STH PHASE					
	2026		2027		2028		2029		2030		2031		2032		2033		2034		2035	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
<b>Total Existing ESA's</b>																				
ESA Data/yr (x1,000)	337.86	304.30	371.65	334.74	408.81	368.21	449.70	405.03	494.67	445.53	544.13	490.09	598.54	539.09	658.40	593.00	724.24	652.30	796.66	717.53
<b>Project Generated ESA's</b>																				
TOTAL ESA INCREASE																				
Byerwen - Glenden (Collinsville - Elphinstone Road)	1.3%	5.1%	1.2%	4.6%	1.1%	4.2%	1.0%	3.8%	1.9%	6.0%	1.7%	5.5%	1.6%	5.0%	0.7%	3.2%	0.7%	2.9%	0.6%	2.6%

**Table 6-4 Maintenance ESA comparison Glenden to Elphinstone**

VEHICLE TYPE	CONSTRUCTION STH PHASE				CONSTRUCTION & OPERATION PHASE*		OPERATION STH PHASE																	
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
<b>Total Existing ESA's</b>																								
ESA Data/yr (x1,000)	85.30	88.58	93.83	97.44	103.21	107.18	113.53	117.90	124.89	129.69	137.38	142.66	151.11	156.93	166.23	172.62	182.85	189.88	201.13	208.87	221.25	229.76	243.37	252.74
<b>Project Generated ESA's</b>																								
TOTAL ESA INCREASE																								
Byerwen - Glenden (Collinsville - Elphinstone Road)	0.7%	1.1%	1.2%	2.0%	1.1%	8.9%	1.4%	9.2%	1.2%	8.3%	1.1%	7.6%	1.0%	6.9%	0.9%	6.3%	0.8%	5.7%	0.8%	5.2%	0.7%	4.7%	0.6%	4.3%

VEHICLE TYPE	OPERATION STH PHASE								CONSTRUCTION NTH & OPERATION STH PHASE*						OPERATION NTH & STH					
	2026		2027		2028		2029		2030		2031		2032		2033		2034		2035	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
<b>Total Existing ESA's</b>																				
ESA Data/yr (x1,000)	267.71	278.01	294.48	305.81	323.93	336.39	356.32	370.03	391.95	407.03	431.15	447.74	474.26	492.51	521.69	541.76	573.86	595.94	631.24	655.53
<b>Project Generated ESA's</b>																				
TOTAL ESA INCREASE																				
Byerwen - Glenden (Collinsville - Elphinstone Road)	0.6%	3.9%	0.5%	3.5%	0.5%	3.2%	0.4%	2.9%	0.6%	3.1%	0.6%	2.8%	0.5%	2.6%	0.4%	2.2%	0.4%	2.0%	0.3%	1.8%

**Table 6-5 Maintenance ESA comparison Elphinstone to Peak Downs Highway**

VEHICLE TYPE	CONSTRUCTION STH PHASE				CONSTRUCTION & OPERATION PHASE*		OPERATION STH PHASE																	
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
<b>Total Existing ESA's</b>																								
ESA Data/yr (x1,000)	152.59	141.95	161.74	150.47	171.44	159.50	181.73	169.07	192.64	179.21	204.19	189.96	216.44	201.36	229.43	213.44	243.20	226.25	257.79	239.83	273.26	254.21	289.65	269.47
<b>Project Generated ESA's</b>																								
TOTAL ESA INCREASE																								
Byerwen - Glenden (Collinsville - Elphinstone Road)	0.7%	0.4%	1.2%	0.8%	5.6%	0.7%	6.0%	0.9%	5.6%	0.9%	5.3%	0.8%	5.0%	0.8%	4.7%	0.7%	4.4%	0.7%	4.2%	0.6%	4.0%	0.6%	3.7%	0.6%

VEHICLE TYPE	OPERATION STH PHASE								CONSTRUCTION NTH & OPERATION STH PHASE*						OPERATION NTH & STH					
	2026		2027		2028		2029		2030		2031		2032		2033		2034		2035	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
<b>Total Existing ESA's</b>																				
ESA Data/yr (x1,000)	307.03	285.64	325.45	302.77	344.98	320.94	365.68	340.20	387.62	360.61	410.88	382.24	435.53	405.18	461.66	429.49	489.36	455.26	518.72	482.58
<b>Project Generated ESA's</b>																				
TOTAL ESA INCREASE																				
Byerwen - Glenden (Collinsville - Elphinstone Road)	3.5%	0.5%	3.3%	0.5%	3.1%	0.5%	3.0%	0.5%	3.2%	0.7%	3.0%	0.6%	2.8%	0.6%	2.5%	0.4%	2.4%	0.4%	2.2%	0.3%

Furthermore, to determine the maintenance contribution required the following formula has been adopted:

$$C = M \times I \times L$$

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 TMR, 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 TMR and adopted to forecast the maintenance cost per km for the subsequent years.

**Table 6-6** to **Table 6-9** summarise the maintenance contribution amounts for the traffic volume increases on the Collinsville-Elphinstone Road sections and Suttor Developmental Road sections for each proposed phase.

**Table 6-6 Maintenance Contribution Required between Project site and Bowen Developmental Road (Collinsville-Elphinstone Road)**

VEHICLE TYPE	CONSTRUCTION STH PHASE				CONSTRUCTION & OPERATION STH PHASE		OPERATION STH PHASE													
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023	
	G	A			G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
MAINTENANCE COST / KM / LANE	\$2,026	\$2,026	\$2,127	\$2,127	\$2,233	\$2,233	\$2,345	\$2,345	\$2,462	\$2,462	\$2,586	\$2,586	\$2,715	\$2,715	\$2,851	\$2,851	\$2,993	\$2,993	\$3,143	\$3,143
Byerwen - Glenden																				
Buses (Class 3)	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Trucks (Class 3)	\$-	\$-	\$-	\$-	\$-	\$-	\$54	\$-	\$51	\$-	\$49	\$-	\$47	\$-	\$45	\$-	\$43	\$-	\$-	\$-
Trucks (Class 4)	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Trucks (Class 9)	\$-	\$-	\$-	\$-	\$-	\$-	\$356	\$-	\$340	\$-	\$324	\$-	\$310	\$-	\$296	\$-	\$282	\$-	\$-	\$-
B-Double (Class 10)	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
TOTAL MAINTENANCE CONTRIBUTION	\$-	\$-	\$-	\$-	\$-	\$-	\$410	\$-	\$391	\$-	\$373	\$-	\$356	\$-	\$340	\$-	\$325	\$-	\$-	\$-

**Table 6-7 Maintenance Contribution Required between Project site and Glenden (Collinsville-Elphinstone Road)**

VEHICLE TYPE	CONSTRUCTION STH PHASE				CONSTRUCTION & OPERATION STH PHASE		OPERATION STH PHASE													
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023	
	G	A			G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
MAINTENANCE COST / KM / LANE	\$2,026	\$2,026	\$2,127	\$2,127	\$2,233	\$2,233	\$2,345	\$2,345	\$2,462	\$2,462	\$2,586	\$2,586	\$2,715	\$2,715	\$2,851	\$2,851	\$2,993	\$2,993	\$3,143	\$3,143
Byerwen - Glenden																				
Buses (Class 3)	\$-	\$1,410	\$2,425	\$2,692	\$-	\$1,028	\$-	\$1,472	\$-	\$1,405	\$-	\$1,341	\$-	\$1,280	\$-	\$1,222	\$-	\$1,166	\$-	\$1,113
Trucks (Class 3)	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Trucks (Class 4)	\$-	\$697	\$162	\$1,330	\$-	\$325	\$-	\$59	\$-	\$56	\$-	\$53	\$-	\$51	\$-	\$49	\$-	\$46	\$-	\$44
Trucks (Class 9)	\$-	\$1,672	\$287	\$3,192	\$-	\$2,828	\$-	\$1,710	\$-	\$1,632	\$-	\$1,558	\$-	\$1,487	\$-	\$1,420	\$-	\$1,355	\$-	\$1,294
B-Double (Class 10)	\$-	\$-	\$-	\$-	\$-	\$4,008	\$-	\$3,826	\$-	\$3,652	\$-	\$3,486	\$-	\$3,327	\$-	\$3,176	\$-	\$3,032	\$-	\$2,894
TOTAL MAINTENANCE CONTRIBUTION	\$-	\$3,779	\$2,874	\$7,215	\$-	\$8,188	\$-	\$7,066	\$-	\$6,745	\$-	\$6,438	\$-	\$6,146	\$-	\$5,866	\$-	\$5,600	\$-	\$5,345

VEHICLE TYPE	OPERATION STH PHASE												CONSTRUCTION NTH & OPERATION STH PHASE						OPERATION NTH & STH PHASE	
	2024		2025		2026		2027		2028		2029		2030		2031		2032		2033	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
MAINTENANCE COST / KM / LANE	\$3,300	\$3,300	\$3,465	\$3,465	\$3,638	\$3,638	\$3,820	\$3,820	\$4,011	\$4,011	\$4,212	\$4,212	\$4,422	\$4,422	\$4,643	\$4,643	\$4,875	\$4,875	\$5,119	\$5,119
Byerwen-Glenden																				
Buses(Class3)	\$-	\$1,063	\$-	\$1,015	\$-	\$968	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$1,876	\$-	\$1,791	\$-	\$-	\$-	\$-
Trucks(Class3)	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Trucks(Class4)	\$-	\$42	\$-	\$40	\$-	\$39	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$366	\$-	\$350	\$-	\$-	\$-	\$-
Trucks(Class9)	\$-	\$1,235	\$-	\$1,179	\$-	\$1,125	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$2,350	\$-	\$2,243	\$-	\$-	\$-	\$-
B-Double(Class10)	\$-	\$2,762	\$-	\$2,637	\$-	\$2,517	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$2,090	\$-	\$1,995	\$-	\$-	\$-	\$-
TOTAL MAINTENANCE CONTRIBUTION	\$-	\$5,102	\$-	\$4,870	\$-	\$4,649	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$6,682	\$-	\$6,378	\$-	\$-	\$-	\$-

**Table 6-8 Maintenance Contribution required between Glenden and Elphinstone (Collinsville-Elphinstone Road)**

VEHICLE TYPE	CONSTRUCTION STH PHASE				CONSTRUCTION & OPERATION STH PHASE		OPERATION STH PHASE															
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024	
	G	A			G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
MAINTENANCECOST/KM/LANE	\$2,026	\$2,026	\$2,026	\$2,026	\$2,127	\$2,127	\$2,233	\$2,233	\$2,345	\$2,345	\$2,462	\$2,462	\$2,586	\$2,586	\$2,715	\$2,715	\$2,851	\$2,851	\$2,993	\$2,993	\$3,143	\$3,143
Glenden - Elphinstone																						
Buses(Class3)	\$-	\$-	\$-	\$-	\$-	\$183	\$-	\$303	\$-	\$290	\$-	\$276	\$-	\$264	\$-	\$252	\$-	\$240	\$-	\$229	\$-	\$-
Trucks(Class3)	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Trucks(Class4)	\$-	\$-	\$-	\$-	\$-	\$30	\$-	\$25	\$-	\$24	\$-	\$23	\$-	\$22	\$-	\$21	\$-	\$20	\$-	\$19	\$-	\$-
Trucks(Class9)	\$-	\$-	\$-	\$-	\$-	\$339	\$-	\$759	\$-	\$725	\$-	\$692	\$-	\$660	\$-	\$630	\$-	\$602	\$-	\$574	\$-	\$-
B-Double(Class10)	\$-	\$-	\$-	\$-	\$-	\$4,011	\$-	\$3,829	\$-	\$3,655	\$-	\$3,488	\$-	\$3,330	\$-	\$3,179	\$-	\$3,034	\$-	\$2,896	\$-	\$-
TOTALMAINTENANCECONTRIBUTION	\$-	\$-	\$-	\$-	\$-	\$4,562	\$-	\$4,916	\$-	\$4,693	\$-	\$4,480	\$-	\$4,276	\$-	\$4,082	\$-	\$3,896	\$-	\$3,719	\$-	\$-

**Table 6-9 Maintenance Contribution required between Elphinstone and Peak Downs Highway (Suttor Developmental Road)**

VEHICLE TYPE	CONSTRUCTION STH PHASE				CONSTRUCTION & OPERATION STH PHASE		OPERATION STH PHASE															
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024	
	G	A			G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
MAINTENANCECOST/KM/LANE	\$2,026	\$2,026	\$2,026	\$2,026	\$2,127	\$2,127	\$2,233	\$2,233	\$2,345	\$2,345	\$2,462	\$2,462	\$2,586	\$2,586	\$2,715	\$2,715	\$2,851	\$2,851	\$2,993	\$2,993	\$3,143	\$3,143
Glenden - Elphinstone																						
Buses(Class3)	\$-	\$-	\$-	\$-	\$260	\$-	\$448	\$-	\$444	\$-	\$439	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Trucks(Class3)	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Trucks(Class4)	\$-	\$-	\$-	\$-	\$6	\$-	\$5	\$-	\$5	\$-	\$5	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Trucks(Class9)	\$-	\$-	\$-	\$-	\$52	\$-	\$120	\$-	\$119	\$-	\$118	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
B-Double(Class10)	\$-	\$-	\$-	\$-	\$508	\$-	\$503	\$-	\$498	\$-	\$494	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
TOTALMAINTENANCECONTRIBUTION	\$-	\$-	\$-	\$-	\$825	\$-	\$1,077	\$-	\$1,066	\$-	\$1,056	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-

The total maintenance contribution per year is summarised in **Table 6-10** to **Table 6-13**.

**Table 6-10 Total maintenance cost between the Project site and Bowen Developmental Road**

YEAR	Gazettal direction	Against gazettal direction	TOTAL
2014	\$-	\$-	\$-
2015	\$-	\$-	\$-
2016	\$-	\$-	\$-
2017	\$410	\$-	\$410
2018	\$391	\$-	\$391
2019	\$373	\$-	\$373
2020	\$356	\$-	\$356
2021	\$340	\$-	\$340
2022	\$325	\$-	\$325
2023	\$-	\$-	\$-
2024	\$-	\$-	\$-
2025	\$-	\$-	\$-
2026	\$-	\$-	\$-
2027	\$-	\$-	\$-
2028	\$-	\$-	\$-
2029	\$-	\$-	\$-
2030	\$-	\$-	\$-
2031	\$-	\$-	\$-
2032	\$-	\$-	\$-
2033	\$-	\$-	\$-
TOTAL CONTRIBUTION			\$2,196
ANNUALISED (Over 50 YR Operation)			\$43.91



**Table 6-11 Total maintenance cost between the Project site and Glenden**

<b>YEAR</b>	<b>Gazettal direction</b>	<b>Against gazettal direction</b>	<b>TOTAL</b>
2014	\$-	\$3,779	\$3,779
2015	\$2,874	\$7,215	\$10,089
2016		\$8,188	\$8,188
2017	\$-	\$7,066	\$7,066
2018	\$-	\$6,745	\$6,745
2019	\$-	\$6,438	\$6,438
2020	\$-	\$6,146	\$6,146
2021	\$-	\$5,866	\$5,866
2022	\$-	\$5,600	\$5,600
2023	\$-	\$5,345	\$5,345
2024	\$-	\$5,102	\$5,102
2025	\$-	\$4,870	\$4,870
2026	\$-	\$4,649	\$4,649
2027	\$-	\$-	\$-
2028	\$-	\$-	\$-
2029	\$-	\$-	\$-
2030	\$-	\$6,682	\$6,682
2031	\$-	\$6,378	\$6,378
2032	\$-	\$-	\$-
2033	\$-	\$-	\$-
<b>TOTALCONTRIBUTION</b>			<b>\$92,945</b>
<b>ANNUALISED (Over 50 YR Operation)</b>			<b>\$1,858.90</b>

**Table 6-12 Total maintenance cost between Glenden and Elphinstone**

<b>YEAR</b>	<b>Gazettal direction</b>	<b>Against gazettal direction</b>	<b>TOTAL</b>
2014	\$-	\$-	\$-
2015	\$-	\$-	\$-
2016	\$-	\$4,562	\$4,562
2017	\$-	\$4,916	\$4,916
2018	\$-	\$4,693	\$4,693
2019	\$-	\$4,480	\$4,480
2020	\$-	\$4,276	\$4,276
2021	\$-	\$4,082	\$4,082
2022	\$-	\$3,896	\$3,896
2023	\$-	\$3,719	\$3,719
2024	\$-	\$-	\$-
2025	\$-	\$-	\$-
2026	\$-	\$-	\$-
2027	\$-	\$-	\$-
2028	\$-	\$-	\$-
2029	\$-	\$-	\$-
2030	\$-	\$-	\$-
2031	\$-	\$-	\$-
2032	\$-	\$-	\$-
2033	\$-	\$-	\$-
<b>TOTAL CONTRIBUTION</b>			<b>\$34,623</b>
<b>ANNUALISED (Over 50 YR Operation)</b>			<b>\$692.47</b>

**Table 6-13 Total maintenance cost between Elphinstone and Peak Downs Highway**

YEAR	Gazettal direction	Against gazettal direction	TOTAL
2014	\$-	\$-	\$-
2015	\$-	\$-	\$-
2016	\$825	\$-	\$825
2017	\$1,077	\$-	\$1,077
2018	\$1,066	\$-	\$1,066
2019	\$1,056	\$-	\$1,056
2020	\$-	\$-	\$-
2021	\$-	\$-	\$-
2022	\$-	\$-	\$-
2023	\$-	\$-	\$-
2024	\$-	\$-	\$-
2025	\$-	\$-	\$-
2026	\$-	\$-	\$-
2027	\$-	\$-	\$-
2028	\$-	\$-	\$-
2029	\$-	\$-	\$-
2030	\$-	\$-	\$-
2031	\$-	\$-	\$-
2032	\$-	\$-	\$-
2033	\$-	\$-	\$-
TOTAL CONTRIBUTION			\$4,025
ANNUALISED (Over 50 YR Operation)			\$80

## 6.4 REHABILITATION CONTRIBUTION REQUIREMENTS

Using the roughness count data supplied by TMR, the background traffic volume ESAs and the proposed generated ESAs, an assessment has been undertaken to determine if a rehabilitation contribution is warranted. The results of this assessment are displayed in **Table 6-14** to **Table 6-17**. The full details of this assessment are included in **Appendix C**.

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.

**Table 6-14 Rehabilitation assessment from project site to Bowen Developmental Road (Collinsville-Elphinstone Road)**

Vehicle Type	Unloaded Direction			Loaded Direction		
	Reduced Pavement Life With Project Traffic (Project Start to Rehab. Year)		Present Value - Rehab Costs	Reduced Pavement Life With Project Traffic (Project Start to Rehab. Year)		Present Value - Rehab Costs
	Cumulative ESA's Development Traffic	Reduced Pavement Life (Years)	Rehab Contribution Required	Cumulative ESA's Development Traffic	Reduced Pavement Life (Years)	Rehab Contribution Required
Byerwen Coal Project	6,818	0.01	NO	64,386	0.08	NO

**Table 6-15 Rehabilitation assessment from project site to Glenden (Collinsville-Elphinstone Road)**

Vehicle Type	Unloaded Direction			Loaded Direction		
	Reduced Pavement Life With Project Traffic (Project Start to Rehab. Year)		Present Value - Rehab Costs	Reduced Pavement Life With Project Traffic (Project Start to Rehab. Year)		Present Value - Rehab Costs
	Cumulative ESA's Development Traffic	Reduced Pavement Life (Years)	Rehab Contribution Required	Cumulative ESA's Development Traffic	Reduced Pavement Life (Years)	Rehab Contribution Required
Byerwen Coal Project	59,673	0.08	NO	207,169	0.31	NO

**Table 6-16 Rehabilitation assessment from Glenden to Elphinstone (Collinsville-Elphinstone Road)**

Vehicle Type	Unloaded Direction			Loaded Direction		
	Reduced Pavement Life With Project Traffic (Project Start to Rehab. Year)		Present Value - Rehab Costs	Reduced Pavement Life With Project Traffic (Project Start to Rehab. Year)		Present Value - Rehab Costs
	Cumulative ESA's Development Traffic	Reduced Pavement Life (Years)	Rehab Contribution Required	Cumulative ESA's Development Traffic	Reduced Pavement Life (Years)	Rehab Contribution Required
Byerwen Coal Project	10,385	0.04	NO	66,407	0.25	NO

**Table 6-17 Rehabilitation assessment from Elphinstone to Peak Downs Highway (Suttor Developmental Road)**

Vehicle Type	Unloaded Direction			Loaded Direction		
	Reduced Pavement Life With Project Traffic (Project Start to Rehab. Year)		Present Value - Rehab Costs	Reduced Pavement Life With Project Traffic (Project Start to Rehab. Year)		Present Value - Rehab Costs
	Cumulative ESA's Development Traffic	Reduced Pavement Life (Years)	Rehab Contribution Required	Cumulative ESA's Development Traffic	Reduced Pavement Life (Years)	Rehab Contribution Required
Byerwen Coal Project	5,455	0.01	NO	31,324	0.08	NO

The rehabilitation assessment demonstrates that the pavement life will be reduced by less than 1 year across the remaining life, therefore no rehabilitation contribution should be required.

## 7.0 RAIL AND PORT FACILITIES

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The proposed mine lies within Queensland's Bowen Basin. The mine location is linked to a number of ports in the region via rail. These ports include:

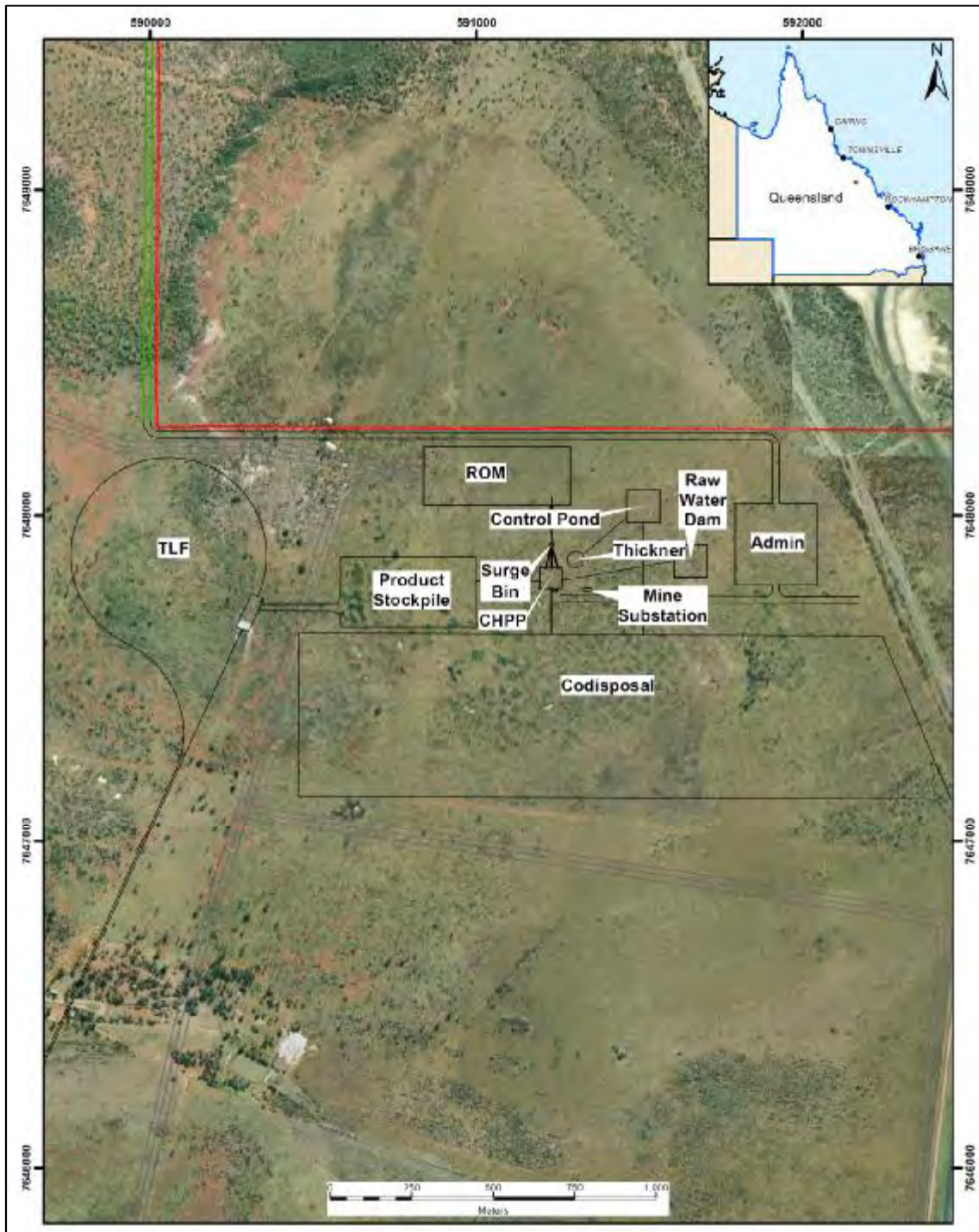
- Abbot Point;
- Mackay; and
- Hay Point.

QR National owns and operates the rail network within Queensland and provides coal freight services to the surrounding mine sites.

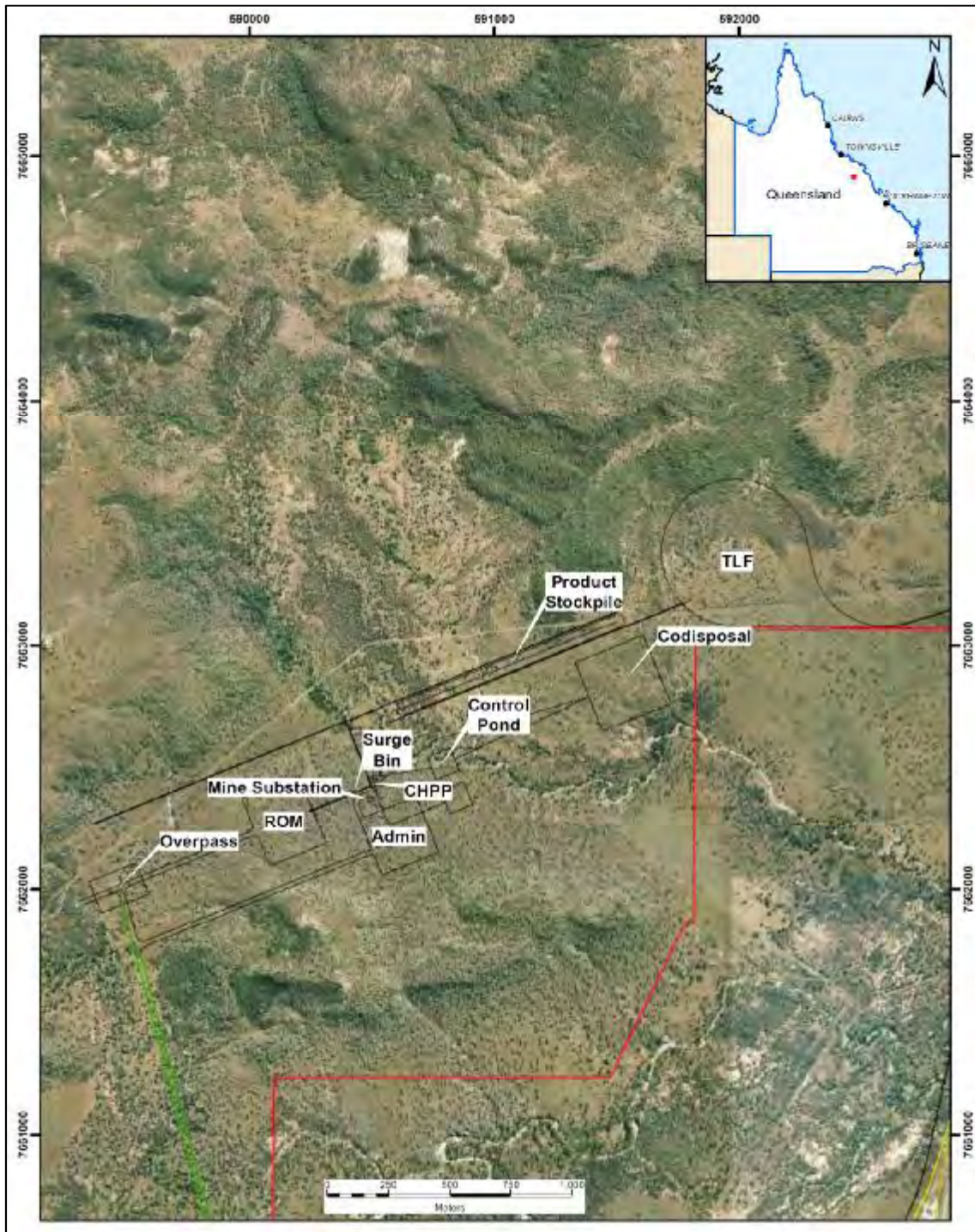
The existing GAP rail line provides a north-south rail connection from the project through to Abbot Point Coal Terminal. The Goonyella rail system also operates within the area connecting through to Mackay and Hay Point Ports. QR National operates a number of diesel trains located at a rolling stock depot and station at Pring, just north of Bowen (Source: *QR National Coal System information sheet, October, 2010*). QR National's GAP rail line crosses the Byerwen Coal MLAs. The GAP rail line will increase capacity in future years out to the Abbot Point Coal Terminal. The project site will be serviced by a two train loading facilities (rail spur, rail loop and loading bin) in the north and south that will connect directly to the GAP rail line. **Figure 7-1** and **Figure 7-2** demonstrate the southern mine infrastructure area and train loading facilities and the northern mine infrastructure area and train loading facilities respectively.

In addition to Byerwen Coal, there are a number of additional mine proponents proposing infrastructure and rail corridors that pass either through or adjacent to the project area. Coordination with these proponents will be required to ensure positive outcomes for all parties can be achieved.

Coal from the project will be transported by rail to the Abbot Point Coal Terminal. There is current expansion planning and works for the Abbot Point Coal Terminal to upgrade and increase the capacity.



**Figure 7-1 Southern Mine Infrastructure Area and Train Loading Facilities**



**Figure 7-2 Northern Mine Infrastructure Area and Train Loading Facilities**



## **8.0 OTHER CONSIDERATIONS**

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### **8.1 RISK OF SPILLAGE**

A spillage action plan and procedure (of 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.

The action plan would be developed following the completion of a hazard risk assessment of 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.

### **8.2 DUST MANAGEMENT**

Dust will be generated by vehicles that are travelling to the site and by vehicles moving around the Project Site. The dust generated by these movements will need to be kept to a minimum and to an acceptable level to not significantly impact surrounding properties. This would be managed by watering operations. A potential safety issue could be the decrease in visibility and sight distance due to dust generation.

As an additional control, load covers will be required on any heavy vehicles carrying material that had the potential to generate dust to or from the Project.

This issue will be addressed further in the Environmental Management Plan.

### **8.3 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 TMR for Queensland.

### **8.4 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 good on the State-controlled road network.

There are a number of requirements that are required such as licenses, safety equipment and incident response plans that are required and 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; and
- Safety equipment requirements for road vehicles.

Based on the information provided by Byerwen Coal and the assumptions made in this document, the materials required for this site include (but are not limited to):

- Fuel;
- Explosives; and
- Waste materials.

A transport management plan may be required that details the type of materials required on site and their quantities for approval.

## **8.5 ACCESS TO ROAD, RAIL AND MAINTENANCE RESERVES**

Access to the site will be from existing State-controlled roads. It is assumed that security or some form of control will be installed on the access roads to the north and south tenements and fencing will be provided at necessary locations adjacent to roadways and rail corridors. As described in **Section 5.2** the access road has been conceptually designed to accommodate the swept path of B-Doubles and provide storage space for turning vehicles. 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 MLA's for Byerwen including:

- GAP rail line;
- Alpha Coal Project rail line;
- Gas pipelines;
- Burdekin to Moranbah water pipeline; and
- 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.

## **8.6 ROAD USE MANAGEMENT PLAN**

The road use management plan will be formulated during later stages of the development process. It is expected that this document will be dynamic and continually updates 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 is expected to include:

- Objectives;
- Strategies (e.g. dangerous goods or over dimension vehicle transportation);
- Monitoring required throughout the project life;
- Corrective actions required; and
- Continual report and updating.

## 9.0 SUMMARY AND CONCLUSIONS

---

The Byerwen Coal Project will transport product coal to port solely by rail. All other transport movements associated with materials, waste, and workforce will be undertaken by road. This report focuses on the impacts of the project on the road network. The project impacts on the air, rail and sea port facilities have not been addressed in this report and would be assessed by the private entities responsible for this infrastructure.

### 9.1 TRAFFIC GENERATION

The Byerwen Coal Project has been divided into five separate phases of traffic generation. These include:

- Construction south phase;
- Construction south/operation south phase (overlap stage);
- Operation south phase;
- Construction north/operation south phase (overlap stage); and
- Full operation phase.

The construction north and operation south phase is expected to generate the highest amounts of traffic with an average workforce of 395 people on site at any one time and approximately 25 (two-way) heavy vehicle movements per day within this three year period (excluding bus movements).

There will be two operational phases of the mine. Operation of the southern tenement is anticipated to occur for 13 years and once the northern tenement comes on line, mine operation will occur for a further 29 years in both the north and south. Mine workforce for all phases will be bussed to site from Glenden.

### 9.2 BACKGROUND TRAFFIC

The adjacent road to the project site is Collinsville-Elphinstone Road. The impact assessment of Collinsville-Elphinstone Road has been based on the expected significant background traffic growth and further industrial activities planned within the surrounding area. In consultation with TMR a growth rate of 10% p.a. has been adopted in this impact assessment.

### 9.3 TRAFFIC OPERATION IMPACTS

The traffic impacts of the Byerwen Coal Project have been assessed in accordance with TMR *Guidelines for the Assessment of Road Impacts of Developments (GARID) (2006)*.

In order to quantify the impact of the proposed project site on the operation of the State-controlled road network, a comparison of the background traffic volumes (without development) and with the project has been undertaken.

The road network operation has been assessed for a 15-year design horizon following the commencement of works as defined in TMR's *Guide for Assessment of Road Impacts of Development*. The guide defines it is preferable to avoid time horizons beyond 15 years due to the certainty of traffic volume predictions.

The impact assessment shows that the mine access road intersection with Collinsville-Elphinstone Road requires as a minimum a short auxiliary left turn lane (AUL(S)) for the left turn movement entering the site. It is a recommendation as part of this report that a channelised right turn (CHR) also be implemented thereby improving the safety and efficiency of the proposed intersection.

#### **9.4 PAVEMENT IMPACTS**

The road network impacts generated by the project have been assessed in accordance with TMR *GARID*. The assessment indicates that the project will have an impact on the pavement of four road sections. There are three sections on Collinsville-Elphinstone Road (full length) and one section on Suttor Developmental Road (between Elphinstone and Peak Downs Highway).

The road impacts of the Byerwen mine site do not warrant any addition pavement rehabilitation works, however a contribution towards the maintenance may be warranted.

Based on the contribution cost estimate methodology outlined in *GARID* and applied herein, a maintenance contribution of \$133,789 (\$2,196 + \$92,945 + \$34,623 + 4,025) is applicable across the life of the mine.

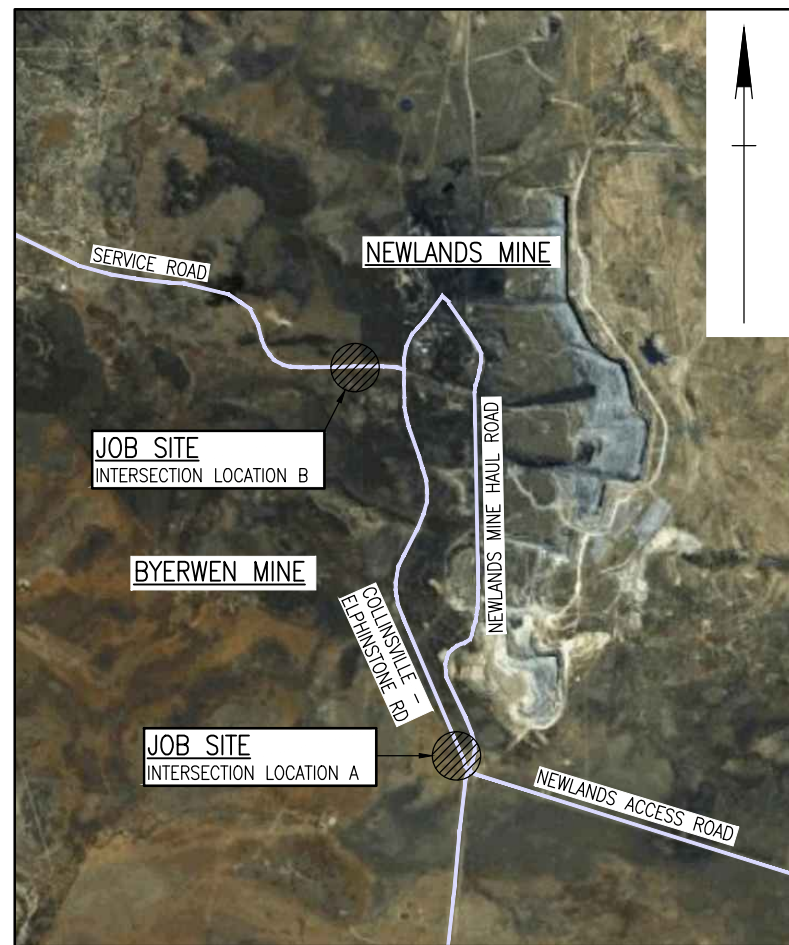
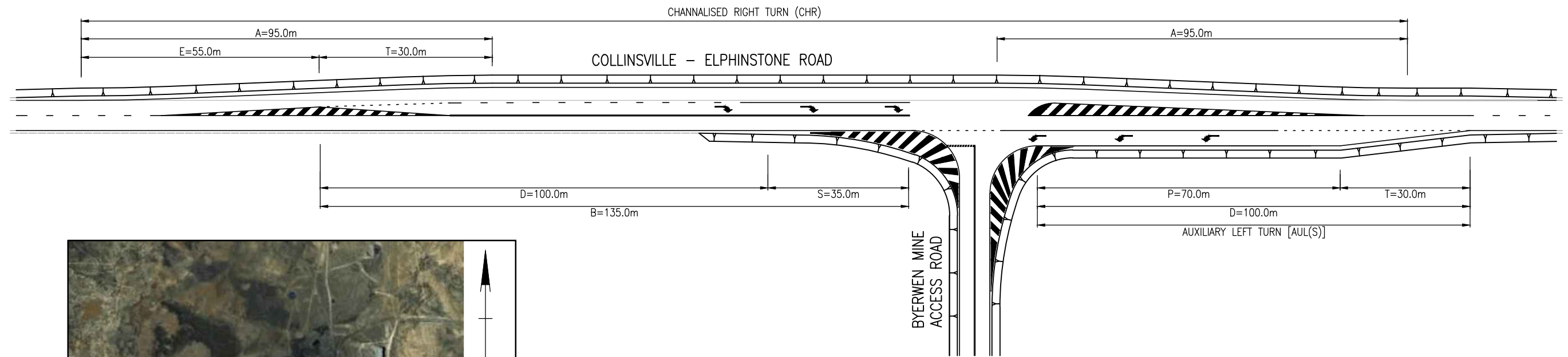
# APPENDIX A

## CONCEPT INTERSECTION LAYOUTS

# BYERWEN MINE PROJECT

## COLLINSVILLE - ELPHINSTONE ROAD /

### BYERWEN MINE ACCESS ROAD INTERSECTIONS



LOCALITY PLAN  
NTS.

GENERAL ARRANGEMENT PLAN – INTERSECTION LOCATIONS A & B  
SCALE 1:500

**DRAWING INDEX:**

SHEET NUMBER	SHEET TITLE
B11219-DI-001	DRAWING INDEX, LOCALITY PLAN, & GENERAL ARRANGEMENT
B11219-PD-001	PAVEMENT AND TYPICAL CROSS SECTIONS
B11219-SP-001	SIGNAGE AND LINEMARKING
B11219-TP-001	TURN PATHS

**GENERAL NOTES:**

- GENERAL ARRANGEMENT MAY BE MODIFIED TO SUIT INDIVIDUAL SITE REQUIREMENTS. LAYOUT IS CONCEPTUAL IN NATURE.
- DETAILED SURVEY AND GEOTECHNICAL INVESTIGATION AND POTHOLES WILL BE REQUIRED WHEN PREFERRED LOCATIONS OF INTERSECTIONS ARE IDENTIFIED.
- DETAILED DESIGN DETAILS ARE DEPENDENT ON THE OUTCOMES OF GEOTECHNICAL INVESTIGATION DETAILED SURVEY AND SITE CONSTRAINTS.

**CONCEPT  
REVIEW ISSUE**  
24 Nov, 2011 – 4:10pm

0 5 10 15 20m  
SCALE 1:500 (A1)

No.	Date	By	Amendment	Checked
A		SM	PRELIMINARY ISSUE	

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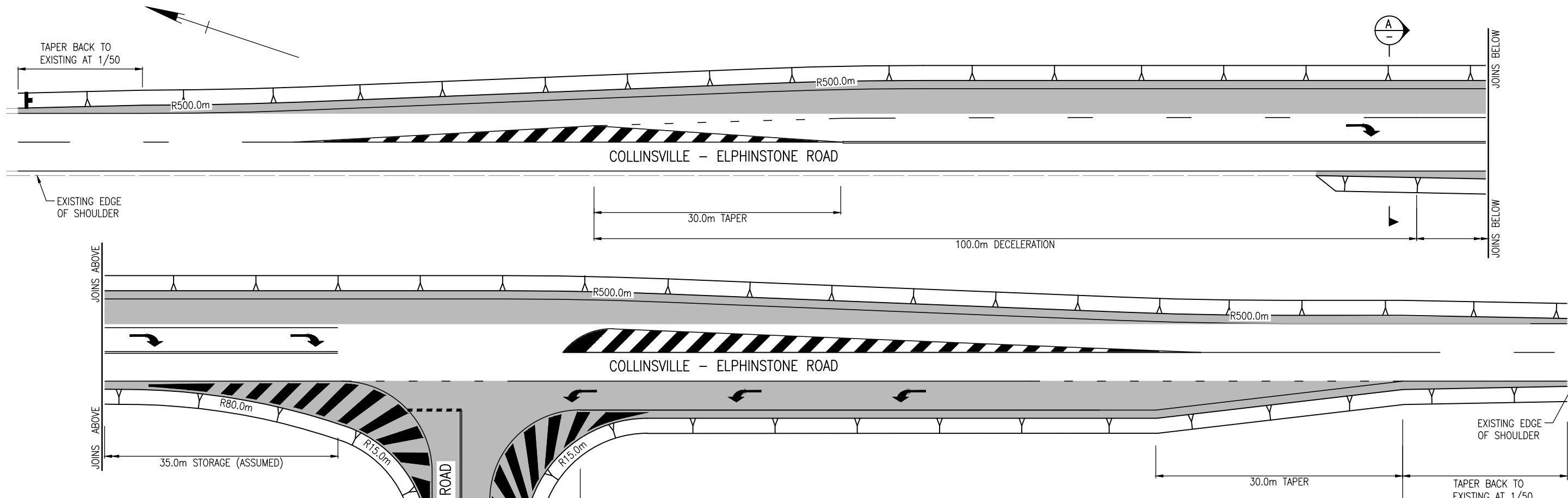
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Project: BYERWEN COAL PROJECT

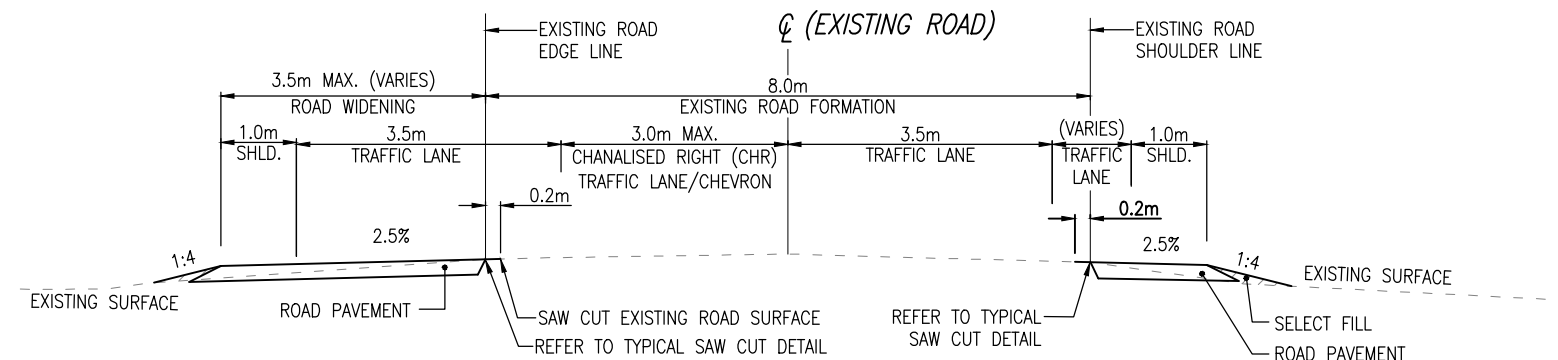
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Client: QCOAL PTY LTD		Sheet Size: A1	Drawing No: B11219-DI-001
Draftsperson: SM	Checked:	Approved: RPEQ No:	
Designer: SM	Date: 24/11/11	A	
Scale: AS SHOWN			

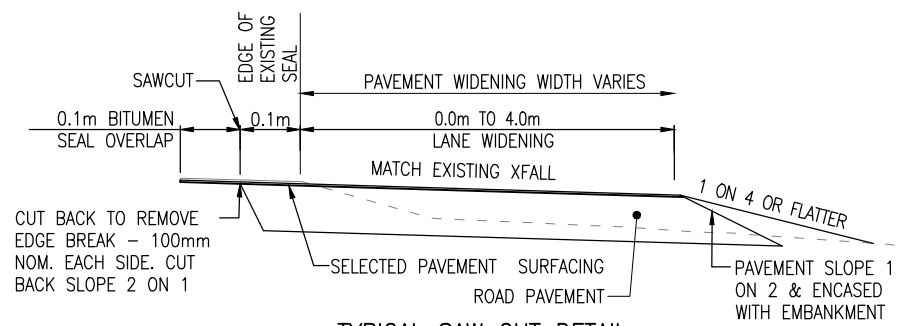


**LEGEND:**  
 PROPOSED ROAD PAVEMENT  
 PROPOSED BATTER SLOPE

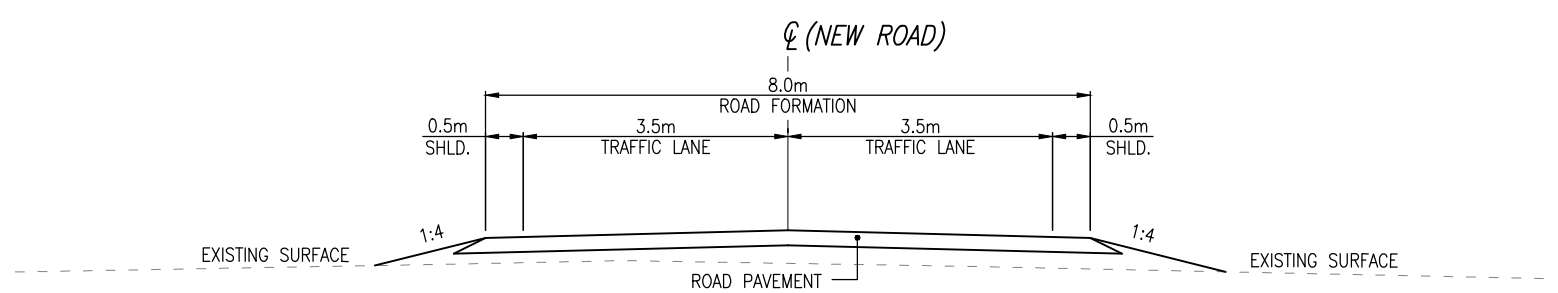
- GENERAL NOTES:**
1. CONCEPT SITE ACCESS LAYOUT TO SUIT TWO POSSIBLE LOCATIONS, SERVICING THE BYERWEN COAL MINE.
  2. SURVEY AND GEOTECHNICAL INFORMATION IS REQUIRED TO IDENTIFY APPROPRIATE EARTHWORKS AND DRAINAGE MEASURES/CONTROLS.
  3. DESIGN SPEED HAS BEEN ASSUMED AT 110km/hr.
  4. DESIGN VEHICLE HAS BEEN ASSUMED AS 25.0m B=DOUBLE CATERING FOR 36.5m B=TRIPLE RIGHT-TURN INTO BYERWEN MINE ACCESS ROAD. REFER DRG TP-001 FOR B=DOUBLE TURN PATH ANALYSIS.
  5. TAPERS AND LANE LENGTH TO BE CONFIRMED AT DETAILED DESIGN.



**TYPICAL SECTION A - COLLINSVILLE-ELPHINSTONE ROAD**  
SCALE 1:50

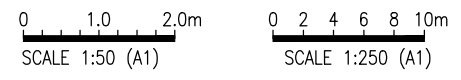


**TYPICAL SAW CUT DETAIL**  
NTS



**TYPICAL SECTION B - BYERWEN ACCESS ROAD**  
SCALE 1:50

**CONCEPT REVIEW ISSUE**  
24 Nov, 2011 - 4:11pm



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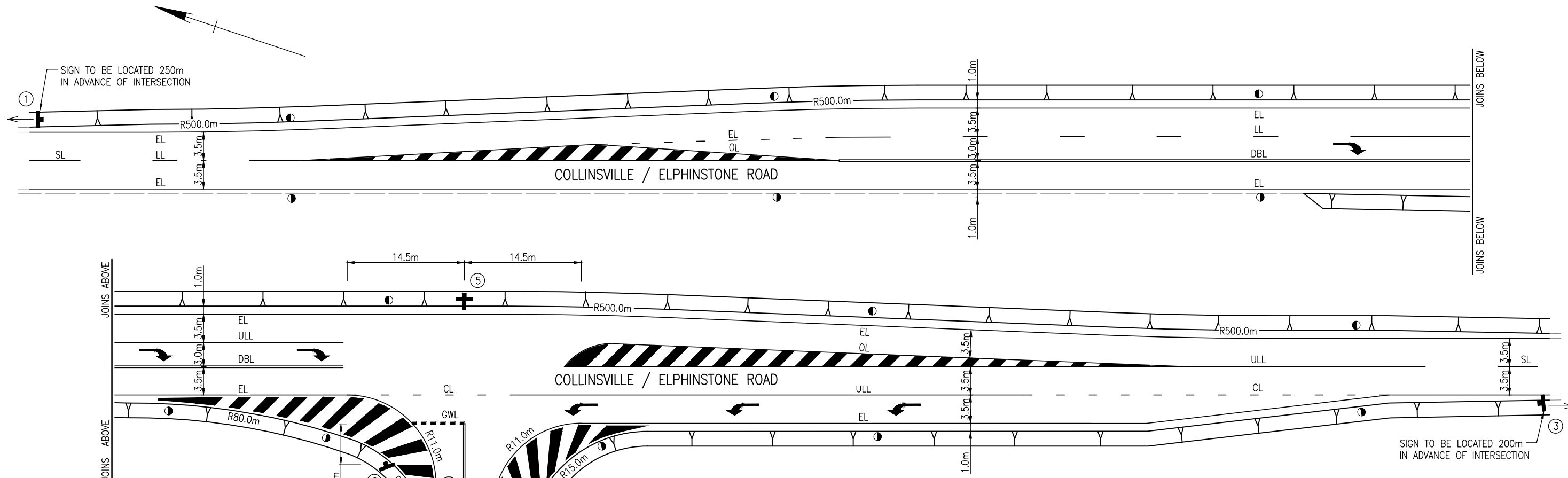
Project: **BYERWEN COAL PROJECT**

Title: **TYPICAL CONCEPTS BYERWEN COAL MINE INTERSECTIONS**

Client: <b>QCOAL PTY LTD</b>			
Draftsperson: <b>SM</b>	Checked:	Sheet Size: <b>A1</b>	Drawing No.: <b>B11219-PD-001</b>
Designer: <b>SM</b>	Approved: RPEQ No.:		
Scale: <b>AS SHOWN</b>	Date: <b>24/11/11</b>	A	

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**LEGEND:**

- ① NEW SIGN
- ROAD EDGE GUIDE POST (REFER DMR STANDARD DRAWING 1356)

**PAVEMENT MARKING LEGEND:**

- DBL - BARRIER LINE DOUBLE (80mm)
- LL - LANE LINE BROKEN (80mm)
- ULL - LANE LINE UN BROKEN (80mm)
- EL - EDGE LINE (100mm)
- CL - CONTINUITY LINE (100mm)
- OL - OUT LINE (100mm)
- SL - STOP LINE (300mm)
- GWL - GIVEWAY LINE (200mm)

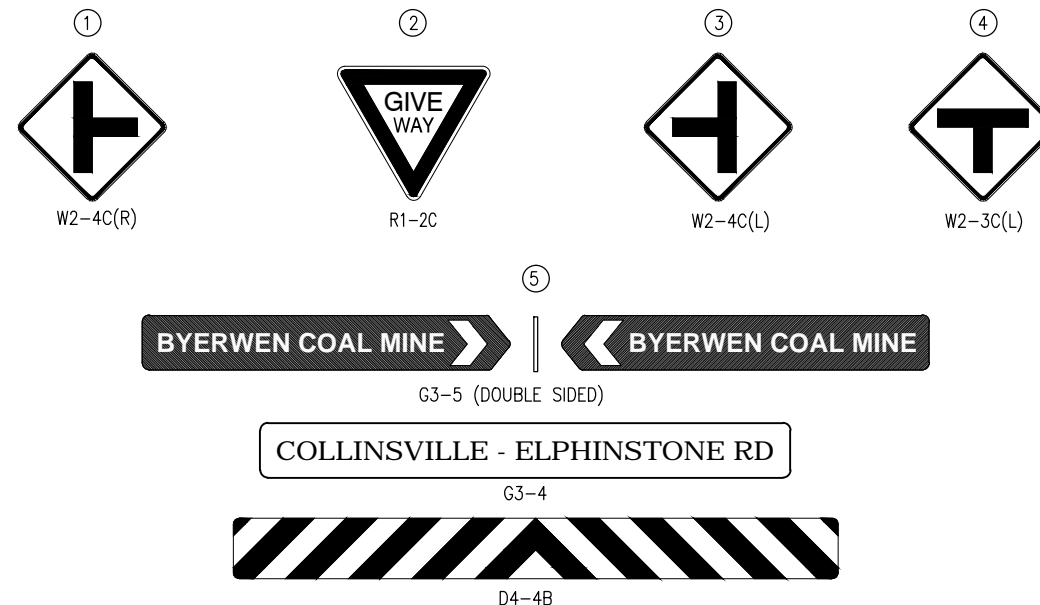
**LINEMARKING NOTES:**

1. PAVEMENT MARKINGS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE MUTCD, QLD, CURRENT EDITION AND WITH MAIN ROADS STANDARD SPECIFICATIONS (MRS45).
2. ALL EXISTING PAVEMENT MARKINGS WHICH CONFLICT WITH THOSE SHOWN ON THESE PLANS ARE TO BE REMOVED AND AMENDED TO AGREE WITH THE PAVEMENT MARKINGS SHOWN ON THESE PLANS AND IN ACCORDANCE WITH THE MUTCD.

**GENERAL NOTES:**

1. SIGNAGE ARRANGEMENT SUITS CONCEPT LAYOUT SHOWN
2. ROAD EDGE GUIDE POSTS TO SATISFY DMR STANDARDS FOR SPACING AND LOCATION.

**SIGNAGE LEGEND:**



0 2 4 6 8 10m  
SCALE 1:250 (A1)

No.	Date	By	Amendment	Checked
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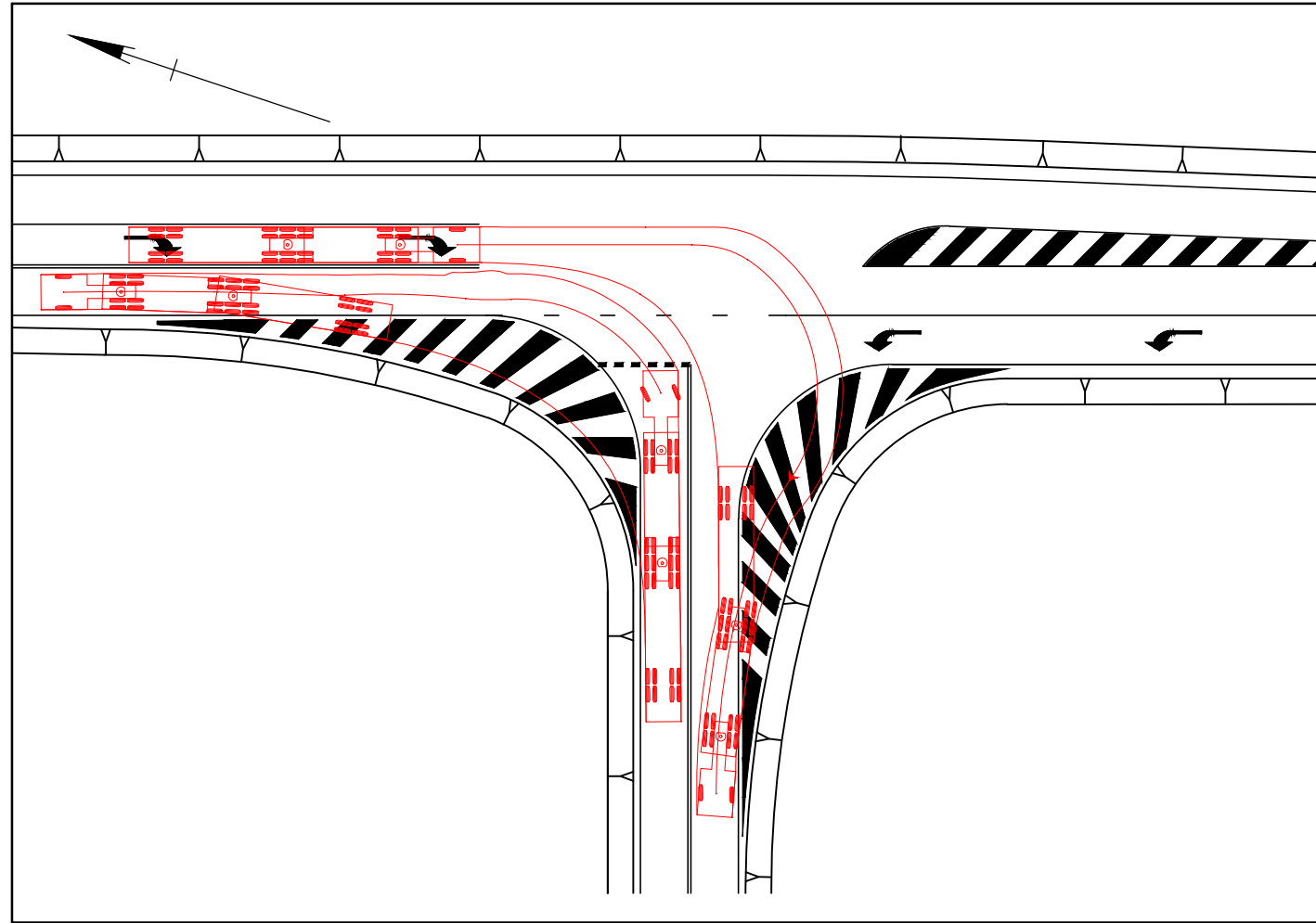
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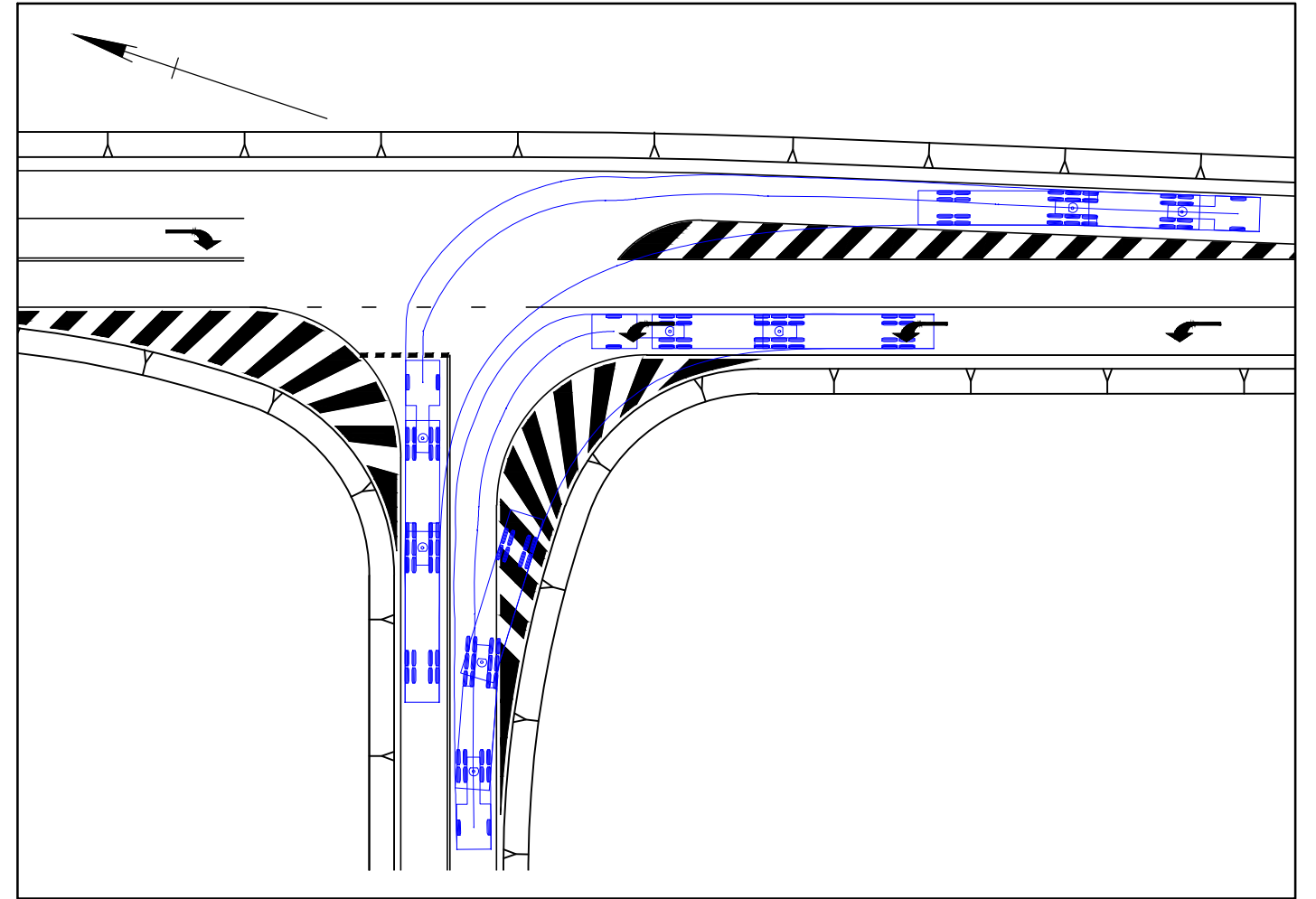
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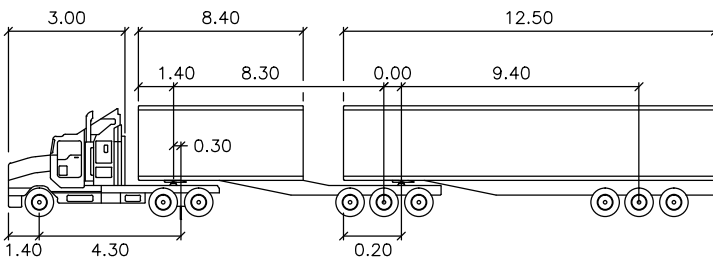
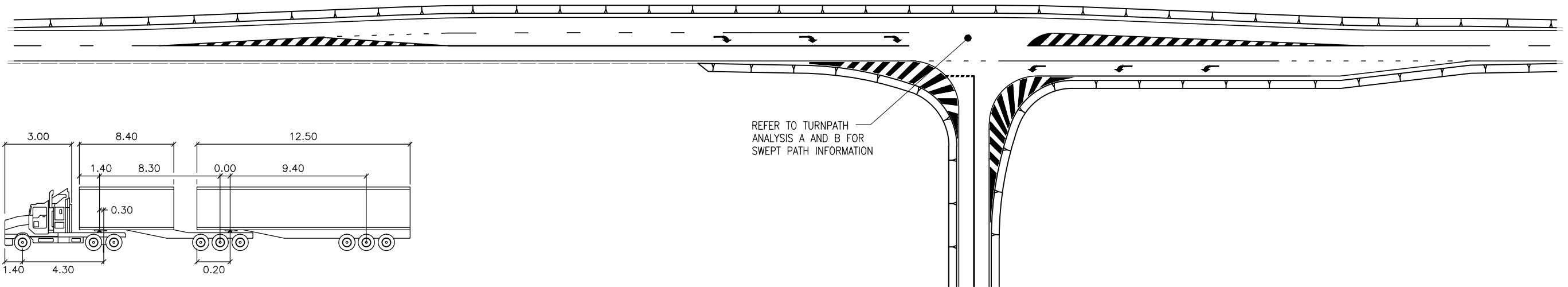
**CONCEPT REVIEW ISSUE**  
24 Nov, 2011 - 4:11pm



TURN PATH ANALYSIS A - 25.0m B-DOUBLE  
SCALE 1:250



TURN PATH ANALYSIS B - 25.0m B-DOUBLE  
SCALE 1:250



**B-DOUBLE 25m**

METERS

TRACTOR WIDTH	: 2.50	LOCK TO LOCK TIME	: 6.0
TRAILER WIDTH	: 2.50	STEERING ANGLE	: 22.2
TRACTOR TRACK	: 2.50	ARTICULATING ANGLE	: 70.0
TRAILER TRACK	: 2.50		

PLAN  
SCALE 1:500

**CONCEPT  
REVIEW ISSUE**

24 Nov, 2011 - 4:13pm

0 2 4 6 8 10m  
SCALE 1:250 (A1)

0 5 10 15 20m  
SCALE 1:500 (A1)

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Title: TYPICAL CONCEPTS BYERWEN COAL MINE INTERSECTIONS

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## **APPENDIX B**

### **PAVEMENT MAINTENANCE ASSESSMENT**

**LAMBERT & REHBEIN**

ENGINEERS - MANAGERS - SCIENTISTS  
 CLIENT: Byerwen Coal Pty Ltd  
 PROJECT NAME: Byerwen Coal - TIA  
 PROJECT No.: B11219  
 PREPARED BY: Chris Howarth-Crewdson  
 Date: 04/12/2012

**ESA's per vehicle**

Truck (Class 4)	ESAs
Loaded	3.7
Unloaded	0.5

Bus (Class 3)	ESAs
Loaded	3
Unloaded	0.54

Trucks (Class 9)	ESAs
Loaded	5.1
Unloaded	0.51

Trucks (Class 3)	ESAs
Loaded	3
Unloaded	0.54

B-Double (Class 10)	ESAs
Loaded	6.4
Unloaded	0.53

F1	2.8
----	-----

**ESA Impact Assessment - Byerwen Coal Mine (Collinsville - Elphinstone Road) north of project site**

VEHICLE TYPE	CONSTRUCTION PHASE				CONSTRUCTION & OPERATION PHASE				OPERATION PHASE																CONSTRUCTION NTH & OPERATION STH				OPERATION NTH & STH															
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027		2028		2029		2030		2031		2032		2033		2034		2035	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A				
<b>Total Existing ESA's</b>	-																																											
ESA Data/yr (x1,000)	34.42	39.00	37.86	42.90	41.65	47.19	45.81	51.91	50.40	57.10	55.44	62.81	60.98	69.09	67.08	76.00	73.78	83.60	81.16	91.96	89.28	101.16	98.21	111.27	108.03	122.40	118.83	134.64	130.71	148.10	143.79	162.91	158.16	179.20	173.98	197.12	191.38	216.84	210.52	238.52	231.57	262.37	254.72	288.61
<b>Project Generated ESA's</b>	-																																											
Road Haulage - Byerwen Coal Mine	-																																											
North of project site (Collinsville - Elphinstone Road)	-																																											
<b>Cars (Class 1)</b>	-																																											
Loaded ESA's (x1,000)	-																																											
% Increase	0.00%																																											
Unloaded ESA's (x1,000)	-																																											
% Increase	0.00%																																											
<b>Buses (Class 3)</b>	-																																											
Loaded ESA's (x1,000)	-																																											
% Increase	0.00%																																											
Unloaded ESA's (x1,000)	-																																											
% Increase	0.00%																																											
<b>Trucks (Class 3)</b>	-																																											
Loaded ESA's (x1,000)	-	-	-	-	-	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
% Increase	0.00%	0.00%	0.00%	0.00%	0.00%	0.65%	0.60%	0.54%	0.49%	0.45%	0.41%	0.37%	0.34%	0.31%	0.28%	0.25%	0.23%	0.21%	0.19%	0.17%	0.16%	0.14%	0.13%	0.12%	0.11%	0.10%	0.09%	0.08%	0.07%	0.06%	0.05%	0.05%	0.04%	0.04%	0.03%	0.03%	0.03%	0.02%	0.02%	0.02%	0.02%	0.02%		
Unloaded ESA's (x1,000)	-	-	-	-	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
% Increase	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.09%	0.09%	0.08%	0.07%	0.06%	0.06%	0.05%	0.05%	0.04%	0.04%	0.04%	0.03%	0.03%	0.03%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%				
<b>Trucks (Class 4)</b>	-																																											
Loaded ESA's (x1,000)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
% Increase	0.00%																																											
Unloaded ESA's (x1,000)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
% Increase	0.00%																																											
<b>Trucks (Class 9)</b>	-																																											
Loaded ESA's (x1,000)	0.33	0.65	0.21	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58				
% Increase	0.95%	1.73%	0.50%	7.82%	7.11%	6.46%	5.88%	5.34%	4.86%	4.41%	4.01%	3.65%	3.32%	3.01%	2.74%	2.49%	2.26%	2.04%	1.83%	1.63%	1.44%	1.26%	1.09%	0.93%	0.78%	0.64%	0.51%	0.39%	0.28%	0.18%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%					
Unloaded ESA's (x1,000)	0.03	0.07	0.02	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36					
% Increase	0.08%	0.15%	0.04%	0.69%	0.63%	0.57%	0.52%	0.47%	0.43%	0.39%	0.35%	0.32%	0.29%	0.27%	0.24%	0.22%	0.20%	0.18%	0.16%	0.14%	0.12%	0.10%	0.09%	0.08%	0.07%	0.06%	0.05%	0.04%	0.03%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%						
<b>B-Double (Class 10)</b>	-																																											
Loaded ESA's (x1,000)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
% Increase	0.00%																																											
Unloaded ESA's (x1,000)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
% Increase	0.00%																																											
<b>TOTAL ESA INCREASE</b>	0.9%	0.1%	1.7%	0.2%	0.5%	0.0%	8.5%	0.8%	7.7%	0.7%	7.0%	0.7%	6.4%	0.6%	5.8%	0.5%	5.3%	0.5%	4.8%	0.4%	4.3%	0.4%	4.0%	0.4%	3.6%	0.3%	3.3%	0.3%	3.0%	0.3%	2.7%	0.3%	2.8%	0.3%	2.5%	0.2%	2.3%	0.2%	2.0%	0.2%	1.8%	0.2%		

# LAMBERT & REHBEIN

ENGINEERS - MANAGERS - SCIENTISTS

CLIENT: Byerwen Coal Pty Ltd

PROJECT NAME: Byerwen Coal - TIA

PROJECT No.: B11219

PREPARED BY: Chris Howarth-Crewdson

Date: 04/12/2012

## MAINTENANCE CONTRIBUTION FOR BYERWEN COAL MINE - North of Project site

mainteneacne	CONSTRUCTION PHASE				CONSTRUCTION & OPERATION PHASE																	
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
MAINTENANCE COST / KM / LANE	\$ 2,026	\$ 2,026	\$ 2,127	\$ 2,127	\$ 2,233	\$ 2,233	\$ 2,345	\$ 2,345	\$ 2,462	\$ 2,462	\$ 2,586	\$ 2,586	\$ 2,715	\$ 2,715	\$ 2,851	\$ 2,851	\$ 2,993	\$ 2,993	\$ 3,143	\$ 3,143	\$ 3,143	\$ 3,143
Glenden - Elphinstone																						
Cars (Class 1)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buses (Class 3)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 3)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 54	\$ -	\$ 51	\$ -	\$ 49	\$ -	\$ 47	\$ -	\$ 45	\$ -	\$ 43	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 4)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 9)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 356	\$ -	\$ 340	\$ -	\$ 324	\$ -	\$ 310	\$ -	\$ 296	\$ -	\$ 282	\$ -	\$ -	\$ -	\$ -	\$ -
B-Double (Class 10)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOTAL MAINTENANCE CONTRIBUTION	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 410	\$ -	\$ 391	\$ -	\$ 373	\$ -	\$ 356	\$ -	\$ 340	\$ -	\$ 325	\$ -	\$ -	\$ -	\$ -	\$ -

YEAR	G	A	TOTAL
2014	\$ -	\$ -	\$ -
2015	\$ -	\$ -	\$ -
2016	\$ -	\$ -	\$ -
2017	\$ 410	\$ -	\$ 410
2018	\$ 391	\$ -	\$ 391
2019	\$ 373	\$ -	\$ 373
2020	\$ 356	\$ -	\$ 356
2021	\$ 340	\$ -	\$ 340
2022	\$ 325	\$ -	\$ 325
2023	\$ -	\$ -	\$ -
2024	\$ -	\$ -	\$ -
2025	\$ -	\$ -	\$ -
2026	\$ -	\$ -	\$ -
2027	\$ -	\$ -	\$ -
2028	\$ -	\$ -	\$ -
2029	\$ -	\$ -	\$ -
2030	\$ -	\$ -	\$ -
2031	\$ -	\$ -	\$ -
2032	\$ -	\$ -	\$ -
2033	\$ -	\$ -	\$ -
TOTAL CONTRIBUTION			\$ 2,196
ANNUALISED (Over 50 YR Operation)			\$ 43.91



**LAMBERT & REHBEIN**

ENGINEERS - MANAGERS - SCIENTISTS

CLIENT: Byerwen Coal Pty Ltd

PROJECT NAME: Byerwen Coal - TIA

PROJECT No.: B11219

PREPARED BY: Chris Howarth-Crewdson

Date: 04/12/2012

**MAINTENANCE CONTRIBUTION FOR BYERWEN COAL MINE - Project Site to Glenden**

VEHICLE TYPE	CONSTRUCTION PHASE								CONSTRUCTION & OPERATION PHASE		OPERATION PHASE																CONSTRUCTION NTH & OPERATION STH PHASE						OPERATION NTH & STH PHASE									
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027		2028		2029		2030		2031		2032		2033			
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A				
MAINTENANCE COST / KM / LANE	\$ 2,026	\$ 2,026	\$ 2,127	\$ 2,127	\$ 2,233	\$ 2,233	\$ 2,345	\$ 2,345	\$ 2,462	\$ 2,462	\$ 2,586	\$ 2,586	\$ 2,715	\$ 2,715	\$ 2,851	\$ 2,851	\$ 2,993	\$ 2,993	\$ 3,143	\$ 3,143	\$ 3,300	\$ 3,300	\$ 3,465	\$ 3,465	\$ 3,638	\$ 3,638	\$ 3,820	\$ 3,820	\$ 4,011	\$ 4,011	\$ 4,212	\$ 4,212	\$ 4,422	\$ 4,422	\$ 4,643	\$ 4,643	\$ 4,875	\$ 4,875	\$ 5,119	\$ 5,119		
Byerwen - Glenden																																										
Cars (Class 1)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buses (Class 3)	\$ -	\$ 1,410	\$ 2,425	\$ 2,692	\$ -	\$ 1,028	\$ -	\$ 1,472	\$ -	\$ 1,405	\$ -	\$ 1,341	\$ -	\$ 1,280	\$ -	\$ 1,222	\$ -	\$ 1,166	\$ -	\$ 1,113	\$ -	\$ 1,063	\$ -	\$ 1,015	\$ -	\$ 968	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,876	\$ -	\$ 1,791	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 3)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 4)	\$ -	\$ 697	\$ 162	\$ 1,330	\$ -	\$ 325	\$ -	\$ 59	\$ -	\$ 56	\$ -	\$ 53	\$ -	\$ 51	\$ -	\$ 49	\$ -	\$ 46	\$ -	\$ 44	\$ -	\$ 42	\$ -	\$ 40	\$ -	\$ 39	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 366	\$ -	\$ 350	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 9)	\$ -	\$ 1,672	\$ 287	\$ 3,192	\$ -	\$ 2,828	\$ -	\$ 1,710	\$ -	\$ 1,632	\$ -	\$ 1,558	\$ -	\$ 1,487	\$ -	\$ 1,420	\$ -	\$ 1,355	\$ -	\$ 1,294	\$ -	\$ 1,235	\$ -	\$ 1,179	\$ -	\$ 1,125	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,350	\$ -	\$ 2,243	\$ -	\$ -	\$ -	\$ -	\$ -	
B-Double (Class 10)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,008	\$ -	\$ 3,826	\$ -	\$ 3,652	\$ -	\$ 3,486	\$ -	\$ 3,327	\$ -	\$ 3,176	\$ -	\$ 3,032	\$ -	\$ 2,894	\$ -	\$ 2,762	\$ -	\$ 2,637	\$ -	\$ 2,517	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,090	\$ -	\$ 1,995	\$ -	\$ -	\$ -	\$ -	\$ -		
<b>TOTAL MAINTENANCE CONTRIBUTION</b>	\$ -	\$ 3,779	\$ 2,874	\$ 7,215	\$ -	\$ 8,188	\$ -	\$ 7,066	\$ -	\$ 6,745	\$ -	\$ 6,438	\$ -	\$ 6,146	\$ -	\$ 5,866	\$ -	\$ 5,600	\$ -	\$ 5,345	\$ -	\$ 5,102	\$ -	\$ 4,870	\$ -	\$ 4,649	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 6,682	\$ -	\$ 6,378	\$ -	\$ -	\$ -	\$ -	\$ -		

YEAR	G	A	TOTAL
2014	\$ -	\$ 3,779	\$ 3,779
2015	\$ 2,874	\$ 7,215	\$ 10,089
2016	\$ -	\$ 8,188	\$ 8,188
2017	\$ -	\$ 7,066	\$ 7,066
2018	\$ -	\$ 6,745	\$ 6,745
2019	\$ -	\$ 6,438	\$ 6,438
2020	\$ -	\$ 6,146	\$ 6,146
2021	\$ -	\$ 5,866	\$ 5,866
2022	\$ -	\$ 5,600	\$ 5,600
2023	\$ -	\$ 5,345	\$ 5,345
2024	\$ -	\$ 5,102	\$ 5,102
2025	\$ -	\$ 4,870	\$ 4,870
2026	\$ -	\$ 4,649	\$ 4,649
2027	\$ -	\$ -	\$ -
2028	\$ -	\$ -	\$ -
2029	\$ -	\$ -	\$ -
2030	\$ -	\$ 6,682	\$ 6,682
2031	\$ -	\$ 6,378	\$ 6,378
2032	\$ -	\$ -	\$ -
2033	\$ -	\$ -	\$ -
<b>TOTAL CONTRIBUTION</b>			\$ 92,945
<b>ANNUALISED (Over 50 YR Operation)</b>			\$ 1,858.90





# LAMBERT & REHBEIN

ENGINEERS - MANAGERS - SCIENTISTS

CLIENT: Byerwen Coal Pty Ltd

PROJECT NAME: Byerwen Coal - TIA

PROJECT No.: B11219

PREPARED BY: Chris Howarth-Crewdson

Date: 04/10/2012

## MAINTENANCE CONTRIBUTION FOR BYERWEN COAL MINE - Glenden to Elphinstone

mainteneacne	CONSTRUCTION PHASE				CONSTRUCTION & OPERATION PHASE																	
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
MAINTENANCE COST / KM / LANE	\$ 2,026	\$ 2,026	\$ 2,026	\$ 2,026	\$ 2,127	\$ 2,127	\$ 2,233	\$ 2,233	\$ 2,345	\$ 2,345	\$ 2,462	\$ 2,462	\$ 2,586	\$ 2,586	\$ 2,715	\$ 2,715	\$ 2,851	\$ 2,851	\$ 2,993	\$ 2,993	\$ 3,143	\$ 3,143
Glenden - Elphinstone																						
Cars (Class 1)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buses (Class 3)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 183	\$ -	\$ 303	\$ -	\$ 290	\$ -	\$ 276	\$ -	\$ 264	\$ -	\$ 252	\$ -	\$ 240	\$ -	\$ 229	\$ -	\$ -
Trucks (Class 3)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 4)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 30	\$ -	\$ 25	\$ -	\$ 24	\$ -	\$ 23	\$ -	\$ 22	\$ -	\$ 21	\$ -	\$ 20	\$ -	\$ 19	\$ -	\$ -
Trucks (Class 9)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 339	\$ -	\$ 759	\$ -	\$ 725	\$ -	\$ 692	\$ -	\$ 660	\$ -	\$ 630	\$ -	\$ 602	\$ -	\$ 574	\$ -	\$ -
B-Double (Class 10)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,011	\$ -	\$ 3,829	\$ -	\$ 3,655	\$ -	\$ 3,488	\$ -	\$ 3,330	\$ -	\$ 3,179	\$ -	\$ 3,034	\$ -	\$ 2,896	\$ -	\$ -
TOTAL MAINTENANCE CONTRIBUTION	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,562	\$ -	\$ 4,916	\$ -	\$ 4,693	\$ -	\$ 4,480	\$ -	\$ 4,276	\$ -	\$ 4,082	\$ -	\$ 3,896	\$ -	\$ 3,719	\$ -	\$ -

YEAR	G	A	TOTAL
2014	\$ -	\$ -	\$ -
2015	\$ -	\$ -	\$ -
2016	\$ -	\$ 4,562	\$ 4,562
2017	\$ -	\$ 4,916	\$ 4,916
2018	\$ -	\$ 4,693	\$ 4,693
2019	\$ -	\$ 4,480	\$ 4,480
2020	\$ -	\$ 4,276	\$ 4,276
2021	\$ -	\$ 4,082	\$ 4,082
2022	\$ -	\$ 3,896	\$ 3,896
2023	\$ -	\$ 3,719	\$ 3,719
2024	\$ -	\$ -	\$ -
2025	\$ -	\$ -	\$ -
2026	\$ -	\$ -	\$ -
2027	\$ -	\$ -	\$ -
2028	\$ -	\$ -	\$ -
2029	\$ -	\$ -	\$ -
2030	\$ -	\$ -	\$ -
2031	\$ -	\$ -	\$ -
2032	\$ -	\$ -	\$ -
2033	\$ -	\$ -	\$ -
TOTAL CONTRIBUTION			\$ 34,623
ANNUALISED (Over 50 YR Operation)			\$ 692.47



# LAMBERT & REHBEIN

ENGINEERS - MANAGERS - SCIENTISTS

CLIENT: Byerwen Coal Pty Ltd

PROJECT NAME: Byerwen Coal - TIA

PROJECT No.: B11219

PREPARED BY: Chris Howarth-Crewdson

Date: 04/12/2012

## MAINTENANCE CONTRIBUTION FOR BYERWEN COAL MINE - Peak Downs Highway - Elphinstone

mainteneacne	CONSTRUCTION PHASE				CONSTRUCTION & OPERATION PHASE																	
	2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024	
	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A	G	A
MAINTENANCE COST / KM / LANE	\$ 2,026	\$ 2,026	\$ 2,127	\$ 2,127	\$ 2,233	\$ 2,233	\$ 2,345	\$ 2,345	\$ 2,462	\$ 2,462	\$ 2,586	\$ 2,586	\$ 2,715	\$ 2,715	\$ 2,851	\$ 2,851	\$ 2,993	\$ 2,993	\$ 3,143	\$ 3,143	\$ 3,143	\$ 3,143
Glenden - Elphinstone																						
Cars (Class 1)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buses (Class 3)	\$ -	\$ -	\$ -	\$ -	\$ 260	\$ -	\$ 448	\$ -	\$ 444	\$ -	\$ 439	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 3)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 4)	\$ -	\$ -	\$ -	\$ -	\$ 6	\$ -	\$ 5	\$ -	\$ 5	\$ -	\$ 5	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Trucks (Class 9)	\$ -	\$ -	\$ -	\$ -	\$ 52	\$ -	\$ 120	\$ -	\$ 119	\$ -	\$ 118	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
B-Double (Class 10)	\$ -	\$ -	\$ -	\$ -	\$ 508	\$ -	\$ 503	\$ -	\$ 498	\$ -	\$ 494	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOTAL MAINTENANCE CONTRIBUTION	\$ -	\$ -	\$ -	\$ -	\$ 825	\$ -	\$ 1,077	\$ -	\$ 1,066	\$ -	\$ 1,056	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

YEAR	G	A	TOTAL
2014	\$ -	\$ -	\$ -
2015	\$ -	\$ -	\$ -
2016	\$ 825	\$ -	\$ 825
2017	\$ 1,077	\$ -	\$ 1,077
2018	\$ 1,066	\$ -	\$ 1,066
2019	\$ 1,056	\$ -	\$ 1,056
2020	\$ -	\$ -	\$ -
2021	\$ -	\$ -	\$ -
2022	\$ -	\$ -	\$ -
2023	\$ -	\$ -	\$ -
2024	\$ -	\$ -	\$ -
2025	\$ -	\$ -	\$ -
2026	\$ -	\$ -	\$ -
2027	\$ -	\$ -	\$ -
2028	\$ -	\$ -	\$ -
2029	\$ -	\$ -	\$ -
2030	\$ -	\$ -	\$ -
2031	\$ -	\$ -	\$ -
2032	\$ -	\$ -	\$ -
2033	\$ -	\$ -	\$ -
TOTAL CONTRIBUTION			\$ 4,025
ANNUALISED (Over 50 YR Operation)			\$ 80



## APPENDIX C

### PAVEMENT REHABILITATION ASSESSMENT

# LAMBERT & REHBEIN

**ENGINEERS - MANAGERS - SCIENTISTS**

CLIENT: Byerwen Coal Pty Ltd

PROJECT NAME: Byerwen Coal - TIA

PROJECT No.: B11219

PREPARED BY: Chris Howarth-Crewdson

Date: 04/12/2012

Existing Roughness:	53.107
Terminal Roughness:	120
Roughness Increase per Year:	3
Development Start Year:	2014
Roughness Count Year:	2010
Discount Rate:	6%
Background ESA's per Year at Development Start (G)	34,421
Background ESA's per Year at Development Start (A)	39,000
Background Traffic Growth Rate	10%
Cumulative Background ESA's (Devel. Start to Rehab) (G)	1,957,883
Cumulative Background ESA's (Devel. Start to Rehab) (A)	2,218,321
Years to Failure:	22.30
Rehab Year Without Develop:	2032
Years to Rehab From Development Start:	18.30
Rehab Cost Per Lane:	\$ 1,200,000.00
Amount of Road Used (km):	22

## Collinsville-Elphinstone Road (North of Project Site)

Vehicle Type	Unloaded Direction						Loaded Direction					
	Reduced Pavement Life With Project Traffic - (Project Start to Rehab. Yr)				Present Value - Rehab Costs		Reduced Pavement Life With Project Traffic - (Project Start to Rehab. Yr)				Present Value - Rehab Costs	
	Cumulative ESA's Dev. Traffic	Reduced B'ground ESA's to Rehab	Yrs to Rehab (With Dev.)	Reduced Pavement Life (Years)	Bring Forward Factor	Rehab Contribution Required	Cumulative ESA's Dev. Traffic	Reduced B'ground ESA's to Rehab	Yrs to Rehab (With Dev.)	Reduced Pavement Life (Years)	Bring Forward Factor	Rehab Contribution Required
Byerwen Coal Mine	6,817.86	1,951,064.99	18.29	0.01	0.00	NO	64,385.95	2,153,935.15	18.21	0.08	0.00	NO

# LAMBERT & REHBEIN

**ENGINEERS - MANAGERS - SCIENTISTS**

CLIENT: Byerwen Coal Pty Ltd

PROJECT NAME: Byerwen Coal - TIA

PROJECT No.: B11219

PREPARED BY: Chris Howarth-Crewdson

Date: 04/12/2012

Existing Roughness:	64.18
Terminal Roughness:	120
Roughness Increase per Year:	3
Development Start Year:	2014
Roughness Count Year:	2010
Discount Rate:	6%
Background ESA's per Year at Development Start (G)	107,654
Background ESA's per Year at Development Start (A)	96,961
Background Traffic Growth Rate	10%
Cumulative Background ESA's (Devel. Start to Rehab) (G)	3,853,707
Cumulative Background ESA's (Devel. Start to Rehab) (A)	3,470,939
Years to Failure:	18.61
Rehab Year Without Develop:	2029
Years to Rehab From Development Start:	14.61
Rehab Cost Per Lane:	\$ 1,200,000.00
Amount of Road Used (km):	25

## Collinsville-Elphinstone Road (Byerwen Site to Glenden)

Vehicle Type	Unloaded Direction						Loaded Direction					
	Reduced Pavement Life With Project Traffic - (Project Start to Rehab. Yr)				Present Value - Rehab Costs		Reduced Pavement Life With Project Traffic - (Project Start to Rehab. Yr)				Present Value - Rehab Costs	
	Cumulative ESA's Dev. Traffic	Reduced B'ground ESA's to Rehab	Yrs to Rehab (With Dev.)	Reduced Pavement Life (Years)	Bring Forward Factor	Rehab Contribution Required	Cumulative ESA's Dev. Traffic	Reduced B'ground ESA's to Rehab	Yrs to Rehab (With Dev.)	Reduced Pavement Life (Years)	Bring Forward Factor	Rehab Contribution Required
Byerwen Coal Mine	59,673.00	3,794,033.69	14.53	0.08	0.00	NO	207,168.77	3,263,770.45	14.29	0.31	0.01	NO

# LAMBERT & REHBEIN

**ENGINEERS - MANAGERS - SCIENTISTS**

CLIENT: Byerwen Coal Pty Ltd

PROJECT NAME: Byerwen Coal - TIA

PROJECT No.: B11219

PREPARED BY: Chris Howarth-Crewdson

Date: 04/12/2012

Existing Roughness:	84.85
Terminal Roughness:	120
Roughness Increase per Year:	3
Development Start Year:	2014
Roughness Count Year:	2010
Discount Rate:	6%
Background ESA's per Year at Development Start (G)	85,300
Background ESA's per Year at Development Start (A)	88,582
Background Traffic Growth Rate	10%
Cumulative Background ESA's (Devel. Start to Rehab) (G)	1,153,514
Cumulative Background ESA's (Devel. Start to Rehab) (A)	1,197,901
Years to Failure:	11.72
Rehab Year Without Develop:	2022
Years to Rehab From Development Start:	7.72
Rehab Cost Per Lane:	\$ 1,200,000.00
Amount of Road Used (km):	24

## Collinsville-Elphinstone Road (Glenden to Elphinstone)

Vehicle Type	Unloaded Direction						Loaded Direction					
	Reduced Pavement Life With Project Traffic - (Project Start to Rehab. Yr)				Present Value - Rehab Costs		Reduced Pavement Life With Project Traffic - (Project Start to Rehab. Yr)				Present Value - Rehab Costs	
	Cumulative ESA's Dev. Traffic	Reduced B'ground ESA's to Rehab	Yrs to Rehab (With Dev.)	Reduced Pavement Life (Years)	Bring Forward Factor	Rehab Contribution Required	Cumulative ESA's Dev. Traffic	Reduced B'ground ESA's to Rehab	Yrs to Rehab (With Dev.)	Reduced Pavement Life (Years)	Bring Forward Factor	Rehab Contribution Required
Byerwen Coal Mine	10,384.55	1,143,129.81	7.68	0.04	0.00	NO	66,406.65	1,131,494.43	7.47	0.25	0.01	NO

# LAMBERT & REHBEIN

**ENGINEERS - MANAGERS - SCIENTISTS**

CLIENT: Byerwen Coal Pty Ltd

PROJECT NAME: Byerwen Coal - TIA

PROJECT No.: B11219

PREPARED BY: Chris Howarth-Crewdson

Date: 04/12/2012

Existing Roughness:	94.26
Terminal Roughness:	120
Roughness Increase per Year:	3
Development Start Year:	2014
Roughness Count Year:	2010
Discount Rate:	6%
Background ESA's per Year at Development Start (G)	152,585
Background ESA's per Year at Development Start (A)	141,952
Background Traffic Growth Rate	6%
Cumulative Background ESA's (Devel. Start to Rehab) (G)	1,167,645
Cumulative Background ESA's (Devel. Start to Rehab) (A)	1,086,277
Years to Failure:	8.58
Rehab Year Without Develop:	2019
Years to Rehab From Development Start:	4.58
Rehab Cost Per Lane:	\$ 1,200,000.00
Amount of Road Used (km):	52

## Suttor Developmental Road (Peak Downs Highway to Elphinstone)

Vehicle Type	Unloaded						Loaded					
	Reduced Pvt Life With Dev. Traffic - (Dev. Start to Rehab. Yr)				Present Value - Rehab Costs		Reduced Pvt Life With Dev. Traffic - (Dev. Start to Rehab. Yr)				Present Value - Rehab Costs	
	Cumulative Dev. Traffic	Reduced B'ground ESA's to Rehab	Yrs to Rehab (With Dev.)	Reduced Pvt Life (Years)	Bring Forward Factor	Rehab Contribution	Cumulative Dev. Traffic	Reduced B'ground ESA's to Rehab	Yrs to Rehab (With Dev.)	Reduced Pvt Life (Years)	Bring Forward Factor	Rehab Contribution
Byerwen Coal Mine	5,454.99	1,162,189.67	4.57	0.01	0.00	NO	31,323.55	1,054,953.28	4.50	0.08	0.00	NO