Appendix

T

Traffic Impact Assessment

Continuation of Boggabri Coal Mine
Traffic Impact Assessment

June, 2010

Boggabri Coal Mine Limited

Parsons Brinckerhoff Australia Pty Limited ABN 80 078 004 798

Ernst & Young Centre,
Level 27, 680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001
Australia
Telephone +61 2 9272 5100
Facsimile +61 2 9272 5101
Email sydney@pb.com.au

NCSI Certified Quality System ISO 9001, ISO14001, AS/NZS4801

2112805A-PR_2554_RevF

Revision	Details	Date	Amended By
	Original	26 November 2009	CC, BH, ZB
A	Revision	03 December 2009	ZB, GS
B	Revision	22 December 2009	ZB
C	Revision	4 January 2010	ZB, GS
D	Revision	6 January 2010	GS
E	Revision	23 June 2010	ZB
F	Revision	28 June 2010	ZB

© Parsons Brinckerhoff Australia Pty Limited (PB) [2010].

Copyright in the drawings, information and data recorded in this document (the information) is the property of PB. This document and the information are solely for the use of the authorised recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that for which it was supplied by PB. PB makes no representation, undertakes no duty and accepts no responsibility to any third party who may use or rely upon this document or the information.

Author: Chris Chun, Ben Hubbard, Zoran Bakovic.....

Signed: .....

Reviewer: Tom Van Drempt.....

Signed: .....

Approved by: John Webster; Graeme Steverson 23/6/10 .....

Signed: .....

Date: 26 June 2010 .....

Distribution: .....

Contents

Page Number

Glossary ..... **iv**

Executive summary ..... **v**

1. Introduction **1**

1.1 The project 3
1.1.1 Coal transport 3
1.1.2 Workforce and hours of operation 4
1.1.3 Conceptual mine plan for the project 4
1.1.4 Proposed public road closure 6
1.2 Traffic impact assessment scope 6

2. Existing road and traffic demand **7**

2.1 Road network 7
2.2 Existing coal movement infrastructure 17
2.3 Existing traffic volumes 17
2.3.1 Traffic surveys 18
2.3.2 Turning movement summary 19
2.3.3 Regional traffic growth 20

3. Existing performance of the key intersections **23**

3.1 Model performance indicators 23
3.1.1 Current performance of the key intersections 24

4. Forecast traffic demand **25**

4.1 Traffic generation 25
4.1.1 Operational traffic generation 25
4.1.2 Construction staff traffic generation 26
4.1.3 Summary of staff traffic generation 27
4.2 Traffic assignment in the AM and PM peak periods 27
4.3 Additional haulage vehicle traffic 30
4.4 Construction heavy vehicle traffic 30
4.5 Peak hours 30
4.6 Traffic distribution 30
4.7 Forecast Year 5 do-nothing traffic demand 31
4.8 Forecast Year 5 peak operational and construction traffic 33
4.9 Traffic redistribution due to closure of a section of Leard Forest Road 36

5. Traffic impact **39**

5.1 Modelling performance of the future Year 5 do-nothing scenario 39
5.2 Modelled performance of Year 5 peak operational and construction traffic 39
5.3 Road safety 40
5.3.1 Crash data 40
5.3.2 Closure of Leard Forest Road 42
5.3.3 Increase in the number of employee/construction staff 42
5.3.4 Road Safety Audit 42
5.4 Public transport services 43
5.5 Cycling and pedestrian access 43
5.6 Mitigation and management measures 43

6. Train operation traffic impact study **45**

7. Conclusions **47**

Contents (continued)

Page Number

List of tables

Table 2-1 Historical traffic trend on the Kamilaroi Highway and Manilla Road 21
Table 3-1 RTA levels of service 23
Table 3-2 Modelled existing traffic conditions (2009) 24
Table 4-1 Staff traffic generation summary 27
Table 4-2 Summary of staff trips in the AM peak period 28
Table 4-3 Summary of staff trips in the PM peak period 29
Table 5-1 Modelled future traffic conditions (Year 5) - Do-nothing scenario 39
Table 5-2 Modelled future traffic conditions (Year 5) - peak operation and construction period 40
Table 6-1 Train movements (supplied by Hansen Bailey) 45

List of figures

Figure 1-1 Locality plan 2
Figure 1-2 Conceptual mine layout plan for Year 21 5
Figure 2-1 Existing road network 7
Figure 2-2 Locations of traffic surveys 18
Figure 2-3 Existing (2009) AM peak hour (5:45 am – 6:45 am) traffic volumes 19
Figure 2-4 Existing (2009) PM peak hour (5:00 pm – 6:00 pm) traffic volumes 20
Figure 4-1 AM peak hour (5:45 am to 6:45 am) traffic distribution 31
Figure 4-2 Do-nothing scenario (Year 5) AM peak hour (5:45 am – 6:45 am) traffic volumes 32
Figure 4-3 Do-nothing scenario (Year 5) PM peak hour (5:00 pm – 6:00 pm) traffic volumes 33
Figure 4-4 Forecast Year 5 AM peak hour (5:45 am to 6:45 am) traffic volumes 34
Figure 4-5 Forecast Year 5 PM peak hour (5:00 pm to 6:00 pm) traffic volumes 35
Figure 4-6 Existing travel times 37
Figure 5-1 Boggabri area crashes 2004 – 2008 41

List of photos

Photo 2-1 Kamilaroi Highway, looking northbound in the vicinity of the intersection with Manila Road to the right 8
Photo 2-2 One-lane iron bridge on Manilla Road across the Namoi River, looking eastbound 9
Photo 2-3 Manilla Road, looking eastbound toward the intersection with Therribri Road 10
Photo 2-4 Leard Forest Road, looking southbound toward the intersection with Manilla Road 11
Photo 2-5 Unsealed rural road section of Leard Forest Road looking northbound 11
Photo 2-6 Goonbri Road, looking eastbound, approximately 200 m east of its intersection with Leard Forest Road 12
Photo 2-7 Leard Forest Road, looking north at the intersection with Boggabri Coal's southern access road (on the right hand side of the photo) 13
Photo 2-8 Harparary Road, at the intersection with Therribri Road, looking westbound. The sign indicates that the B-double vehicles are not permitted to use this section of the road 14
Photo 2-9 One-lane bridge on Harparary Road across Namoi River, looking westbound 14
Photo 2-10 Therribri Road looking northbound 15
Photo 2-11 Therribri Road - Back Creek crossing looking southbound 15
Photo 2-12 Leard Forest Road, at the intersection with Boggabri Coal's private haul road, looking northbound 16
Photo 2-13 Boggabri Coal's private haul road at the intersection with Therribri Road, looking eastbound 16
Photo 2-14 Boggabri Coal's private haul road crossing over the Kamilaroi Highway 17

Contents (continued)

Page Number

List of appendices

Appendix A
Traffic survey data
Appendix B
SIDRA analysis results
Appendix C
Crash data
2004 to 2008
Appendix D
Stage 5 (Existing Road) - Road Safety Audit
Appendix E
Train operations traffic impact study

Glossary

SIDRA	Intersection performance analysis software by Akcelik & Associates Pty Ltd
AADT	Annual Average Daily Traffic
Mtpa	Million tonnes per annum
LoS	Level of Service
DOS	Degree of Saturation
LV	Light Vehicles; including cars, vans, motorbikes, etc.
HV	Heavy Vehicles; including rigid trucks, buses, semitrailers, etc.
OD	Origin and/or Destination of trips
ROM	Run of Mine
CHPP	Coal Handling and Preparation Plant
RTA	Road and Traffic Authority NSW
NSC	Narrabri City Council
Boggabri Coal	Boggabri Coal Mine Ltd
HMA	Hot Mix Asphalt
veh/day	Vehicles per day
veh/hr	Vehicles per hour
ARTC	Australian Rail Track Corporation

Executive summary

Hansen Bailey engaged Parsons Brinckerhoff (PB) to undertake a Traffic Impact Assessment for the proposed Continuation of the Boggabri Coal Mine (the Project) to support a project application under Part 3A of the NSW Environment Planning Assessment Act 1979.

The Boggabri Coal Mine is located 15 km north-east of Boggabri in NSW within the Narrabri Shire Council local government area. The mine currently produces 1.5 Mtpa of coal and employs 147 staff.

The Project generally comprises the following developments and activities:

- the continuation of coal mining operations via open cut methods to extract up to 7 Mtpa of product coal
- construction of further mine infrastructure and service facilities (including offices, rail spur, coal preparation facilities, workshops and bathhouse).

The study has not identified any significant traffic impact that would result from the projected increase in mine operations, the number of construction staff or the proposed closure of a section of Leard Forest Road. Year 5 is considered as the peak combined employment/construction year, with the mine related employees expected to reach 500 and construction staff totalling 150.

The following scenarios were included in the analysis:

- 2009 current situation
- Year 5 do-nothing scenario
- Year 5 peak employment/construction scenario.

Three sources of impact on road traffic were considered:

- increase in the number of employees and construction staff
- increased coal haulage traffic on private haul road
- closure of a section of Leard Forest Road.

The following key intersections were assessed using the SIDRA intersection assessment package and their performance in terms of Level of Service (LOS) for each scenario year is summarised in the Table 1.

Table 1 Level of Service (LOS) for each scenario year

Year	2009	Year 5	
Scenario / Intersection	Current	Do-nothing	Peak employment/ construction
Kamilaroi Highway/Manilla Road	A[1]	A	A
Manilla Road/Therribri Road	A	A	A
Manilla Road/Leard Forest Road	A	A	A
Leard Forest Road/Goonbri Road	A	A	B
Leard Forest Road/Mine Access Road	A	A	B
Leard Forest Road/Harparary Road	A	A	A
Harparary Road/Therribri Road	A	A	A

Note: LoS A = Good operation LoS B = Acceptable delays and spare capacity

This traffic assessment has not identified any significant traffic impact that would result from the projected increase in the number of mine employees and construction staff.

The traffic survey indicates that the section of Leard Forest Road that may be closed carried only 13 vehicles in the morning between 5:00 am and 9:00 am and only 31 vehicles in the afternoon between 3:00 pm and 8:00 pm. Of these movements, four vehicles in the morning and 13 in the afternoon were not associated with mining activities. The closure of this section of road would have little impact on traffic movements. The subsequent re-routing of traffic also would have no significant impact on other intersections in the area.

If the section of Leard Forest Road was closed:

- the public travel time from Maules Creek to the Leard Forest Road/Manilla Road intersection would increase by 5 minutes and 54 seconds. The additional distance required to be travelled would be 6.7 km
- the public travel time from Leard Forest Road/Harparary Road intersection to the Leard Forest Road/Manilla Road intersection would increase by 21 minutes and 30 seconds. The additional distance required to be travelled would be 24.7 km.

PB also considered the impact of the proposed road closure on traffic safety on the surrounding road network. The modest increase in peak traffic from the combined employee/construction activity in Year 5 would not significantly affect traffic safety as there is sufficient spare capacity at the key intersections to accommodate the additional traffic. Furthermore, if the section of Leard Forest Road was closed, the safety impact on the surrounding road network and its key intersections would not be significant, as the amount of diverted traffic would be very low.

[1] Refer to Chapter 3.1

A road safety audit of the primary access route used by traffic between the Kamilaroi Highway and the Boggabri Coal Mine was undertaken to assess the safety of this route. The majority of the identified road safety deficiencies were not caused by the mining related traffic nor would this further deteriorate as the result of the proposed increase in the mining related traffic. However, the following deficiencies listed in the Road Safety Audit Report affect the safety of current traffic and the future increased mine related traffic:

- significant pavement bleeding
- loose gravel on the road surface
- unprotected culverts
- poor drainage of the drainage facilities
- pavement edge drop-offs
- surface fatigue cracking
- poor road markings
- signage deficiencies.

The additional volumes of heavy vehicles, that haul coal via the private haul road, would neither impact the capacity of the Leard Forest Road or Therribri Road at-grade intersection nor traffic safety.

School buses are the only existing public transport service in the vicinity of the Project site. These services are not impacted by the Project because:

- they do not use Leard Forest Road
- the forecast increase in Project related traffic is not considered significant
- forecast increases in project related traffic will occur at different times to the operation of the school bus services.

Opportunities for cycling and walking journey to work trips to the Boggabri Coal Mine are limited due to the distance from major townships and the absence of dedicated facilities which are typical to its rural environment.

A Train Operations Traffic Impact Study has concluded that the increased length and number of coal trains as a direct result of the Project would not make any significant impact on the at-grade railway crossings in Boggabri, Gunnedah and Curlewis.

The Director-General requirements in regards to Traffic & Transport are provided in Table 2. This table also references where these conditions are discussed in the report.

Table 2 Director-General requirements

Director-General requirements	Reference
Accurate prediction of the road and rail traffic of the project	Chapter 4 & Chapter 6 & Appendix E
A detailed assessment of the potential impacts of this traffic on the capacity, efficiency, and safety of the road and rail networks	Chapter 5
A detailed assessment of the potential impacts on the road/rail crossings at Gunnedah, Boggabri and Curlewis	Chapter 6 & Appendix E
A Road Safety Audit to assess the suitability of the proposed traffic volumes and types	Chapter 5.3.4 & Appendix D
Assessment of impacts to the school bus routes and possible measures to reduce conflict between project-related vehicles and school buses	Chapter 5.4

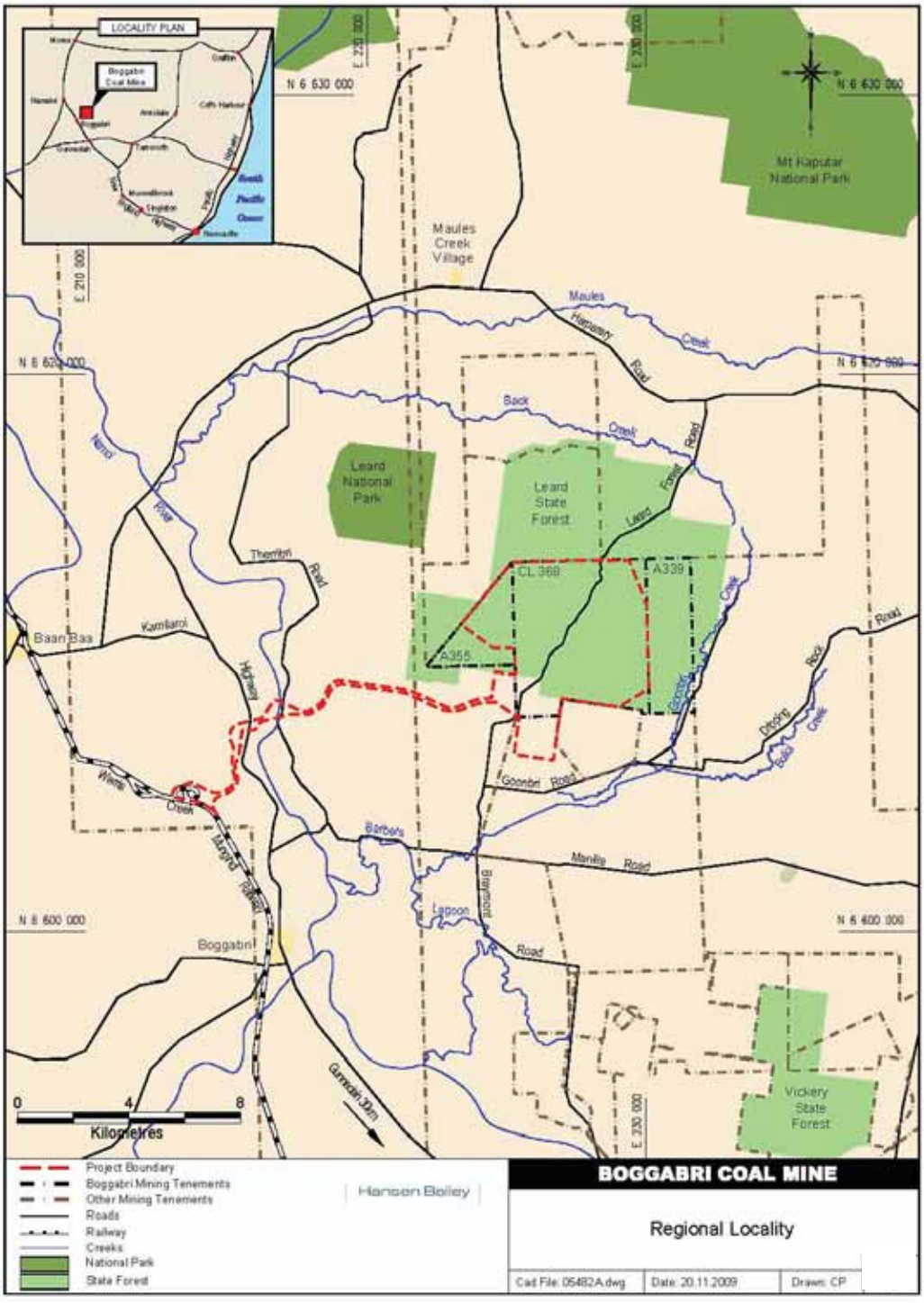
The conclusions of the Traffic Impact Assessment for the continuation of the Boggabri Coal Mine are:

- the proposed mine extension will generate additional traffic through the provision of new employment opportunities but this additional traffic has no significant impact on the surrounding road network
- the closure of a section of Leard Forest Road has no significant impact on traffic on the surrounding road network
- a small number of vehicles currently use the section of Leard Forest Road which is proposed to be closed
- the Project would not cause an increase in road and traffic safety risks. However there are some road deficiencies that affect safety for current traffic and future increased project related traffic
- the increased length and number of coal trains as direct result of the Project would not have any significant impact on the at-grade railway crossings in Boggabri, Gunnedah and Curlewis
- school bus services are not affected by the Project.

1. Introduction

Hansen Bailey engaged Parsons Brinckerhoff (PB) to undertake a Traffic Impact Assessment to support a Project Application under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the Continuation of the Boggabri Coal Mine for a further 21 years (the Project).

The Boggabri Coal Mine is located 15 km north–east of Boggabri in NSW within the Narrabri Shire Council local government area. Narrabri is the closest major centre located 60 km to the north. Tamworth is the closest regional centre located 120 km to the south–east. Figure 1-1 shows the location of the Project and environmental assessment boundary.



Source: Boggabri Coal Mine Limited (2009)

Figure 1-1 Locality plan

Mining operations at Boggabri were approved in November 1990. However, full scale mining under this approval did not commence until 2006. Boggabri Coal Mine currently operates under Departmental File Number (DFN) 79/1443(z)2, which expires on 15 November 2011.

1.1 The project

The project generally comprises the following developments and activities:

- continuous coal mining operations via open cut methods to extract up to 7 Mtpa of product coal
- modification of existing and construction of new infrastructure including:
  - Coal Handling and Preparation Plant (CHPP)
  - Run-of-Mine (ROM) coal hopper, second load-out crusher, stockpile area, coal loading facilities, water management and irrigation system
  - rail loop and 17 km rail line across Namoi River and floodplain including overpasses across the Kamilaroi Highway, Therribri Road and Namoi River
  - minor widening of the existing coal haul road
  - upgrading and relocating site facilities including offices, car parking and maintenance sheds as and when required
  - closing a section of Leard Forest Road
  - upgrading the power supply capacity to 132-kilovolt high voltage lines suitable for dragline operations.
- construction of the mine infrastructure and service facilities (including offices, coal preparation facilities, workshops and bathhouse).

1.1.1 Coal transport

Coal haulage from the mine site to the coal stockpile is currently achieved using a fleet of three 125 t capacity B-double haul trucks. A private haul road facilitates the transport of coal to the train load-out facility. The mine infrastructure area is currently located 17 km to the east of the closest point to the Werris Creek to Mungindi Railway Line.

Two options for the transport of up to 7 Mtpa of coal will be sought in relation to the Project:

1. As currently approved, coal will continue to be transported by the haul trucks along the private haul road to the rail load-out facility with some additional trucks required as production increases.
2. The Project will also include the provision to construct a rail spur and loop, associated conveyor system and auxiliary equipment to enable the direct transport of coal to the Port of Newcastle via rail. The construction of a rail spur and loop would include a rail bridge and overpass across the Namoi River floodplain, Therribri Road and the Kamilaroi Highway.

The construction of the rail spur and loop would occur when coal production levels and market conditions justify the additional expenditure for the construction of the rail facilities. If justified, the rail-spur and loop is likely to be constructed in Year 5 when the maximum production levels are anticipated to be achieved.

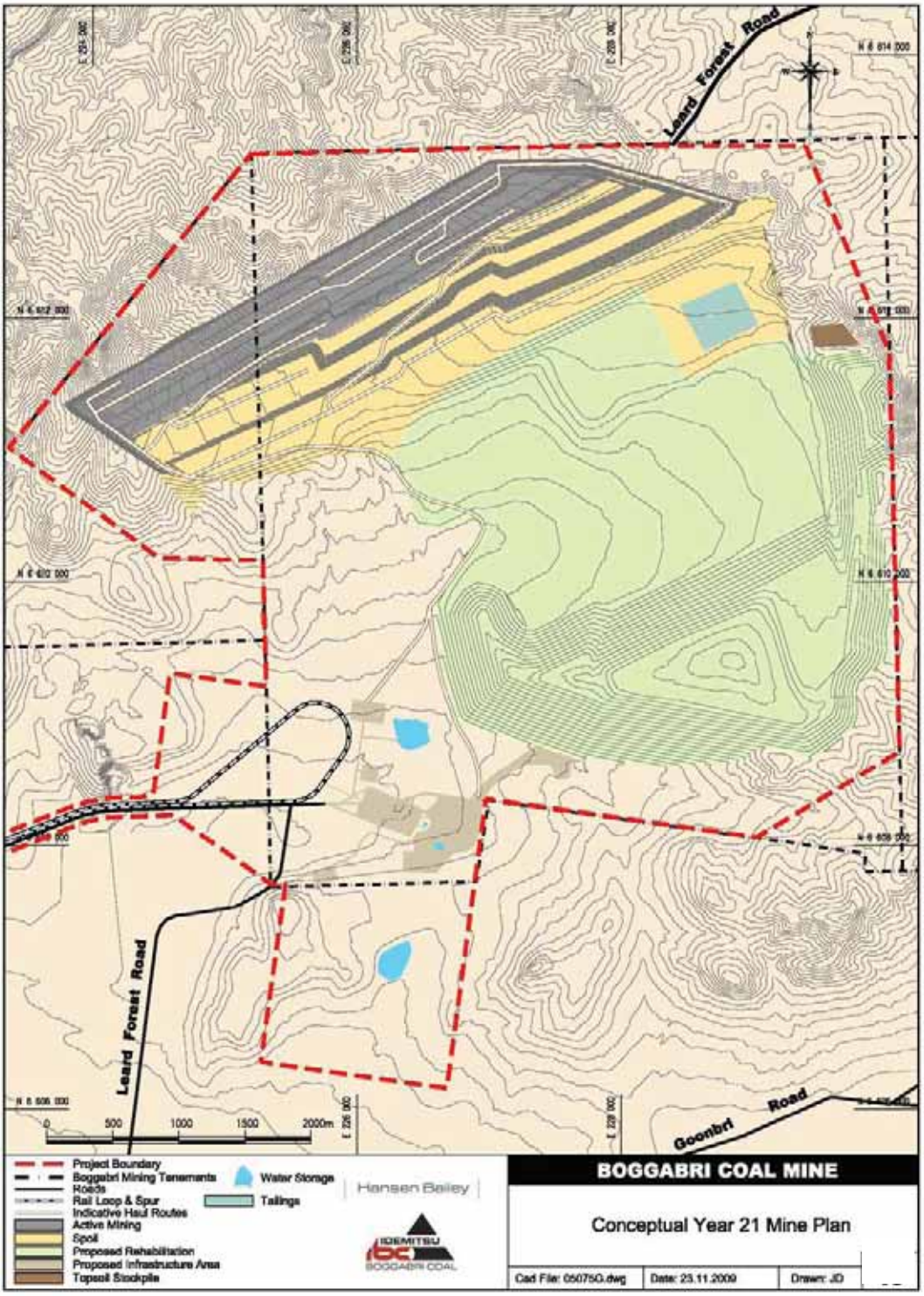
1.1.2 Workforce and hours of operation

The mine will require approximately 500 full time operational employees at maximum production. Maintenance activities, deliveries, coal processing, coal transport and mining operations will continue 24 hours per day, 7 days per week.

The construction workforce is anticipated to reach a maximum of 150 full time equivalent employees in Year 5.

1.1.3 Conceptual mine plan for the project

The study area and proposed extension of the mining zone (conceptual mine plan layout for the Project) for Year 21 is shown on Figure 1-2.



Source: Boggabri Coal Mine Limited (2009)

Figure 1-2 Conceptual mine layout plan for Year 21

1.1.4 Proposed public road closure

As mining progresses the Project will require the closure of a section of Leard Forest Road to enable Boggabri Coal to access the coal reserves located below the existing road.

1.2 Traffic impact assessment scope

The traffic impact assessment is a supplement to the environmental assessment for the Project. This study includes assessment of:

- the existing road and traffic environment including road hierarchy, road condition and traffic conditions
- the traffic generation during the construction and operational phases of the Project due to an increase in the workforce and heavy vehicle movement
- the capacity of the affected road network to cater for increased traffic volumes during the Project's construction and operation phases
- the likely increase in traffic due to the proposed increase in coal production
- the potential impacts on traffic conditions, level of service and intersection operation during the AM and PM peak traffic periods
- the potential impacts on the surrounding intersections associated with the traffic re-distribution due to the closure of a section of Leard Forest Road
- the potential road safety issues associated with the Project
- potential of mitigation measures (if required) to address the identified safety impacts
- the road safety of the primary access route to the mine
- the train operation traffic impact on the at-grade rail crossings in Boggabri, Gunnedah and Curlewis due to changes in rail operations.

2. Existing road and traffic demand

2.1 Road network

The surrounding road network, in the vicinity of the Boggabri Coal Mine consists of (refer to Figure 2-1):

- Kamilaroi Highway
- Manilla Road
- Leard Forest Road
- Goonbri Road
- Harparary Road
- Therribri Road
- Boggabri Coal Access Road
- Boggabri Coal's private haul road.

Figure 2-1 Existing road network

Kamilaroi Highway, which passes to the west of the mining area, is a national road freight route, linking the Upper Hunter region to north western New South Wales via inland regional centres such as Quirindi, Gunnedah, Boggabri, Narrabri, Walgett and Bourke. The section of the highway in the vicinity of the Project boundary is a two-lane, two-way road with a posted speed limit of 100 km/h and carries approximately 2,200 vehicles per day[2].

Photo 2-1 Kamilaroi Highway, looking northbound in the vicinity of the intersection with Manila Road to the right

Manilla Road is a collector road which connects Kamilaroi Highway to the west and the township of Manilla to the east. The road has a posted speed limit of 80 km/h and carries an average of 160 vehicles per day.

Manilla Road is generally a two-lane, two-way undivided rural road. The horizontal road alignment consists of straights and high radii curved sections whilst the vertical alignment is flat.

Manila Road intersects Kamilaroi Highway to the north of the Boggabri town centre, forming a T-type intersection. The intersection has a 'channelised right' configuration ('CHR' or Austroads Type C) including a left turn deceleration lane on the southern approach, and a right-turn lane on the northern approach, as shown in Photo 2-1. These lanes ensure that any vehicle which turns onto Manila Road have minimal impact on the Kamilaroi Highway through movements. The intersection appears to have an appropriate layout to safely and efficiently cater for turning movements associated with the current traffic generated by the mine.

Approximately 1.6 km east of the Kamilaroi Highway/Manilla Road intersection, there is a one-lane iron bridge over the Namoi River (refer to Photo 2-2).

[2] Obtained from the RTA's Traffic volume data 2002, Western region.

Photo 2-2 One-lane iron bridge on Manilla Road across the Namoi River, looking eastbound

The bridge does not allow passing or overtaking, so traffic approaching the bridge from the west gives way to traffic entering the bridge from the east, as well as to traffic on the bridge. Motorists are required to wait until the traffic on the bridge has made a complete crossing before entering the bridge.

The bridge has a posted speed limit of 10 km/h and a signed load limit of 42.5-tonnes with no vertical restrictions. As such, this bridge would be appropriate for use as a part of the future employee vehicle access route as well as a potential construction vehicle route.

Manilla Road also intersects Therribri Road, forming a give way controlled, T-type intersection (refer to Photo 2-3).

Photo 2-3 Manilla Road, looking eastbound toward the intersection with Therribri Road

Leard Forest Road is a two-lane, two-way rural road linking Harparary Road to the north and Manilla Road to the south. The road delineation is poor due to the lack of road markings (centre line and edge lines in particular) on most of the road sections. No speed signs were observed during the site inspection.

Leard Forest Road intersects with Manilla Road forming a give-way controlled T-type intersection (refer to Photo 2-4). All approaches have one lane per direction as shown in Photo 2-4.

Photo 2-4 Leard Forest Road, looking southbound toward the intersection with Manilla Road

A section of Leard Forest Road, between the intersections with Boggabri Coal's private haul Road and Harparary Road is an unsealed gravel road (refer to Photo 2-5).

Photo 2-5 Unsealed rural road section of Leard Forest Road looking northbound

Goonbri Road is generally a two-lane, two-way road which provides the access to the Tarrawonga Mine site. Most of the road section is unsealed with the exception of the area near the intersection with Leard Forest Road (refer to Photo 2-6).

Goonbri Road intersects Leard Forest Road, forming a T-type intersection.

Photo 2-6 Goonbri Road, looking eastbound, approximately 200 m east of its intersection with Leard Forest Road

Boggabri Coal Mine Access Road is a no-through road, which provides the only access to the Boggabri Coal Mine site for general traffic. This road also intersects Leard Forest Road, forming a give-way controlled T-type intersection (refer to Photo 2-7).

Photo 2-7 Leard Forest Road, looking north at the intersection with Boggabri Coal's southern access road (on the right hand side of the photo)

Harparary Road is a two-lane, two-way rural road linking the Kamilaroi Highway to the west and Leard Forest Road to the east. Most of the road section is not paved and has a posted speed limit of 100 km/h. Currently B-double vehicles are banned between intersections with Kamilaroi Highway and Therribri Road (refer to Photo 2-8).

Photo 2-8 Harparary Road, at the intersection with Therribri Road, looking westbound. The sign indicates that the B-double vehicles are not permitted to use this section of the road

There is a one-lane bridge across the Namoi River, approximately 5.6 km east of the Kamilaroi Highway/Harparary Road intersection (refer to Photo 2-9). The bridge does not allow passing or overtaking. Currently there is no give way control signs on either approach to the bridge, so traffic approaching the bridge should give way to traffic already on the bridge.

The bridge has a posted speed limit of 40 km/h and a signed load limit of 42.5-tonnes with no vertical restrictions. As such, this bridge would be appropriate for use as a part of the future employee vehicle access route as well as a potential construction route.

Photo 2-9 One-lane bridge on Harparary Road across Namoi River, looking westbound

Therribri Road is an unsealed road (refer to Photo 2-10) with varied width between 6 m and 8 m. The narrow section of the road requires vehicles to pass very close to each other causing discomfort for some drivers. The road also crosses a number of creeks and there are signs indicating that some sections of road are subject to flooding (refer to Photo 2-11).

Photo 2-10 Therribri Road looking northbound

Photo 2-11 Therribri Road - Back Creek crossing looking southbound

Boggabri Coal's private haul road intersects both Leard Forest Road and Therribri Road, forming stop priority controlled intersections, with traffic on the public roads required to give way to the traffic on the private haul road (see Photo 2-12 and Photo 2-13).

Photo 2-12 Leard Forest Road, at the intersection with Boggabri Coal's private haul road, looking northbound

Photo 2-13 Boggabri Coal's private haul road at the intersection with Therribri Road, looking eastbound

The road has sufficient width, is sealed and suitable for use by heavy vehicles. The pavement is in good condition and the road has proper road delineation and adequate sight distances at the intersections.

This road also forms a grade-separated crossing over the Kamilaroi Highway as shown in Photo 2-14.

Photo 2-14 Boggabri Coal's private haul road crossing over the Kamilaroi Highway

2.2 Existing coal movement infrastructure

Under the current operations, ROM coal produced in the Boggabri Coal Mine is hauled by 125-tonne capacity B-double trucks to the train loading facilities at the Boggabri Coal Terminal via the existing private haulage road. This route includes a grade-separated crossing at the Kamilaroi Highway and two at-grade intersections with Therribri Road and Leard Forest Road. No coal is transported by public roads except at the two intersections with the two local roads.

Boggabri Coal Mine has proposed to increase the saleable coal production rate to up to 7 Mtpa. This will increase the truck traffic generated between the mine and the existing rail loading facilities.

2.3 Existing traffic volumes

The existing traffic volumes and the intersection movements have been identified from the AADT data published by the Road and Traffic Authority (RTA) as well as from the traffic count surveys at the locations shown in Figure 2-2.

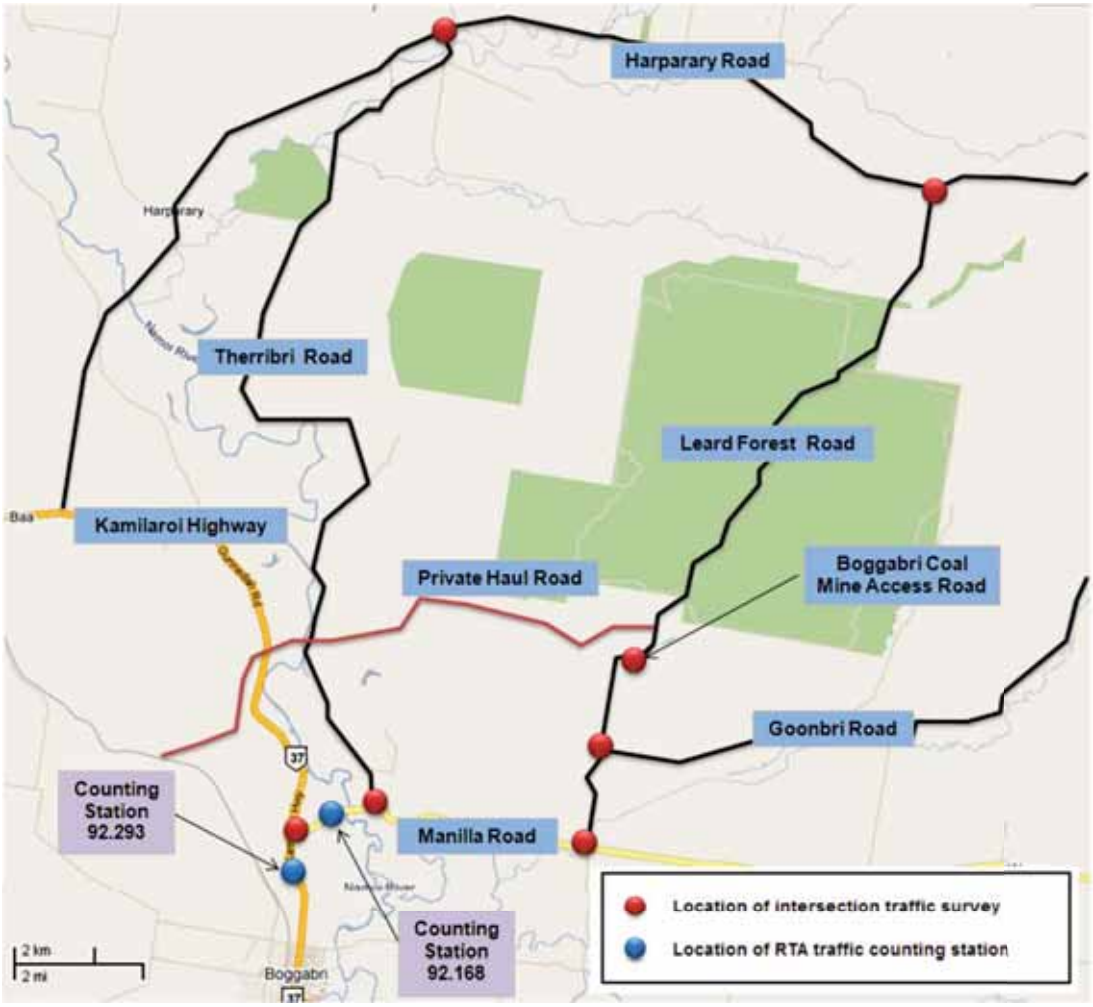


Figure 2-2 Locations of traffic surveys

2.3.1 Traffic surveys

PB commissioned traffic turning movement surveys at the following seven locations:

- Kamilaroi Highway/Manilla Road intersection (I-01)
- Manilla Road/Therribri Road intersection (I-02)
- Manilla Road/Leard Forest Road intersection (I-03)
- Leard Forest Road/Goonbri Road intersection (I-04)
- Leard Forest Road/Boggabri Coal Mine Access Road intersection (I-05)
- Leard Forest Road/Harparary Road intersection (I-06)
- Harparary Road/Therribri Road intersection (I-07).

The surveys were undertaken on Thursday, 29 October 2009 during both AM and PM peak periods from 5:00 am to 9:00 am and from 3:00 pm to 8:00 pm respectively.

2.3.2 Turning movement summary

The AM traffic peak hour related to the shift changes at Boggabri Coal Mine and Tarrawonga Mine and occurred between 5:45 am and 6:45 am at the following intersections:

- Manilla Road/Therribri Road intersection (I-02)
- Manilla Road/Leard Forest Road intersection (I-03)
- Leard Forest Road/Goonbri Road intersection (I-04)
- Leard Forest Road/Boggabri Coal Mine Access Road intersection (I-05).

The AM peak hour occurred between 8:00 am and 9:00 am at the following locations:

- Kamilaroi Highway/Manilla Road intersection (I-01)
- Leard Forest Road/Harparary Road intersection (I-06).

The most common PM peak hour at these intersections occurred between 5:00 pm and 6:00 pm.

Figures 2-3 and 2-4 show the existing intersections turning movement volumes during the analysed peak hours.

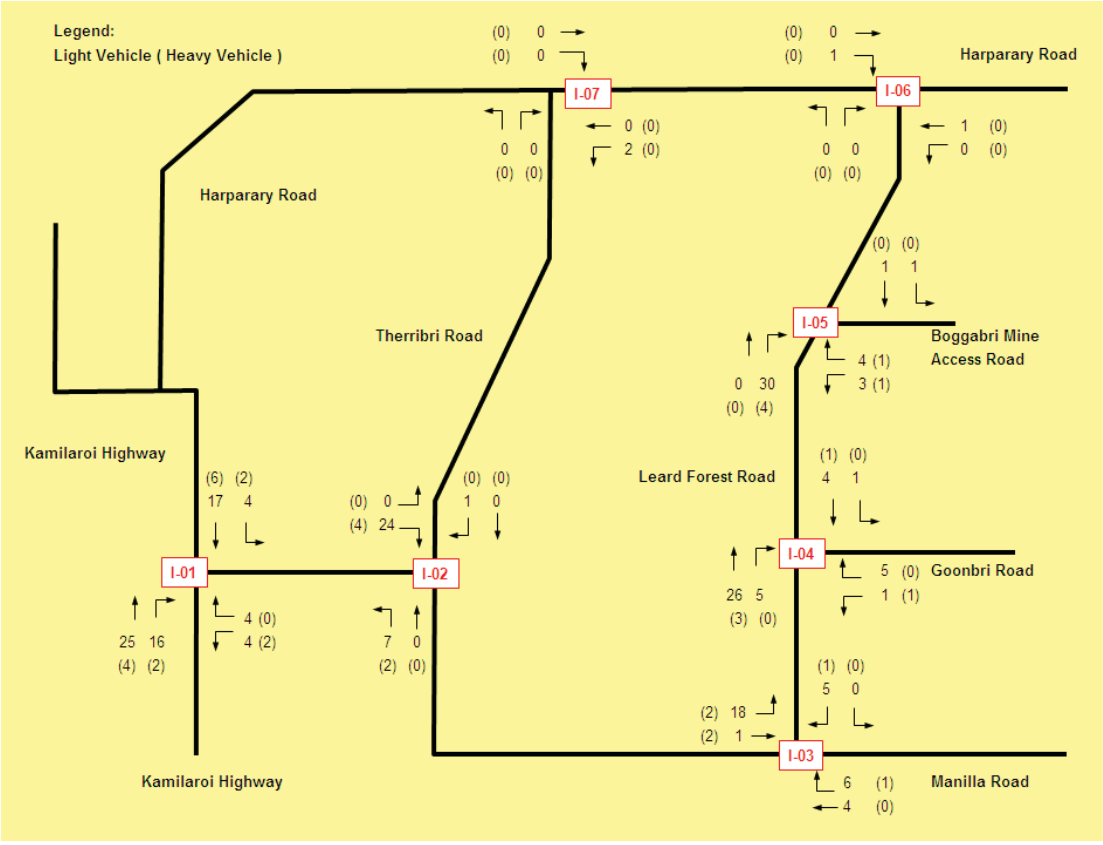


Figure 2-3 Existing (2009) AM peak hour (5:45 am – 6:45 am) traffic volumes

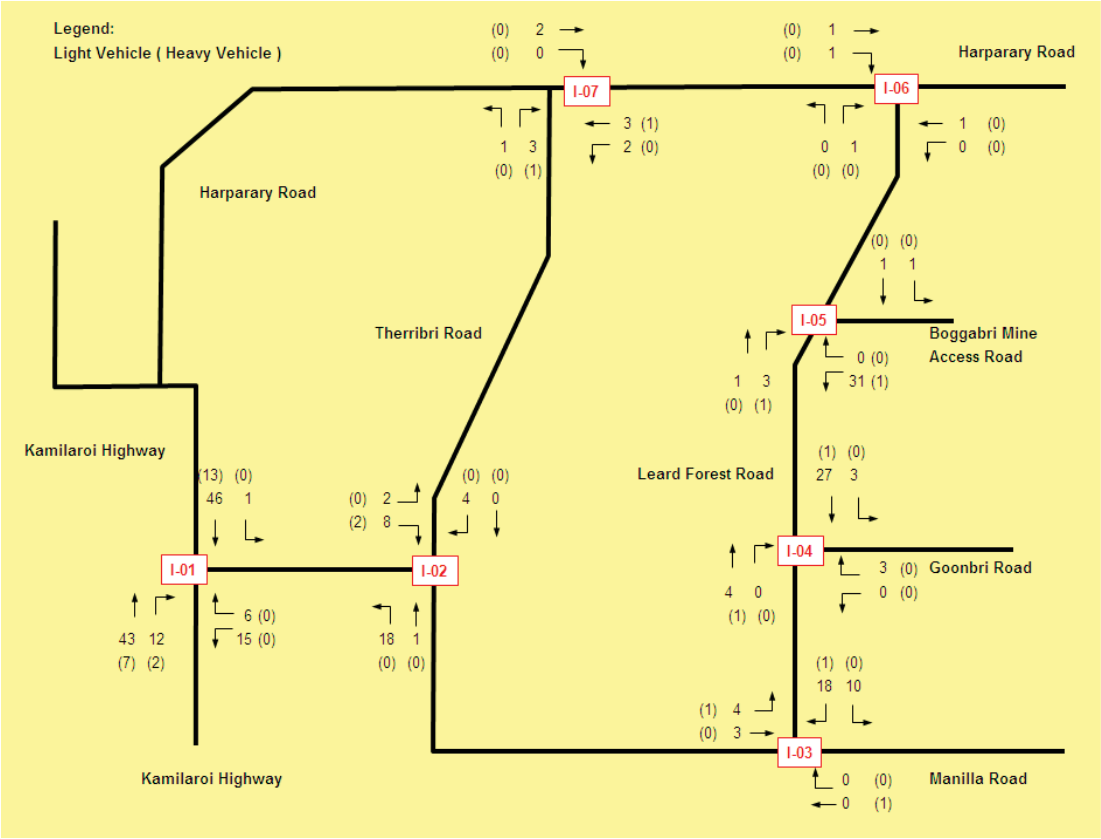


Figure 2-4 Existing (2009) PM peak hour (5:00 pm – 6:00 pm) traffic volumes

2.3.3 Regional traffic growth

In order to assess the future traffic, the historical traffic growth rate on the Kamilaroi Highway and Manilla Road were considered.

AADT data records (1980-2005) in the vicinity of the Project were available from RTA counting station at the following locations:

- count station 92.293, located on Kamilaroi Highway, south of its intersection with Manilla Road
- count station 92.168, located on Manilla Road, east of its intersection with the Kamilaroi Highway (refer to Figure 2-2).

Table 2-1 shows the 1980-2005 Annual Average Daily Traffic (AADT) at these two locations.

Table 2-1 Historical traffic trend on the Kamilaroi Highway and Manilla Road

Year	1980	1984	1988	1992	1999	2002	2005	Average annual growth (1980-2005)
Kamilaroi Highway (92.293)								
AADT	1430	1120	1579	1867	2163	2232	1832	
Annual Growth (%pa)	-	-5.9%	9.0%	4.3%	2.1%	1.1%	-6.4%	1.0%
Manilla Road (92.168)								
AADT	210	310	142	153	138	162	175	
Annual Growth (%pa)	-	10.2%	-17.7%	1.9%	-1.5%	5.5%	-6.4%	-1.2%

Source: Road and Traffic Authority (2005)

Table 2-1 shows that traffic volume along the both Kamilaroi Highway and Manilla Road had fluctuated considerably during the 25 year period. While the traffic on Manilla Road slightly decreased over those periods, there was an overall increase in traffic on Kamilaroi Highway with the traffic growth rate of 1.0% per annum and this rate has been adopted taking a conservative approach.

Page intentionally left blank

3. Existing performance of the key intersections

3.1 Model performance indicators

Intersection performance was assessed using the SIDRA intersection analysis software package. This provides several useful indicators in order to determine the level of performance of an intersection. This assessment has used the four performance indicators listed and described below:

- level of service (LoS)
- degree of saturation (DoS)
- average intersection delay
- queue length.

Level of service

Level of service (LoS) is a basic performance parameter used to describe the operation of an intersection. Levels of service range from A (indicating good intersection operation) to F (indicating over saturated conditions with long delays and queues). At signalised intersections, the LoS criteria are related to average intersection delay (seconds per vehicle). At priority controlled (give-way and stop controlled) and roundabout intersections, the LoS is based on the modelled delay (seconds per vehicle) for the most delayed movement (refer to Table 3-1).

Table 3-1 RTA levels of service

Level of service	Average delay (seconds per vehicle)	Traffic signals, Roundabout	Give Way and Stop signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity. At signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity; requires other control mode
F	Greater than 71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control mode

Source: RTA Guide to Traffic Generating Developments (2002)

Degree of saturation

Degree of saturation (DoS) is the ratio of demand flow to capacity, and therefore has no unit. As it approaches 1.0, extensive queues and delays could be expected. For a satisfactory situation, DoS should be less than the nominated practical degree of saturation, usually 0.9. The intersection DoS is based on the movement with the highest value.

Delay

Delay is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. At signalised intersections and roundabouts, the average intersection delay is usually reported. At priority controlled intersections, the average delay for the most delayed movement is usually reported.

Queue length

Queue length is usually quoted as the 95th percentile back of queue, which is the value below which 95% of all observed queue lengths fall. The intersection queue length is usually taken from the movement with the longest queue length.

3.1.1 Current performance of the key intersections

Table 3-2 shows the SIDRA modelling results of the key intersections under the current traffic conditions.

Table 3-2 Modelled existing traffic conditions (2009)

Intersection	Control	Peak hour	DoS	Delays (Sec)	LoS	Queue (m)
Kamilaroi Highway/Manilla Road	Priority	AM	0.02	14	A	1
		PM	0.04	13	A	1
Manilla Road/Therribri Road	Priority	AM	0.03	12	A	1
		PM	0.01	12	A	0
Manilla Road/Leard Forest Road	Priority	AM	0.01	12	A	0
		PM	0.03	12	A	1
Leard Forest Road/Goonbri Road	Priority	AM	0.02	14	A	1
		PM	0.02	11	A	0
Leard Forest Road/Mine Access Road	Priority	AM	0.03	13	A	1
		PM	0.03	12	A	1
Harparary Road/Leard Forest Road	Priority	AM	0.00*	12	A	0
		PM	0.00*	12	A	0
Harparary Road/Therribri Road	Priority	AM	0.00*	12	A	0
		PM	0.00*	12	A	0

*Degree of Saturation (DoS) is less than 0.01

All of the intersections operate far below their capacity, with all intersections having DoS equal or less than 3%.

The current LoS for all intersections is A, with practically no queuing and delays of no more than 14 seconds per vehicle.

4. Forecast traffic demand

4.1 Traffic generation

Several factors have been considered in the calculation of the likely future traffic and transport demands on the road network surrounding the Boggabri Coal Mine. These include:

- **operational traffic generation** as a result of the increase in coal production of up to 7 Mtpa. Generated traffic was considered to bring 353 additional staff (up to 500 from the existing operational staff of 147)
- **construction activity traffic generation** resulting from the building of supporting infrastructure for the mine expansion and the 150 construction workers. Construction heavy vehicles traffic was not considered because it is likely to occur in the off-peak periods
- **the time distribution of generated traffic in the peak periods**. The generated operational and construction traffic has been assigned to the AM and PM peaks based on the expected shift start and end times
- **the spatial distribution of generated traffic**. The additional generated traffic was assigned to the road network proportionally to the existing traffic distribution. The closure of the Leard Forest Road was modelled by assuming that all traffic using this route would be diverted via Manilla Road, Therribri Road and Harparary Road.

4.1.1 Operational traffic generation

It is proposed that the project will operate 24 hours a day and 7 days a week with following types of employees:

- professional, supervisory and office staff 14%
- mining operations 55%
- maintenance 23%
- coal handling and preparation 8%

At the time of the assessment there were approximately 147 employees working at the existing Boggabri Coal Mine. The number of employees is expected to peak at 500 persons (an increase of 353 staff) during the proposed Year 5 scenario. Therefore, Year 5 was selected as the peak operation period for the traffic impact assessment.

The total increase in traffic, as direct result of the proposed operation, would be no more than 73 vehicles per peak hour due to the following:

- employees are split evenly into two working shifts
- different shift hours for the mining operation staff (55% of staff) compared with the other staff e.g. administration staff
- vehicle occupancy of a minimum 1.2 people/vehicle
- not all employees would work every day due to days off, annual leave etc (factor = 0.9).

It is expected that there will be an increase in the number of 125 t capacity B-double haul trucks vehicle trips of up to 10 per hour as production levels approach 7 Mtpa. However these trucks would use the private haul road. It is possible that the rail spur and loop would be constructed to transport coal prior to this rate of production being achieved.

4.1.2 Construction staff traffic generation

It was assumed that the construction hours would be between 7:00 am and 9:00 pm, Monday to Saturday with no construction on Sunday or Public Holidays.

The number of employees engaged in construction is expected to peak at 150 persons during Year 5 of the proposed construction programme.

The breakdown of the expected construction workforce is:

- professional and office staff 18 - 20%
- technical and trades 25 – 35%
- operators and labourers 47 – 55%.

The construction staff will be working on the following construction works:

- construction of a rail loop and 17 km rail spur across Namoi River and Kamilaroi Highway (when financially feasible)
- construction of a coal preparation plant (CPP)
- upgrading and relocating site facilities including offices, car parking and maintenance sheds if and when required
- increasing existing site infrastructure capacities including run of mine (ROM) hopper, second load-out crusher, stockpile area, coal loading facilities, water management and irrigation system
- widening of the existing coal haulage route as required, to allow for transportation of increased coal product. It was understood that:
  - the increased haul quantity by road would have road asset implications on the residual life
  - as well as widening, this may require a pavement upgrade to accommodate the additional load.
- upgrading the power supply capacity to 66 kV suitable for dragline operations. The dragline excavator is powered by electricity and will require a direct connection to the high voltage grid. As such, this would have traffic generation implications during the construction phase of the project.

Total increase in traffic, as a direct result of the proposed construction, would be no more than 90 veh/hr per peak hour due to the following:

- 100% of construction staff arrive in the morning
- all morning peak trips are inbound
- vehicle occupancy of a minimum 1.2 people/vehicle
- not all employees would work every day due to days off, annual leave etc (factor = 0.9).

4.1.3 Summary of staff traffic generation

Table 4-1 summarises the traffic generated by operational and construction staff.

Table 4-1 Staff traffic generation summary

	Number of staff	% of total staff	Trip generation rate per day	Vehicles per staff member	Total vehicle trips per day
Operational					
Professional, supervisory and office staff	49	14	1.8[3]	0.83[4]	73
Mining operations	194	55	1.8	0.83	290
Maintenance	81	23	1.8	0.83	121
Coal preparation	29	8	1.8	0.83	43
Total	**353**	**100**			**527**
Construction					
Professional and office staff	29	19	1.8	0.83	43
Technical and trades	45	30	1.8	0.83	67
Operators and labourers	76	51	1.8	0.83	114
Total	**150**	**100**			**224**
Grand total	**503**				**751**

4.2 Traffic assignment in the AM and PM peak periods

Tables 4-2 and 4-3 show how trips have been assigned into the AM and PM peak periods and are based on the shift arrival and departure times provided by Boggabri Coal Mine.

The distribution of traffic into the AM and PM peak periods also assumed that:

- 50% of vehicle trips occur in the AM peak period
- 50% of the mining operations trips are arrivals for the AM shift.

[3] Assuming 10% of staff not at work on a given day (e.g. sick, annual leave) – the total number of daily trips (2 trips) is multiplied by 0.9 (90%).

[4] Occupancy of 1.2person/vehicle is equal to 1/1.2=0.83 vehicle per person.

Table 4-2 Summary of staff trips in the AM peak period

	Total vehicle trips per day	Shift start and end times	5:00 am to 6:00 am		5:45 am to 6:45 am		7:00 am to 8:00 am	
			Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Operational								
Professional, supervisory and office staff	73	8:00 am to 4:00 pm	0	0	0	0	36	0
Mining operations	290	AM Shift – 6:30 am to 5:00 pm	0	0	73	0	0	0
		PM Shift – 5:00 pm to 3:30 am	0	0	0	0	0	0
Maintenance	121	6:00 am to 6:00 pm	60	0	0	0	0	0
Coal handling and preparation	43	AM Shift – 6:00 am to 3:00 pm	11	0	0	0	0	0
		PM Shift 3:00 pm to midnight						
Total	**527**		**71**	**0**	**73**	**0**	**36**	**0**
Construction								
Professional and office staff	43	8:00 am to 5:00 pm	0	0	0	0	21	0
Technical and Trades	67	7:00 am to 7:00 pm	0	0	33	0	0	0
Operators and Labourers	114	7:00 am to 7:00 pm	0	0	57	0	0	0
Total	**224**		**0**	**0**	**90**	**0**	**21**	**0**
Grand total	**751**		**71**	**0**	**163**	**0**	**57**	**0**

Table 4-3 Summary of staff trips in the PM peak period

	Total vehicle trips per day	Shift start and end times	3:00 pm to 4:00 am		4:00 pm to 5:00 pm		5:00 pm to 6:00 pm		6:00 pm to 7:00 pm	
			Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Operational										
Professional, supervisory and office staff	73	8:00 am to 4:00 pm	0	0	0	36	0	0	0	0
Mining operations	290	AM Shift – 6:30 am to 5:00 pm	0	0	0	0	0	73	0	0
		PM Shift – 5:00 pm to 3:30 am	0	0	73	0	0	0	0	0
Maintenance	121	6:00 am to 6:00 pm	0	0	0	0	0	0	0	60
Coal handling and preparation	43	AM Shift – 6:00 am to 3:00 pm	0	11	0	0	0	0	0	0
		PM Shift 3:00 pm to midnight								
Total	**527**		**0**	**11**	**73**	**36**	**0**	**73**	**0**	**60**
Construction										
Professional and office staff	43	8:00 am to 5:00 pm	0	0	0	0	0	21	0	0
Technical and trades	67	7:00 am to 7:00 pm	0	0	0	0	0	0	0	0
Operators and labourers	114	7:00 am to 7:00 pm	0	0	0	0	0	0	0	0
Total	**224**		**0**	**0**	**0**	**0**	**0**	**21**	**0**	**0**
Grand total	**751**		**0**	**11**	**73**	**0**	**0**	**94**	**0**	**0**

4.3 Additional haulage vehicle traffic

The total production of saleable coal is scheduled to achieve 7 Mtpa by Year 5. This increase in coal production from currently 1.5 Mtpa will require an approximate additional 10 truck trips per hour, assuming:

- B-double trucks with a haulage capacity of 125 t
- seven day a week operations, 363 days a year
- two trips per load (a trip to the stock pile and a return trip to the mine).

This additional traffic would not affect the capacity of the Leard Forest Road or Therribri Road at-grade intersections nor would it have a significant impact on traffic safety.

4.4 Construction heavy vehicle traffic

Construction heavy vehicles, transporting materials and plant to the site and removing waste materials from the site, have not been included in the analysis as heavy vehicle construction traffic is not expected to be a significant generator of additional traffic onto the road network. Also, any construction traffic that does occur is unlikely to be within the modelled peak hours.

A construction Traffic Management Plan would be required to take into account all relevant traffic aspects of the construction. Such a plan is necessary to ensure construction traffic does not adversely affect traffic in the surrounding area.

4.5 Peak hours

Because background traffic on the surrounding road network is low, the greatest impact on traffic is likely to occur during the hours of peak traffic generation (this represents the worst case scenario). The forecast peak hours selected for assessment were:

- AM peak hour between 5:45 am and 6:45 am
- PM peak hour between 5:00 pm and 6:00 pm.

4.6 Traffic distribution

It was assumed that the additional staff, and their associated trips created by the mine expansion, would originate from similar locations to the existing staff. Therefore it has been assumed that the traffic distribution on the road network in the Year 5 is likely to be the same as the current distribution. Figure 4-1 shows the current distribution of traffic in the AM peak hour. The reverse of the AM distribution is assumed in the PM peak hour.

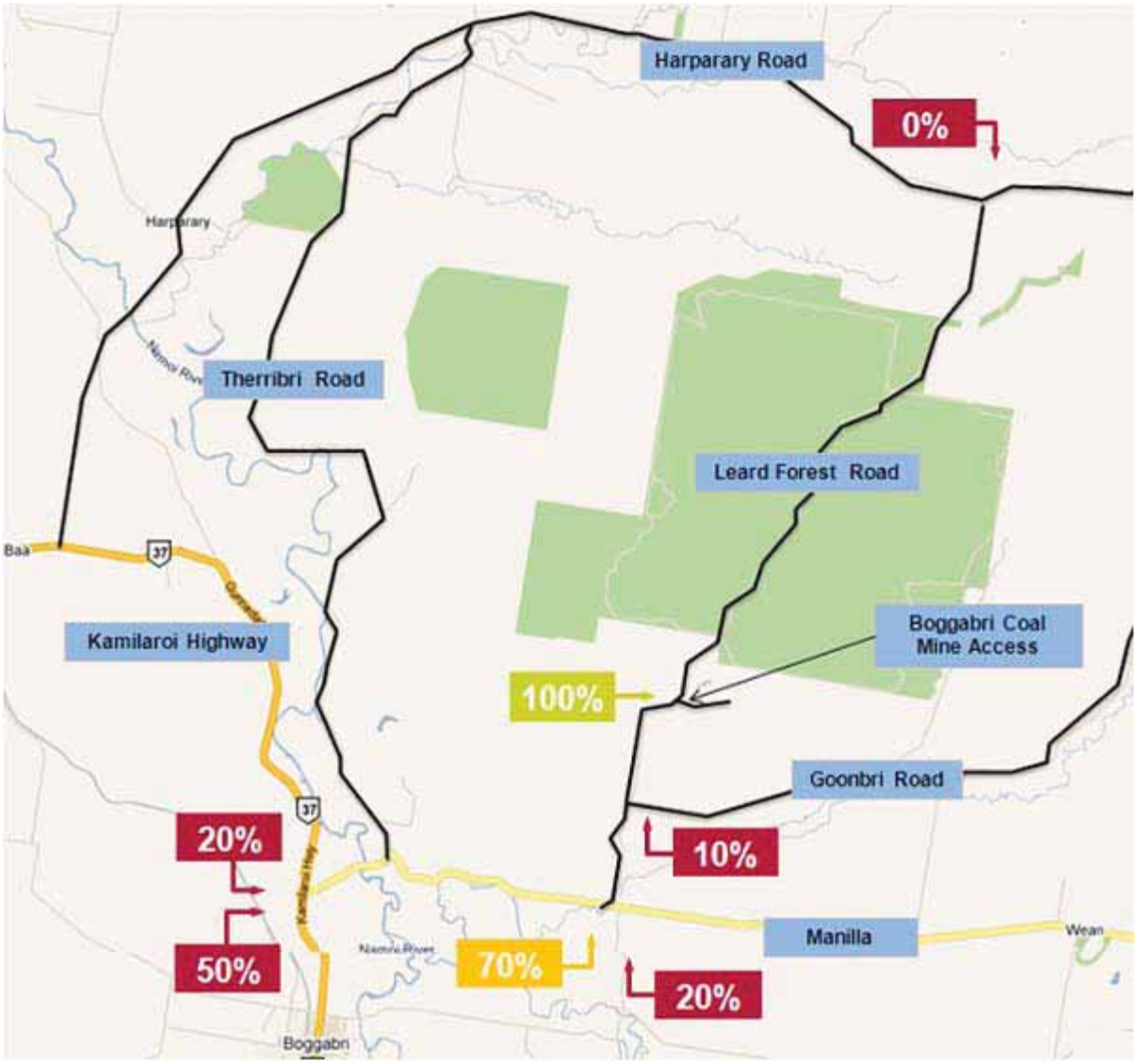


Figure 4-1 AM peak hour (5:45 am to 6:45 am) traffic distribution

4.7 Forecast Year 5 do-nothing traffic demand

Future Year 5 do-nothing volumes were calculated as the sum of the 2009 existing traffic and growth in the background traffic (1.0% per annum). This scenario forecast the condition that would exist if the mine is not granted approval.

Figures 4-2 and 4-3 show the forecast traffic assigned to the key intersections during the peak hour periods.

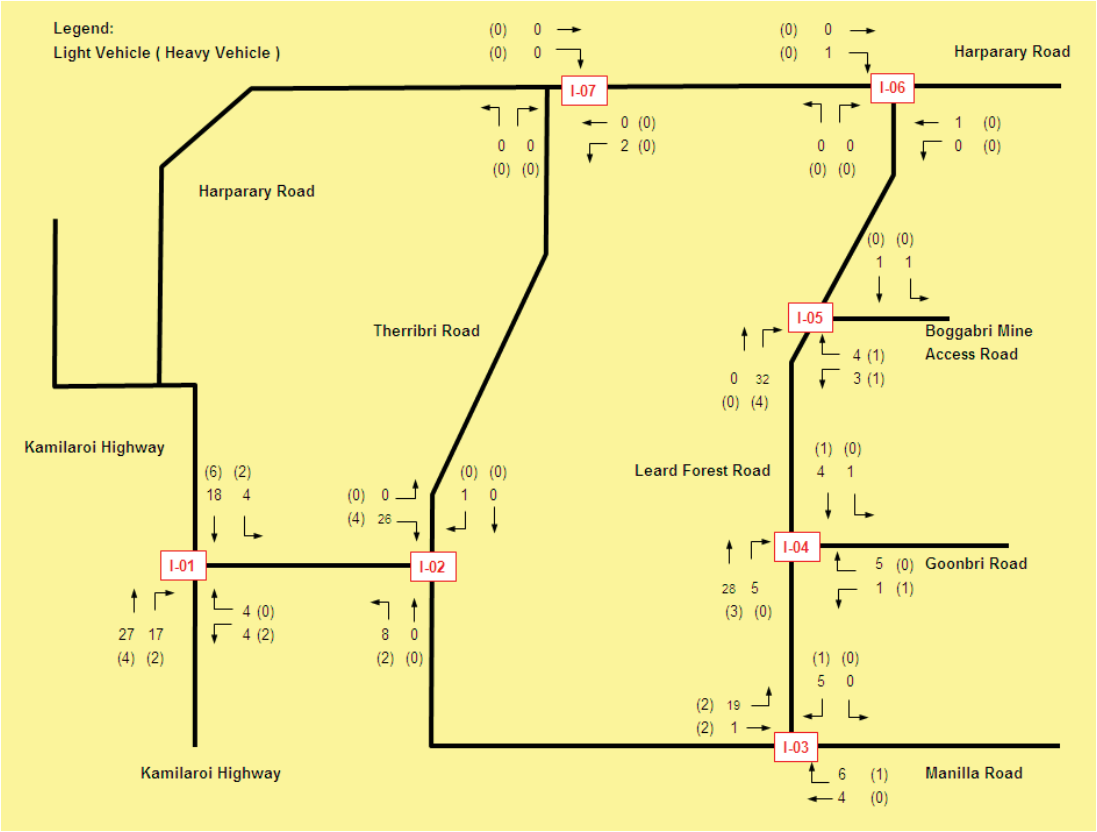


Figure 4-2 Do-nothing scenario (Year 5) AM peak hour (5:45 am – 6:45 am) traffic volumes

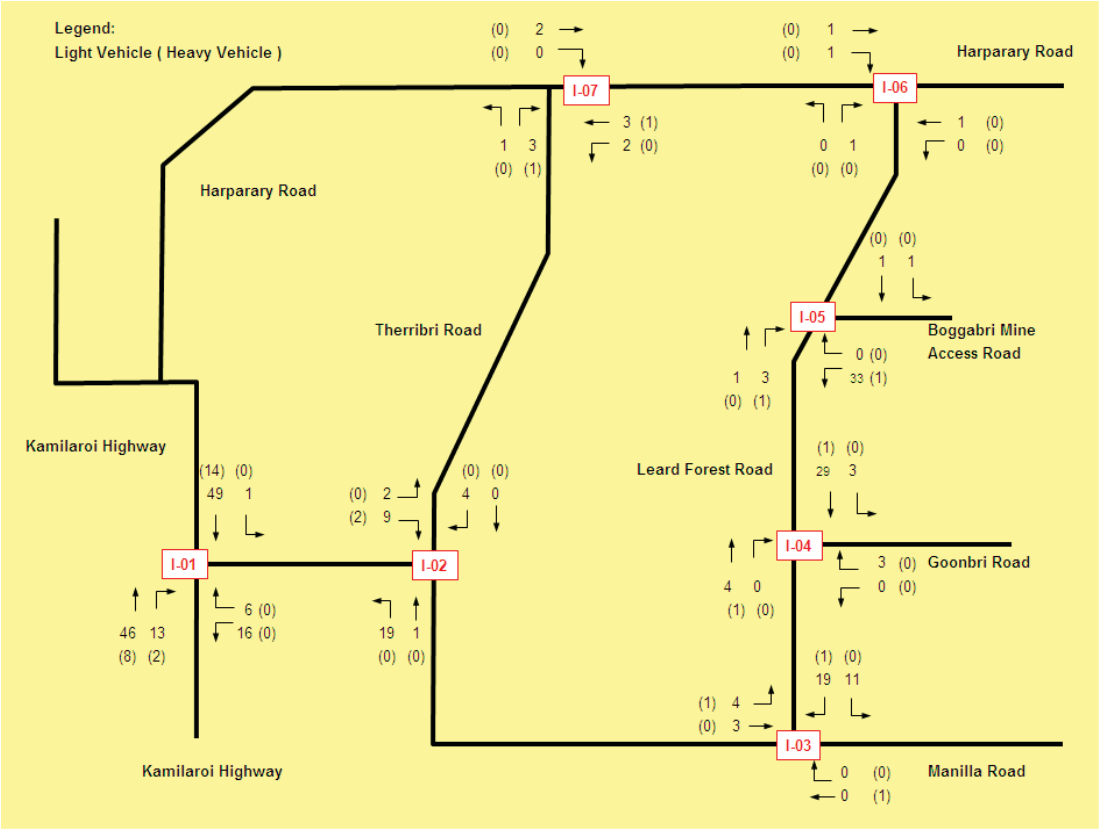


Figure 4-3 Do-nothing scenario (Year 5) PM peak hour (5:00 pm – 6:00 pm) traffic volumes

4.8 Forecast Year 5 peak operational and construction traffic

Figures 4-4 and 4-5 show the forecast Year 5 future traffic volumes for the AM and PM peak hours. The Year 5 future traffic is the sum of:

- existing peak hour traffic
- traffic generation for the peak hour
- background traffic growth in the peak hour based on 1% per annum between 2009 and 2016.

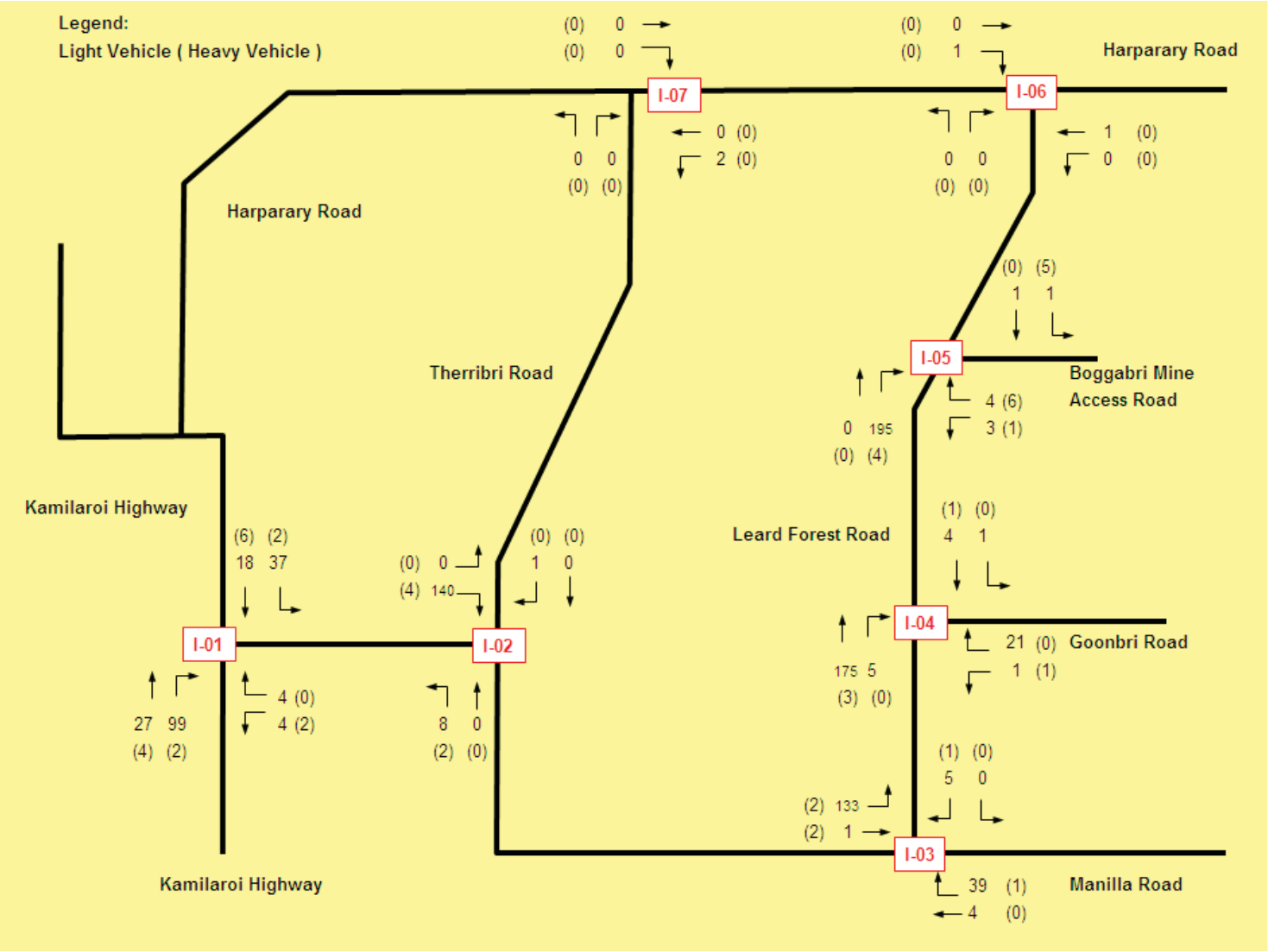


Figure 4-4 Forecast Year 5 AM peak hour (5:45 am to 6:45 am) traffic volumes

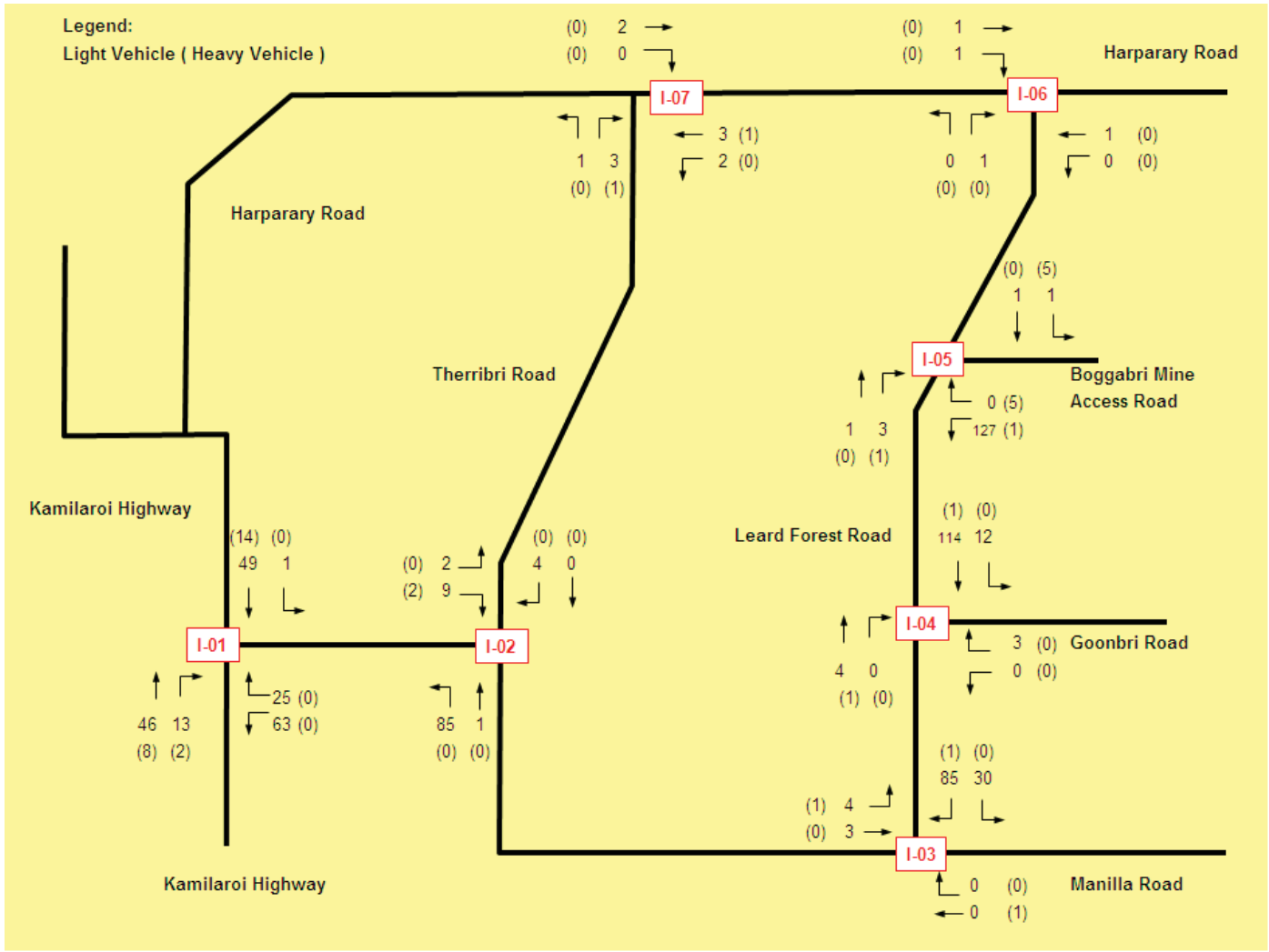


Figure 4-5 Forecast Year 5 PM peak hour (5:00 pm to 6:00 pm) traffic volumes

4.9 Traffic redistribution due to closure of a section of Leard Forest Road

Consistent with the current Development Consent, the Project will require the closure of a section of Leard Forest Road prior to Year 5 of the mine plan to enable Boggabri Coal access to the additional coal reserves located below the existing road.

The traffic redistribution due to this closure would not be significant due to the following:

- currently, in the AM peak period (between 5:00 am and 9:00 am):
  - the majority of the Leard Forest Road users are coming from the south and use the road on their way to/from the southern access to the mine
  - only 13 vehicles in total travelled on the northern part of Leard Forest Road (just south of its intersection with Harparary Road). Only four out of 13 vehicles used the road for purposes not associated with mining activities.
- currently, in the PM peak period (between 3:00 pm and 8:00 pm):
  - the majority of the Leard Forest Road users are also coming from the south and use the road on their way to/from the southern access to the mine
  - in the afternoon, the traffic volume was higher than in the AM peak period, but still not significant in terms of the number of vehicles. Apart from mining related trips, few vehicles use the section of the road planned to be closed. Currently, only 31 vehicles in total appear on the northern part of Leard Forest Road (just south of its intersection with Harparary Road). Only 11 out of 31 vehicles used the road for purposes not associated with mining activities.
- this small number of vehicles affected means that the closure of Leard Forest Road would not significantly affect the surrounding network in AM or PM peak traffic periods.

The current travel times, on the sections of the road network the subject of this study, are shown in Figure 4-6. These travel times were recorded by driving the routes numerous times and taking an average of the resultant travel times.

The difference in travel times for vehicles affected by the closure of the section of Leard Forest Road would depend of their origin and destination.

Section	Distance	Travel time
A to B	2.4 km	2 minutes
B to C	5.5 km	4 minutes
C to D	2.7 km	2 minutes
D to E	3.1 km	2.5 minutes
E to F	14.0 km	12 minutes
F to G	14.0 km	12 minutes
B to G	25.0 km	22 minutes

Figure 4-6 Existing travel times

If the section of Leard Forest Road is closed:

- the public travel time from Maules Creek to the Leard Forest Road/Manilla Road intersection would increase by 5 minutes and 54 seconds. The additional distance required to travel would be 6.7 km

- the public travel time from Leard Forest Road/Harparary Road intersection to the Leard Forest Road/Manilla Road intersection would increase by 21 minutes and 30 seconds. The additional distance required to travel would be 24.7 km

.

Page intentionally left blank

5. Traffic impact

5.1 Modelling performance of the future Year 5 do-nothing scenario

Table 5-1 shows the SIDRA modelling results of the performance of the key intersections for the Year 5 do nothing scenario. In this scenario the mine extension has not occurred and there are no changes to Leard Forest Road.

Table 5-1 Modelled future traffic conditions (Year 5) - Do-nothing scenario

Intersection	Control	Peak hour	DoS	Delays (Sec)	LoS	Queue (m)
Kamilaroi Highway/Manilla Road	Priority	AM	0.02	14	A	1
		PM	0.04	13	A	1
Manilla Road/Therribri Road	Priority	AM	0.03	12	A	1
		PM	0.01	12	A	0
Manilla Road/Leard Forest Road	Priority	AM	0.02	12	A	0
		PM	0.03	12	A	1
Leard Forest Road/Goonbri Road	Priority	AM	0.02	14	A	1
		PM	0.02	11	A	0
Leard Forest Road/Mine Access Road	Priority	AM	0.03	13	A	1
		PM	0.03	12	A	1
Harparary Road/Leard Forest Road	Priority	AM	0.00*	12	A	0
		PM	0.00*	12	A	0
Harparary Road/Therribri Road	Priority	AM	0.00*	12	A	0
		PM	0.00*	12	A	0

*Degree of Saturation (DoS) is less than 0.01

The analysis indicates that all of the intersections would still operate far below their capacity, with all intersections having DoS equal or less that 3%.

The LoS for all intersections would be A, with practically no queuing and delays of no more than 14 seconds per vehicle.

5.2 Modelled performance of Year 5 peak operational and construction traffic

Table 5-2 shows the SIDRA modelling results of the key intersections in the peak operation and construction Year 5. This year is considered as the critical year for the traffic modelling purposes. This scenario presumes that the project has gone ahead and peak employment and construction staff are travelling to the mine.

Table 5-2 Modelled future traffic conditions (Year 5) - peak operation and construction period

Intersection	Control	Peak hour	DoS	Delays (Sec)	LoS	Queue (m)
Kamilaroi Highway/Manilla Road	Priority	AM	0.10	14	A	3
		PM	0.08	13	A	3
Manilla Road/Therribri Road	Priority	AM	0.15	12	A	5
		PM	0.05	12	A	0
Manilla Road/Leard Forest Road	Priority	AM	0.08	13	A	0
		PM	0.11	12	A	4
Leard Forest Road/Goonbri Road	Priority	AM	0.10	15	B	5
		PM	0.07	12	A	0
Leard Forest Road/Mine Access Road	Priority	AM	0.15	17	B	6
		PM	0.00*	16	B	4
Harparary Road/Leard Forest Road	Priority	AM	0.00*	12	A	0
		PM	0.00*	12	A	0
Harparary Road/Therribri Road	Priority	AM	0.00*	12	A	0
		PM	0.00*	12	A	0

*Degree of Saturation (DoS) is less than 0.01

All the intersections will still operate far below their capacity, with all intersections having DoS equal to or less than 15%.

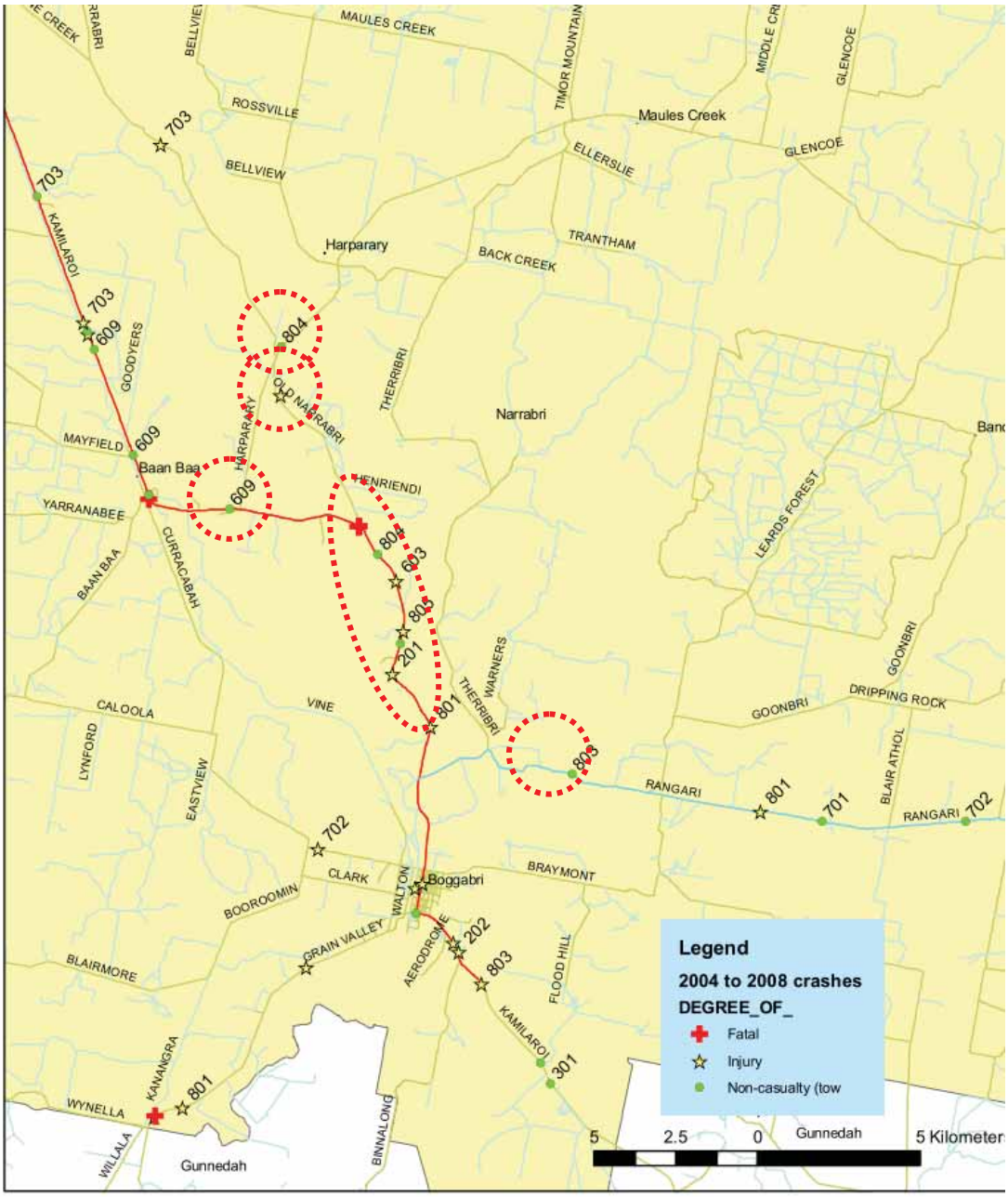
The majority of intersections would still have LoS A, with exception of Leard Forest Road/Goonbri Road in the AM peak and Leard Forest Road/Mine Access Road in both AM and PM peaks with LOS B.

The results clearly indicate that there would be no significant impact on the intersections and the road network adjacent to the project site as a result of the increase in the staff number and coal production.

5.3 Road safety

5.3.1 Crash data

Between 2004 and 2008, a total 11 crashes occurred in the study area network and its key intersections (refer to Figure 5-1).



Source: Road and Traffic Authority data (2008)

Figure 5-1 Boggabri area crashes 2004 – 2008

Analysis the location of recorded crashes suggests that:

- eight out of 11 crashes (73%) occurred on Kamilaroi Highway
- one crash occurred on each of the following roads:
  - Rangari Road
  - Narrabri Road
  - Harparary Road.

There were no crashes recorded by Police on the remaining surrounding road network to the Project boundary.

Analysing the type of crashes suggests that:

- off path on curve (Loss of Control) was the most common crash type (45%)
- the majority of crashes (64%) were clustered on the Kamilaroi Highway, between its intersections with Rangari Road and Old Narrabri Road
- the weekend (including late Friday) is the most critical part of the week with almost 73% of all crashes occurring during that time
- one head-on fatal crash occurred on the straight, in dry weather conditions.

5.3.2 Closure of Leard Forest Road

Closure of a section of Leard Forest Road would not result in a significant traffic reassignment to the surrounding road network and so the crash rate on the surrounding roads should not change. Of the possible existing alternative routes – Therribri Road and the Kamilaroi Highway, Therribri Road is shorter and therefore more likely to be used. From a road safety point of view, the most suitable diversion route of the existing road network would be Therribri Road. Therribri Road experienced no crashes during the analysed period as opposed to the Kamilaroi Highway which experienced 73% of all crashes.

5.3.3 Increase in the number of employee/construction staff

Eighty percent of traffic to the site use roads with no crash history. The remaining 20% use the Kamilaroi Highway, between Old Narrabri Road and Manilla Road, which has experienced the majority of recorded crashes. There is no reason to conclude that extra traffic will increase the crash potential so the additional traffic is not a safety issue.

5.3.4 Road Safety Audit

A road safety audit of the primary access route used by traffic between Kamilaroi Highway and the Boggabri Coal Mine was undertaken to assess the safety of the public roads. A number of road safety concerns were identified and listed with recommended mitigation measures in the safety deficiency log presented in Section 3 of the Road Safety Audit Report (refer to Appendix D). The majority of the identified road safety deficiencies were not caused by the mining related traffic and therefore would not further deteriorate as a result of forecast increases in project related traffic.

However, current road deficiencies adversely affect the safety of the current traffic as well as the proposed increases in traffic.

The audit identified poor pavement conditions, especially fatigue cracking at the Manilla Road/Leard Forest Road intersection, which would further deteriorate as a result of the proposed increase in traffic (repeated bending of the HMA layer under traffic), however this deficiency is not caused by traffic but rather:

- relatively thin or weak HMA layers for the magnitude of the wheel load
- soft spots or areas in inbound aggregate base material or in the subgrade soil
- weak aggregate base/subbase layers caused by inadequate compaction or increases in moisture contents.

Consideration should be given by the responsible road maintenance authority to the proper and timely pavement maintenance as well as addressing other identified road safety improvements mentioned in the Road Safety Audit Report.

5.4 Public transport services

Local school bus services are the only public transport services that operate in the vicinity of the Project. It should be noted that no school bus services use Leard Forest Road and therefore would not be impacted by its proposed closure. As the forecast increase in Project related traffic is not significant and the peak traffic periods for mine related traffic and school bus service hours occur at different times, it is unlikely that, as result of the Project, there would be any conflict in terms of traffic delays.

5.5 Cycling and pedestrian access

The remote location of the mine in relation to major townships does not encourage cycling or walking trips as a method of journey to work travel. Due to its rural location, there is no dedicated cycling or pedestrian facilities such as bike lanes, off-road shared paths or footpaths in the vicinity of the Project. Cyclists who do choose to ride to work would be required to share the road with both general vehicles and heavy vehicles.

5.6 Mitigation and management measures

The following mitigation measures should be considered:

- if the section of Leard Forest Road was closed, installation of speed advisory and curve warning signs on the section of Kamilaroi Highway, between Old Narrabri Road and Rangari Road should be considered. It is anticipated that this would reduce the likelihood of future crashes
- mitigation measures as recommended in the Road Safety Audit Report, that should be considered in regards to the current road safety deficiencies and concerns are as follow:
  - proper and timely road pavement maintenance
  - proper and timely road surface cleaning
  - installation of safety barriers on the large culverts
  - proper and timely maintenance of drainage facilities
  - monitoring and addressing pavement drop-offs
  - proper and timely maintenance of the pavement markings
  - proper and timely maintenance and upgrade of the road signage.

Page intentionally left blank

6. Train operation traffic impact study

A Train Operations Traffic Impact Study was undertaken to assess the impact caused on the road traffic within Gunnedah (two at grade crossings), Boggabri and Curlewis by train movements going to and coming from the Project, as per train movements provided in Table 6-1.

Table 6-1 Train movements (supplied by Hansen Bailey)

Year	Product coal (Mtpa)	Train movements (up & back)	No. of carriages	No. of locomotives	Train length (metres)
Current	1.5	560	72 (5400t)	3	1275
Approved	5	3120	21 (CHS 1,617t)	n/a	n/a
Year 1	2.5	870	72 to 80 (5400t to 6000t)	3	1275 to 1300
Year 5	7	2000	80 (7000t)	3	1300
Year 10	7	1650	91 (8500t)	3	1450 to 1530
Year 21	7	1650	91 (8500t)	3	1450 to 1530

The assessment did draw a comparison to the Boggabri Coal Mine's current train movements, that are currently approved and proposed as a part of the Project.

The full study report is available in Appendix E. The summary of the study is:

- the expansion of coal production at the Boggabri Coal Mine from 1.5 Mtpa to 7 Mtpa would increase the number of coal trains required from the one train per day currently to two to three coal trains per day, resulting in on average 5,5 train movements per day
- Australian Rail Track Corporation (ARTC) propose to upgrade both track and coal trains by 2015. These upgrades will improve rail capacity by increasing the total load of each coal train, increasing the length of each coal train and adding an additional coal train path per day to the Northern Rail Corridor
- the increased length of coal trains serving the Boggabri Coal Mine could increase the time vehicles are held at the four studied railway crossings by 30 seconds
- two to three coal trains per day (on average 5,5 train movements per day) are required to transport the 7 Mtpa of coal from the Boggabri Coal Mine would close each of the railway crossings in the study area a total of five to six times per day. Each of these closures could delay traffic by up to 480 seconds (8 minutes)
- the existing single coal train per day serving Boggabri Coal Mine closes the railway crossings on average twice a day with each closure causing delays to traffic of approximately 450 seconds (7 minutes and 30seconds)
- an increase of 100 m in the length of the coal trains serving the Boggabri Coal Mine would increase the time each of the railway crossings is closed by approximately 30 seconds

- two to three coal trains required to transport coal from the Boggabri Coal Mine would close each of the railway crossings in the study area on average five to six times per day. Each of these closures could delay traffic by up to 480 seconds (8 minutes)

- the impact, of the increased length and number of coal trains, on traffic on the railway crossings on Boston Street, Boggabri and New Street and Carroll Street, Gunnedah is likely to be minimal. Average traffic queues at these railway crossings could increase by approximately three vehicles in each direction per train with a high growth scenario of 5%. All these crossings have sufficient space for significantly more than three vehicles

- the impact, of the increased length and number of coal trains, on traffic at the railway crossing on the Kamilaroi Highway, Curlewis would be minor. Average traffic queues at this intersection could increase to approximately 16 vehicles per direction per train with a high growth scenario of 5%. The Kamilaroi Highway, Curlewis has road space to accommodate this length of queue.

7. Conclusions

The traffic impact assessment for the Continuation of Boggabri Coal Mine (the Project) has identified no significant traffic impacts associated with:

- closure of a section of Leard Forest Road
- increased coal production
- increased number of permanent staff and the presence of construction staff.

It is assumed that the additional staff, and associated trips created by the mine expansion, would originate from similar locations to those of existing staff. Therefore it has been assumed that the traffic distribution on the road network in Year 5 is likely to be the same as the current distribution.

Currently in the AM peak period (between 5:00 am and 9:00 am):

- the majority of the Leard Forest Road users are coming from the south and use the road on their way to/from the southern access to the mine
- only 13 vehicles in total ravelled on the northern part of Leard Forest Road (just south of its intersection with Harparary Road) between 5:00 am and 9:00 am. Only four out of 13 vehicles used the road for purposes not associated with the mining activities.

Currently in the PM peak period (between 3:00 pm and 8:00 pm):

- the majority of the Leard Forest Road users are also coming from the south and use the road on their way to/from the southern access to the mine
- in the afternoon, the traffic volume was higher than in the morning, but still not significant in terms of the number of vehicles. Apart from mining related trips, few vehicles use the section of the road planned to be closed. Currently, only 31 vehicles in total appear on the northern part of Leard Forest Road (just south of its intersection with Harparary Road). Only 11 out of 31 vehicles use the road for purposes not associated with the mining activities.

The small number of vehicles affected means that the closure of Leard Forest Road would not significantly impact traffic operation of the surrounding network in AM or PM peak traffic periods. However, some individual local residents who do use the road will be inconvenience by the closure.

It is not expected that an increase in the number of vehicle crashes on the surrounding roads would result from the closure of Leard Forest Road.

SIDRA modelling results for the peak period of operation and construction, Year 5, shows that all key intersections will continue to operate far below their capacity, with all intersections having DoS less than or equal to 15%. Compared with the current situation, this is considered to be an insignificant increase in DoS. The majority of the intersections will still operate at LoS A, with exception of the Leard Forest Road/Goonbri Road intersection in AM peak and the Leard Forest Road/Mine Access Road intersection in both AM and PM peaks which operate at LoS B. The longest queues of 6 m with an average delay of 17 sec/veh would occur in AM peak at the Leard Forest Road/Mine Access Road intersection. The SIDRA results clearly indicate that there would be no significant impact on the intersections and the road network adjacent to the Project neither as result of the increase in the number of staff, coal production or project construction.

The additional volumes of heavy vehicles, that haul coal via the private haul road, would neither impact the capacity of the Leard Forest Road or Therribri Road at-grade intersection nor traffic safety.

The construction stage of the Project is not expected to be a significant generator of additional traffic onto the road network. Furthermore, any construction generated traffic that would occur is unlikely to be within the peak periods of mine operation.

Based on the current crash record, installation of the speed advisory and curve warning signs on the Kamilaroi Highway, between Narrabri Road and Rangari Road, are considered as a measure to reduce the likelihood of future crashes.

Mitigation measures as recommended in the Road Safety Audit Report that should be considered in regards to the current road safety deficiencies and concerns are as follow:

- proper and timely road pavement maintenance
- proper and timely road surface cleaning
- installation of safety barriers on the large culverts
- proper and timely maintenance of drainage facilities
- monitoring and addressing pavement drop-offs
- proper and timely maintenance of the pavement markings
- proper and timely maintenance and upgrade of the road signage.

School buses are the only existing public transport service in the vicinity of the Project, but they are largely unaffected by the Project because:

- they do not use Leard Forest Road and are unaffected by its closure
- the forecast increase in Project related traffic is not significant
- the difference in mine related peak traffic hours and school bus service operating hours ensures that there would be no significant conflict between the additional traffic and school buses.

The opportunities for walking and cycling to the Boggabri Coal Mine are limited due to the proximity from major townships and lack of dedicated facilities typical of the rural environment.

The increased length and number of coal trains as a direct result of the Project would not make any significant impact on the at-grade railway crossings in Boggabri, Gunnedah and Curlewis. Average traffic queues at these railway crossings could increase by approximately three vehicles in each direction per train. All these crossings have sufficient space for significantly more than three vehicles. The impact, of the increased length and number of coal trains, on traffic at the railway crossing on the Kamilaroi Highway, Curlewis would be minor. Average traffic queues at this intersection could increase to approximately 16 vehicles per direction per train with a high growth scenario of 5%. The Kamilaroi Highway, Curlewis has road space to accommodate this length of queue.

Appendix A

Traffic survey data

Page intentionally left blank

Intersection of Kamilaroi Highway / Manilla Road

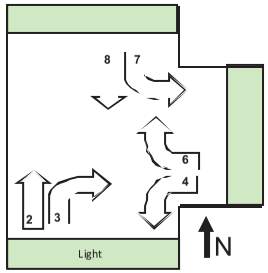
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Kamilaroi Highway
East Approach Manilla Road
South Approach Kamilaroi Highway
West Approach -

Date 29/10/09

Classfication Light Heavy



AM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 5:15	0	0	0	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0
5:15 - 5:30	0	0	0	1	1	2	2	0	2	0	0	0	0	0	0	0	0	0
5:30 - 5:45	0	0	0	4	2	6	0	0	0	0	0	0	0	0	0	0	0	0
5:45 - 6:00	0	0	0	2	0	2	4	0	4	1	0	1	0	0	0	0	0	0
6:00 - 6:15	0	0	0	1	3	4	8	1	9	1	1	2	0	0	0	0	0	0
6:15 - 6:30	0	0	0	10	1	11	0	1	1	1	1	2	0	0	0	1	0	1
6:30 - 6:45	0	0	0	12	0	12	4	0	4	1	0	1	0	0	0	3	0	3
6:45 - 7:00	0	0	0	6	1	7	2	0	2	2	1	3	0	0	0	0	0	0
7:00 - 7:15	0	0	0	2	4	6	2	0	2	0	0	0	0	0	0	0	0	0
7:15 - 7:30	0	0	0	8	5	13	2	0	2	0	0	0	0	0	0	0	0	0
7:30 - 7:45	0	0	0	4	3	7	3	1	4	3	0	3	0	0	0	3	0	3
7:45 - 8:00	0	0	0	6	5	11	1	0	1	1	0	1	0	0	0	0	0	0
8:00 - 8:15	0	0	0	7	3	10	1	0	1	0	0	0	0	0	0	1	0	1
8:15 - 8:30	0	0	0	6	5	11	1	0	1	1	1	2	0	0	0	2	0	2
8:30 - 8:45	0	0	0	6	1	7	2	0	2	1	0	1	0	0	0	1	1	2
8:45 - 9:00	0	0	0	16	2	18	1	0	1	2	0	2	0	0	0	1	0	1
Peak Σ	0	0	0	94	37	131	33	3	36	14	4	18	0	0	0	12	1	13

TIME PERIOD	VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 5:15	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	6
5:15 - 5:30	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	4	2	6
5:30 - 5:45	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2	10
5:45 - 6:00	2	0	2	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	11	1	12
6:00 - 6:15	1	0	1	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	16	6	22
6:15 - 6:30	1	2	3	3	3	6	0	0	0	0	0	0	0	0	0	0	0	0	16	8	24
6:30 - 6:45	0	0	0	7	1	8	0	0	0	0	0	0	0	0	0	0	0	0	27	1	28
6:45 - 7:00	1	0	1	4	5	9	0	0	0	0	0	0	0	0	0	0	0	0	15	7	22
7:00 - 7:15	1	0	1	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	10	5	15
7:15 - 7:30	0	0	0	6	3	9	0	0	0	0	0	0	0	0	0	0	0	0	16	8	24
7:30 - 7:45	0	0	0	6	2	8	0	0	0	0	0	0	0	0	0	0	0	0	19	6	25
7:45 - 8:00	1	0	1	6	3	9	0	0	0	0	0	0	0	0	0	0	0	0	15	8	23
8:00 - 8:15	0	0	0	11	2	13	0	0	0	0	0	0	0	0	0	0	0	0	20	5	25
8:15 - 8:30	0	3	3	13	2	15	0	0	0	0	0	0	0	0	0	0	0	0	23	11	34
8:30 - 8:45	2	0	2	22	2	24	0	0	0	0	0	0	0	0	0	0	0	0	34	4	38
8:45 - 9:00	1	0	1	13	4	17	0	0	0	0	0	0	0	0	0	0	0	0	34	6	40
Peak Σ	16	5	21	104	31	135	0	0	0	0	0	0	0	0	0	0	0	0	273	81	354

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 6:00	0	0	0	10	4	14	6	0	6	1	0	1	0	0	0	0	0	0
5:15 - 6:15	0	0	0	8	6	14	14	1	15	2	1	3	0	0	0	0	0	0
5:30 - 6:30	0	0	0	17	6	23	12	2	14	3	2	5	0	0	0	1	0	1
Peak 5:45 - 6:45	0	0	0	25	4	29	16	2	18	4	2	6	0	0	0	4	0	4
6:00 - 7:00	0	0	0	29	5	34	14	2	16	5	3	8	0	0	0	4	0	4
6:15 - 7:15	0	0	0	30	6	36	8	1	9	4	2	6	0	0	0	4	0	4
6:30 - 7:30	0	0	0	28	10	38	10	0	10	3	1	4	0	0	0	3	0	3
6:45 - 7:45	0	0	0	20	13	33	9	1	10	5	1	6	0	0	0	3	0	3
7:00 - 8:00	0	0	0	20	17	37	8	1	9	4	0	4	0	0	0	3	0	3
7:15 - 8:15	0	0	0	25	16	41	7	1	8	4	0	4	0	0	0	4	0	4
7:30 - 8:30	0	0	0	23	16	39	6	1	7	5	1	6	0	0	0	6	0	6
7:45 - 8:45	0	0	0	25	14	39	5	0	5	3	1	4	0	0	0	4	1	5
8:00 - 9:00	**0**	**0**	**0**	**35**	**11**	**46**	**5**	**0**	**5**	**4**	**1**	**5**	**0**	**0**	**0**	**5**	**1**	**6**

TIME PERIOD	VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 6:00	8	0	8	3	2	5	0	0	0	0	0	0	0	0	0	0	0	0	28	6	34
5:15 - 6:15	7	0	7	8	3	11	0	0	0	0	0	0	0	0	0	0	0	0	39	11	50
5:30 - 6:30	8	2	10	10	5	15	0	0	0	0	0	0	0	0	0	0	0	0	51	17	68
Peak 5:45 - 6:45	4	2	6	17	6	23	0	0	0	0	0	0	0	0	0	0	0	0	70	16	86
6:00 - 7:00	3	2	5	19	10	29	0	0	0	0	0	0	0	0	0	0	0	0	74	22	96
6:15 - 7:15	3	2	5	19	10	29	0	0	0	0	0	0	0	0	0	0	0	0	68	21	89
6:30 - 7:30	2	0	2	22	10	32	0	0	0	0	0	0	0	0	0	0	0	0	68	21	89
6:45 - 7:45	2	0	2	21	11	32	0	0	0	0	0	0	0	0	0	0	0	0	60	26	86
7:00 - 8:00	2	0	2	23	9	32	0	0	0	0	0	0	0	0	0	0	0	0	60	27	87
7:15 - 8:15	1	0	1	29	10	39	0	0	0	0	0	0	0	0	0	0	0	0	70	27	97
7:30 - 8:30	1	3	4	36	9	45	0	0	0	0	0	0	0	0	0	0	0	0	77	30	107
7:45 - 8:45	3	3	6	52	9	61	0	0	0	0	0	0	0	0	0	0	0	0	92	28	120
8:00 - 9:00	**3**	**3**	**6**	**59**	**10**	**69**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**111**	**26**	**137**

Peak

Intersection of Kamilaroi Highway / Manilla Road

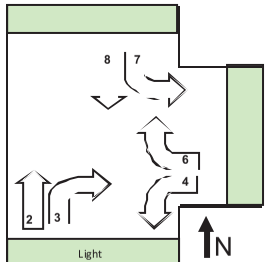
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Kamilaroi Highway
East Approach Manilla Road
South Approach Kamilaroi Highway
West Approach -

Date 29/10/09

Classfication Light Heavy



PM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 15:15	0	0	0	12	6	18	2	0	2	2	0	2	0	0	0	1	0	1
15:15 - 15:30	0	0	0	7	2	9	6	0	6	4	0	4	0	0	0	0	0	0
15:30 - 15:45	0	0	0	15	0	15	2	0	2	3	2	5	0	0	0	1	0	1
15:45 - 16:00	0	0	0	13	2	15	1	0	1	3	1	4	0	0	0	0	0	0
16:00 - 16:15	0	0	0	5	1	6	2	0	2	0	0	0	0	0	0	2	0	2
16:15 - 16:30	0	0	0	14	2	16	6	0	6	6	1	7	0	0	0	2	0	2
16:30 - 16:45	0	0	0	11	2	13	2	0	2	0	0	0	0	0	0	2	0	2
16:45 - 17:00	0	0	0	13	3	16	6	0	6	6	0	6	0	0	0	2	0	2
17:00 - 17:15	0	0	0	15	1	16	3	0	3	1	0	1	0	0	0	3	0	3
17:15 - 17:30	0	0	0	5	3	8	4	1	5	7	0	7	0	0	0	2	0	2
17:30 - 17:45	0	0	0	12	2	14	3	1	4	3	0	3	0	0	0	1	0	1
17:45 - 18:00	0	0	0	11	1	12	2	0	2	4	0	4	0	0	0	0	0	0
18:00 - 18:15	0	0	0	4	1	5	3	0	3	4	1	5	0	0	0	1	0	1
18:15 - 18:30	0	0	0	5	1	6	2	0	2	3	1	4	0	0	0	3	0	3
18:30 - 18:45	0	0	0	10	5	15	1	0	1	1	0	1	0	0	0	1	0	1
18:45 - 19:00	0	0	0	9	4	13	2	1	3	7	1	8	0	0	0	0	0	0
19:00 - 19:15	0	0	0	8	0	8	3	0	3	2	0	2	0	0	0	1	0	1
19:15 - 19:30	0	0	0	6	2	8	0	0	0	1	1	2	0	0	0	0	0	0
19:30 - 19:45	0	0	0	4	2	6	0	0	0	3	0	3	0	0	0	0	1	1
19:45 - 20:00	0	0	0	6	2	8	1	0	1	0	0	0	0	0	0	0	0	0
Peak Σ	0	0	0	185	42	227	51	3	54	60	8	68	0	0	0	22	1	23

TIME PERIOD	VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 15:15	0	1	1	6	5	11	0	0	0	0	0	0	0	0	0	0	0	0	23	12	35
15:15 - 15:30	0	0	0	13	4	17	0	0	0	0	0	0	0	0	0	0	0	0	30	6	36
15:30 - 15:45	2	0	2	11	1	12	0	0	0	0	0	0	0	0	0	0	0	0	34	3	37
15:45 - 16:00	2	0	2	12	1	13	0	0	0	0	0	0	0	0	0	0	0	0	31	4	35
16:00 - 16:15	3	1	4	4	2	6	0	0	0	0	0	0	0	0	0	0	0	0	16	4	20
16:15 - 16:30	1	0	1	9	1	10	0	0	0	0	0	0	0	0	0	0	0	0	38	4	42
16:30 - 16:45	3	0	3	13	1	14	0	0	0	0	0	0	0	0	0	0	0	0	31	3	34
16:45 - 17:00	1	0	1	10	2	12	0	0	0	0	0	0	0	0	0	0	0	0	38	5	43
17:00 - 17:15	0	0	0	13	3	16	0	0	0	0	0	0	0	0	0	0	0	0	35	4	39
17:15 - 17:30	0	0	0	11	3	14	0	0	0	0	0	0	0	0	0	0	0	0	29	7	36
17:30 - 17:45	1	0	1	13	3	16	0	0	0	0	0	0	0	0	0	0	0	0	33	6	39
17:45 - 18:00	0	0	0	9	4	13	0	0	0	0	0	0	0	0	0	0	0	0	26	5	31
18:00 - 18:15	3	0	3	6	2	8	0	0	0	0	0	0	0	0	0	0	0	0	21	4	25
18:15 - 18:30	0	0	0	10	1	11	0	0	0	0	0	0	0	0	0	0	0	0	23	3	26
18:30 - 18:45	0	0	0	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	16	6	22
18:45 - 19:00	0	0	0	11	1	12	0	0	0	0	0	0	0	0	0	0	0	0	29	7	36
19:00 - 19:15	1	0	1	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	20	1	21
19:15 - 19:30	0	0	0	3	4	7	0	0	0	0	0	0	0	0	0	0	0	0	10	7	17
19:30 - 19:45	0	0	0	3	2	5	0	0	0	0	0	0	0	0	0	0	0	0	10	5	15
19:45 - 20:00	0	0	0	7	1	8	0	0	0	0	0	0	0	0	0	0	0	0	14	3	17
Peak Σ	17	2	19	172	43	215	0	0	0	0	0	0	0	0	0	0	0	0	507	99	606

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 16:00	0	0	0	47	10	57	11	0	11	12	3	15	0	0	0	2	0	2
15:15 - 16:15	0	0	0	40	5	45	11	0	11	10	3	13	0	0	0	3	0	3
15:30 - 16:30	0	0	0	47	5	52	11	0	11	12	4	16	0	0	0	5	0	5
15:45 - 16:45	0	0	0	43	7	50	11	0	11	9	2	11	0	0	0	6	0	6
16:00 - 17:00	0	0	0	43	8	51	16	0	16	12	1	13	0	0	0	8	0	8
16:15 - 17:15	**0**	**0**	**0**	**53**	**8**	**61**	**17**	**0**	**17**	**13**	**1**	**14**	**0**	**0**	**0**	**9**	**0**	**9**
16:30 - 17:30	0	0	0	44	9	53	15	1	16	14	0	14	0	0	0	9	0	9
16:45 - 17:45	0	0	0	45	9	54	16	2	18	17	0	17	0	0	0	8	0	8
Peak 17:00 - 18:00	0	0	0	43	7	50	12	2	14	15	0	15	0	0	0	6	0	6
17:15 - 18:15	0	0	0	32	7	39	12	2	14	18	1	19	0	0	0	4	0	4
17:30 - 18:30	0	0	0	32	5	37	10	1	11	14	2	16	0	0	0	5	0	5
17:45 - 18:45	0	0	0	30	8	38	8	0	8	12	2	14	0	0	0	5	0	5
18:00 - 19:00	0	0	0	28	11	39	8	1	9	15	3	18	0	0	0	5	0	5
18:15 - 19:15	0	0	0	32	10	42	8	1	9	13	2	15	0	0	0	5	0	5
18:30 - 19:30	0	0	0	33	11	44	6	1	7	11	2	13	0	0	0	2	0	2
18:45 - 19:45	0	0	0	27	8	35	5	1	6	13	2	15	0	0	0	1	1	2
19:00 - 20:00	0	0	0	24	6	30	4	0	4	6	1	7	0	0	0	1	1	2

TIME PERIOD	VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 16:00	4	1	5	42	11	53	0	0	0	0	0	0	0	0	0	0	0	0	118	25	143
15:15 - 16:15	7	1	8	40	8	48	0	0	0	0	0	0	0	0	0	0	0	0	111	17	128
15:30 - 16:30	8	1	9	36	5	41	0	0	0	0	0	0	0	0	0	0	0	0	119	15	134
15:45 - 16:45	9	1	10	38	5	43	0	0	0	0	0	0	0	0	0	0	0	0	116	15	131
16:00 - 17:00	8	1	9	36	6	42	0	0	0	0	0	0	0	0	0	0	0	0	123	16	139
16:15 - 17:15	**5**	**0**	**5**	**45**	**7**	**52**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**142**	**16**	**158**
16:30 - 17:30	4	0	4	47	9	56	0	0	0	0	0	0	0	0	0	0	0	0	133	19	152
16:45 - 17:45	2	0	2	47	11	58	0	0	0	0	0	0	0	0	0	0	0	0	135	22	157
Peak 17:00 - 18:00	1	0	1	46	13	59	0	0	0	0	0	0	0	0	0	0	0	0	125	22	145
17:15 - 18:15	4	0	4	39	12	51	0	0	0	0	0	0	0	0	0	0	0	0	109	22	131
17:30 - 18:30	4	0	4	38	10	48	0	0	0	0	0	0	0	0	0	0	0	0	103	18	121
17:45 - 18:45	3	0	3	28	8	36	0	0	0	0	0	0	0	0	0	0	0	0	86	18	104
18:00 - 19:00	3	0	3	30	5	35	0	0	0	0	0	0	0	0	0	0	0	0	89	20	109
18:15 - 19:15	1	0	1	29	4	33	0	0	0	0	0	0	0	0	0	0	0	0	88	17	105
18:30 - 19:30	1	0	1	22	7	29	0	0	0	0	0	0	0	0	0	0	0	0	75	21	96
18:45 - 19:45	1	0	1	22	8	30	0	0	0	0	0	0	0	0	0	0	0	0	69	20	89
19:00 - 20:00	1	0	1	18	8	26	0	0	0	0	0	0	0	0	0	0	0	0	54	16	70

Peak

Intersection of Kamilaroi Highway / Manilla Road

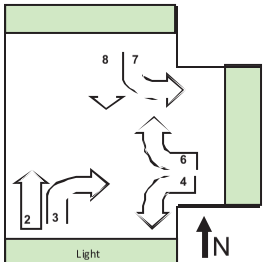
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Kamilaroi Highway
East Approach Manilla Road
South Approach Kamilaroi Highway
West Approach -

Date 29/10/09

Classfication Light Heavy



	Lookup L	5	8	11	14	17	20	23	26	29	32	35	38	41	
	Lookup H	6	9	12	15	18	21	24	27	30	33	36	39	42	
	1 Hr	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**	
Peak	**AM-LV**	0	25	16	4	0	4	4	17	0	0	0	0	70	
Peak	**AM-HV**	0	4	2	2	0	0	2	6	0	0	0	0	16	
	AM-Tota	0	29	18	6	0	4	6	23	0	0	0	0	86	Check
	Total														
Peak	**AM-LV**	0	94	33	14	0	12	16	104	0	0	0	0	273	
Peak	**AM-HV**	0	37	3	4	0	1	5	31	0	0	0	0	81	
	AM-Tota	0	131	36	18	0	13	21	135	0	0	0	0	354	OK

	1 Hr	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**	
Peak	**PM-LV**	0	43	12	15	0	6	1	46	0	0	0	0	123	
Peak	**PM-HV**	0	7	2	0	0	0	0	13	0	0	0	0	22	
	PM-Tota	0	50	14	15	0	6	1	59	0	0	0	0	145	Check
	Total														
Peak	**PM-LV**	0	185	51	60	0	22	17	172	0	0	0	0	507	
Peak	**PM-HV**	0	42	3	8	0	1	2	43	0	0	0	0	99	
	PM-Tota	0	227	54	68	0	23	19	215	0	0	0	0	606	OK

Intersection of Manilla Road / Therribri Road

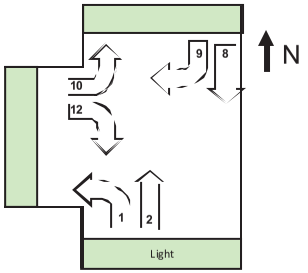
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Therribri Road
East Approach -
South Approach Manilla Road
West Approach Manilla Road

Date 29/10/09

Classfication Light Heavy



AM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 5:15	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2	0	2	4	0	4
5:15 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2	0	2
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5	0	5
5:45 - 6:00	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	10	0	10	11	1	12
6:00 - 6:15	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	9	9	1	10
6:15 - 6:30	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	5	3	4	7
6:30 - 6:45	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	9	0	9
6:45 - 7:00	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	4	0	4	5	1	6
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2	3	0	3
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
7:30 - 7:45	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	2	1	3	8	1	9
7:45 - 8:00	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	3	1	4
8:00 - 8:15	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2	2	4
8:15 - 8:30	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	6	1	7
8:30 - 8:45	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	1	1	2	4	1	5
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	2	0	2	4	0	4
Peak Σ	18	5	23	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	5	1	6	4	0	4	0	0	0	48	7	55	79	13	92

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 6:00	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	19	0	19	22	1	23
5:15 - 6:15	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	25	1	26	27	2	29
5:30 - 6:30	2	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	25	4	29	28	6	34
Peak 5:45 - 6:45	7	2	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	24	4	28	32	6	38
6:00 - 7:00	8	1	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	18	4	22	26	6	32
6:15 - 7:15	7	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	12	3	15	20	5	25
6:30 - 7:30	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	11	0	11	18	1	19
6:45 - 7:45	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	2	0	2	0	0	0	9	1	10	17	2	19
7:00 - 8:00	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	3	0	3	0	0	0	6	1	7	15	2	17
7:15 - 8:15	5	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2	2	0	2	0	0	0	4	2	6	14	4	18
7:30 - 8:30	9	3	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2	2	0	2	0	0	0	5	2	7	19	5	24
7:45 - 8:45	7	3	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	2	0	2	0	0	0	4	2	6	15	5	20
8:00 - 9:00	6	2	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2	0	2	1	0	1	0	0	0	5	2	7	16	4	20

Peak

Intersection of Manilla Road / Therribri Road

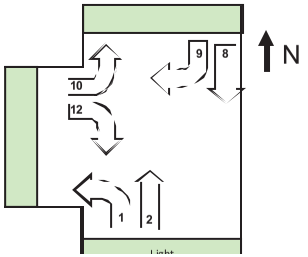
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Therribri Road
East Approach -
South Approach Manilla Road
West Approach Manilla Road

Date 29/10/09

Classfication Light Heavy



PM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 15:15	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	1	0	1	0	0	0	3	1	4	9	1	10
15:15 - 15:30	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	5	0	5	8	1	9
15:30 - 15:45	5	0	5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	2	9	0	9
15:45 - 16:00	1	1	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	6	1	7
16:00 - 16:15	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	3	0	3	6	0	6
16:15 - 16:30	7	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	9	0	9	18	0	18
16:30 - 16:45	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2	0	0	0	3	1	4	7	1	8
16:45 - 17:00	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	3	0	3	5	0	5
17:00 - 17:15	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	1	2	6	1	7
17:15 - 17:30	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	11	0	11
17:30 - 17:45	3	0	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	4	1	5	10	1	11
17:45 - 18:00	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	1	0	1	6	0	6
18:00 - 18:15	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	3	0	3	10	1	11
18:15 - 18:30	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	7	1	8
18:30 - 18:45	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
18:45 - 19:00	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	7	1	8
19:00 - 19:15	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2	6	0	6
19:15 - 19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:30 - 19:45	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	3	1	4
19:45 - 20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
Peak Σ	60	6	66	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	14	13	0	13	0	0	0	46	4	50	136	10	146

OK

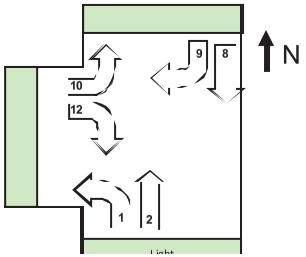
TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 16:00	10	2	12	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	2	0	2	0	0	0	14	1	15	32	3	35
15:15 - 16:15	10	2	12	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	14	0	14	29	2	31
15:30 - 16:30	**15**	**1**	**16**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**3**	**1**	**0**	**1**	**0**	**0**	**0**	**18**	**0**	**18**	**39**	**1**	**40**
15:45 - 16:45	11	1	12	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3	0	3	0	0	0	19	1	20	37	2	39
16:00 - 17:00	11	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	3	0	3	0	0	0	18	1	19	36	1	37
16:15 - 17:15	13	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	4	0	4	0	0	0	16	2	18	36	2	38
16:30 - 17:30	15	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	3	0	3	0	0	0	9	2	11	29	2	31
16:45 - 17:45	17	0	17	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2	0	2	0	0	0	10	2	12	32	2	34
Peak 17:00 - 18:00	18	0	18	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	2	0	2	0	0	0	8	2	10	33	2	35
17:15 - 18:15	19	1	20	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	3	0	3	0	0	0	10	1	11	37	2	39
17:30 - 18:30	15	2	17	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	4	0	4	0	0	0	9	1	10	33	3	36
17:45 - 18:45	13	2	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3	0	3	0	0	0	5	0	5	24	2	26
18:00 - 19:00	16	3	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4	0	4	0	0	0	4	0	4	25	3	28
18:15 - 19:15	14	2	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	0	3	0	0	0	3	0	3	21	2	23
18:30 - 19:30	9	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2	0	0	0	2	0	2	14	1	15
18:45 - 19:45	10	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2	0	2	0	0	0	2	0	2	16	2	18
19:00 - 20:00	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2	0	0	0	2	0	2	10	1	11

Peak

Intersection of Manilla Road / Therribri Road

Thursday, 29 October 2009

Skyhigh



Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Therribri Road
East Approach -
South Approach Manilla Road
West Approach Manilla Road

Date 29/10/09

Classfication Light Heavy

	Lookup L	5	8	11	14	17	20	23	26	29	32	35	38	41		
	Lookup H	6	9	12	15	18	21	24	27	30	33	36	39	42		
	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total		
Peak	AM-LV	7	0	0	0	0	0	0	0	1	0	0	24	32		
Peak	AM-HV	2	0	0	0	0	0	0	0	0	0	0	4	6		
	AM-Tota	9	0	0	0	0	0	0	0	1	0	0	28	38	OK	
	Total															
Peak	AM-LV	18	1	0	0	0	0	0	3	5	4	0	48	79		
Peak	AM-HV	5	0	0	0	0	0	0	0	1	0	0	7	13		
	AM-Tota	23	1	0	0	0	0	0	3	6	4	0	55	92	OK	

	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total		
Peak	PM-LV	18	1	0	0	0	0	0	0	4	2	0	8	33		
Peak	PM-HV	0	0	0	0	0	0	0	0	0	0	0	2	2		
	PM-Tota	18	1	0	0	0	0	0	0	4	2	0	10	35	Check	
	Total															
Peak	PM-LV	60	3	0	0	0	0	0	0	14	13	0	46	136		
Peak	PM-HV	6	0	0	0	0	0	0	0	0	0	0	4	10		
	PM-Tota	66	3	0	0	0	0	0	0	14	13	0	50	146	OK	

Intersection of Manilla Road / Leard Forest Road

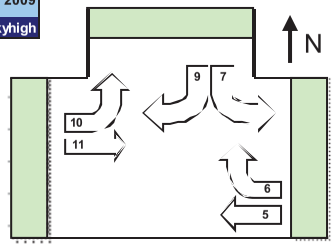
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Leard Forest Road
East Approach Manillar Road
South Approach -
West Approach Manillar Road

Date 29/10/09

Classfication Light Heavy



AM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	2	0	2
5:15 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	3	0	3
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	6	0	6	2	0	2	0	0	0	8	2	10
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	1	0	1	9	0	9	0	0	0	0	0	0	13	0	13
6:00 - 6:15	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2	1	3	0	0	0	0	0	0	1	1	2	4	2	6	1	0	1	0	0	0	10	4	14
6:15 - 6:30	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	0	0	0	2	0	2	2	0	2	0	2	2	0	0	0	7	2	9
6:30 - 6:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	0	3	0	0	0	0	0	0	4	0	4
6:45 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	5	0	5
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	2
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	2	1	3
7:45 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	1	1	2
8:00 - 8:15	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	1	0	0	0	5	1	6
8:15 - 8:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	2	4	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	4	3	7
8:30 - 8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	3	0	3
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	2	0	0	0	0	0	0	2	1	3
Peak Σ	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	12	4	16	0	0	0	0	0	0	6	3	9	37	4	41	7	4	11	0	0	0	72	15	87

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	0	0	0	1	1	2	19	0	19	3	0	3	0	0	0	26	2	28
5:15 - 6:15	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	5	2	7	0	0	0	0	0	0	2	2	4	21	2	23	4	0	4	0	0	0	34	6	40
5:30 - 6:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**4**	**6**	**2**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**2**	**6**	**21**	**2**	**23**	**3**	**2**	**5**	**0**	**0**	**0**	**38**	**8**	**46**
Peak 5:45 - 6:45	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	6	1	7	0	0	0	0	0	0	5	1	6	18	2	20	1	2	3	0	0	0	34	6	40
6:00 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	6	1	7	0	0	0	0	0	0	4	1	5	11	2	13	1	2	3	0	0	0	26	6	32
6:15 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	4	0	4	0	0	0	0	0	0	3	0	3	8	0	8	0	2	2	0	0	0	18	2	20
6:30 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4	0	4	0	0	0	0	0	0	1	0	1	6	0	6	0	0	0	0	0	0	12	0	12
6:45 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	4	0	4	0	0	0	0	0	0	0	0	0	4	0	4	0	1	1	0	0	0	10	1	11
7:00 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	2	1	3	1	1	2	0	0	0	6	2	8
7:15 - 8:15	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	1	0	1	0	0	0	0	0	0	0	1	1	2	1	3	2	1	3	0	0	0	9	3	12
7:30 - 8:30	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	2	2	4	0	0	0	0	0	0	0	1	1	3	1	4	2	2	4	0	0	0	12	6	18
7:45 - 8:45	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	2	2	4	0	0	0	0	0	0	0	1	1	4	1	5	3	1	4	0	0	0	13	5	18
8:00 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	2	2	4	0	0	0	0	0	0	1	1	2	5	1	6	2	1	3	0	0	0	14	5	19

Intersection of Manilla Road / Leard Forest Road

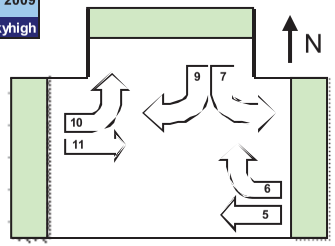
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Leard Forest Road
East Approach Manillar Road
South Approach -
West Approach Manillar Road

Date 29/10/09

Classfication Light Heavy



PM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
15:15 - 15:30	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0
15:30 - 15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45 - 16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00 - 16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
16:15 - 16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
16:30 - 16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45 - 17:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
18:00 - 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15 - 18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30 - 18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45 - 19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
19:00 - 19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:15 - 19:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
19:30 - 19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:45 - 20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Σ	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	4	0	4

TIME PERIOD	VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 15:15	1	0	1	0	0	0	1	1	2	4	0	4	0	0	0	0	0	0	7	1	8
15:15 - 15:30	0	0	0	0	0	0	2	0	2	4	0	4	0	0	0	0	0	0	7	1	8
15:30 - 15:45	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
15:45 - 16:00	1	0	1	0	0	0	2	0	2	2	0	2	0	0	0	0	0	0	5	0	5
16:00 - 16:15	0	0	0	0	0	0	5	0	5	6	0	6	2	0	2	0	0	0	14	0	14
16:15 - 16:30	3	0	3	0	0	0	0	0	0	3	0	3	2	0	2	0	0	0	9	0	9
16:30 - 16:45	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
16:45 - 17:00	2	0	2	0	0	0	2	0	2	1	0	1	1	0	1	0	0	0	7	0	7
17:00 - 17:15	8	0	8	0	0	0	9	0	9	0	0	0	1	0	1	0	0	0	18	0	18
17:15 - 17:30	1	0	1	0	0	0	2	0	2	0	0	0	1	0	1	0	0	0	4	0	4
17:30 - 17:45	1	0	1	0	0	0	3	0	3	4	1	5	1	0	1	0	0	0	9	1	10
17:45 - 18:00	0	0	0	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	4	2	6
18:00 - 18:15	0	0	0	0	0	0	5	0	5	2	0	2	2	0	2	0	0	0	9	0	9
18:15 - 18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30 - 18:45	0	1	1	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	4	2	6
18:45 - 19:00	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	4	0	4
19:00 - 19:15	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	2	0	2
19:15 - 19:30	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2	0	2
19:30 - 19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:45 - 20:00	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Peak Σ	18	1	19	0	0	0	43	3	46	30	1	31	10	0	10	0	0	0	108	7	115

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 16:00	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	1
15:15 - 16:15	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	1
15:30 - 16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
15:45 - 16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
16:00 - 17:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2
16:15 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
16:30 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
16:45 - 17:45	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**
Peak 17:00 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
17:15 - 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
17:30 - 18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
17:45 - 18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
18:00 - 19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
18:15 - 19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
18:30 - 19:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
18:45 - 19:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
19:00 - 20:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0

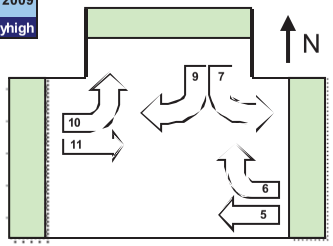
TIME PERIOD	VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 16:00	2	0	2	0	0	0	5	1	6	11	0	11	0	0	0	0	0	0	20	2	22
15:15 - 16:15	1	0	1	0	0	0	9	0	9	13	0	13	2	0	2	0	0	0	27	1	28
15:30 - 16:30	4	0	4	0	0	0	7	0	7	12	0	12	4	0	4	0	0	0	29	0	29
15:45 - 16:45	4	0	4	0	0	0	7	0	7	12	0	12	4	0	4	0	0	0	29	0	29
16:00 - 17:00	5	0	5	0	0	0	7	0	7	11	0	11	5	0	5	0	0	0	31	0	31
16:15 - 17:15	13	0	13	0	0	0	11	0	11	5	0	5	4	0	4	0	0	0	35	0	35
16:30 - 17:30	11	0	11	0	0	0	13	0	13	2	0	2	3	0	3	0	0	0	30	0	30
16:45 - 17:45	**12**	**0**	**12**	**0**	**0**	**0**	**16**	**0**	**16**	**5**	**1**	**6**	**4**	**0**	**4**	**0**	**0**	**0**	**38**	**1**	**39**
Peak 17:00 - 18:00	10	0	10	0	0	0	18	1	19	4	1	5	3	0	3	0	0	0	35	3	38
17:15 - 18:15	2	0	2	0	0	0	14	1	15	6	1	7	4	0	4	0	0	0	26	3	29
17:30 - 18:30	1	0	1	0	0	0	12	1	13	6	1	7	3	0	3	0	0	0	22	3	25
17:45 - 18:45	0	1	1	0	0	0	13	2	15	2	0	2	2	0	2	0	0	0	17	4	21
18:00 - 19:00	0	1	1	0	0	0	12	1	13	2	0	2	2	0	2	0	0	0	17	2	19
18:15 - 19:15	0	1	1	0	0	0	7	1	8	2	0	2	0	0	0	0	0	0	10	2	12
18:30 - 19:30	0	1	1	0	0	0	8	1	9	2	0	2	0	0	0	0	0	0	12	2	14
18:45 - 19:45	0	0	0	0	0	0	4	0	4	2	0	2	0	0	0	0	0	0	8	0	8
19:00 - 20:00	1	0	1	0	0	0	1	0	1	2	0	2	0	0	0	0	0	0	5	0	5

Peak

Intersection of Manilla Road / Leard Forest Road

Thursday, 29 October 2009

Skyhigh



Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Leard Forest Road
East Approach Manillar Road
South Approach -
West Approach Manillar Road

Date 29/10/09

Classfication Light Heavy

	Lookup L	5	8	11	14	17	20	23	26	29	32	35	38	41	
	Lookup H	6	9	12	15	18	21	24	27	30	33	36	39	42	
	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	AM-LV	0	0	0	0	4	6	0	0	5	18	1	0	34	
Peak	AM-HV	0	0	0	0	0	1	0	0	1	2	2	0	6	
	AM-Tota	0	0	0	0	4	7	0	0	6	20	3	0	40	Check
	Total														
Peak	AM-LV	0	0	0	0	10	12	0	0	6	37	7	0	72	
Peak	AM-HV	0	0	0	0	0	4	0	0	3	4	4	0	15	
	AM-Tota	0	0	0	0	10	16	0	0	9	41	11	0	87	OK
	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	PM-LV	0	0	0	0	0	0	10	0	18	4	3	0	35	
Peak	PM-HV	0	0	0	0	1	0	0	0	1	1	0	0	3	
	PM-Tota	0	0	0	0	1	0	10	0	19	5	3	0	38	Check
	Total														
Peak	PM-LV	0	0	0	0	3	4	18	0	43	30	10	0	108	
Peak	PM-HV	0	0	0	0	2	0	1	0	3	1	0	0	7	
	PM-Tota	0	0	0	0	5	4	19	0	46	31	10	0	115	OK

Intersection of Leard Forest Road / Goonbri Road

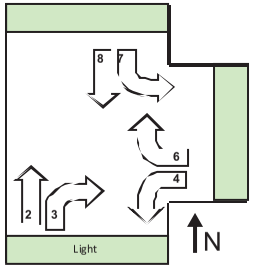
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Leard Forest Road
East Approach Goonbri Road
South Approach Leard Forest Road
West Approach -

Date 29/10/09

Classfication Light Heavy



AM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 5:15	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
5:15 - 5:30	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
5:30 - 5:45	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
5:45 - 6:00	0	0	0	10	1	11	1	0	1	0	1	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	13	2	15
6:00 - 6:15	0	0	0	10	0	10	1	0	1	0	0	0	0	0	0	2	0	2	1	0	1	2	1	3	0	0	0	0	0	0	0	0	0	16	1	17
6:15 - 6:30	0	0	0	4	2	6	1	0	1	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	9
6:30 - 6:45	0	0	0	2	0	2	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	6	0	6
6:45 - 7:00	0	0	0	2	0	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
7:00 - 7:15	0	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	7
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 - 7:45	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
7:45 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 - 8:15	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
8:15 - 8:30	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2	1	3
8:30 - 8:45	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2	2	4
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2
Peak Σ	0	0	0	44	5	49	7	0	7	2	1	3	0	0	0	7	1	8	1	0	1	7	2	9	0	0	0	0	0	0	0	0	0	68	9	77

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 6:00	0	0	0	14	1	15	2	0	2	0	1	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	18	2	20
5:15 - 6:15	0	0	0	24	1	25	2	0	2	0	1	1	0	0	0	3	0	3	1	0	1	3	1	4	0	0	0	0	0	0	0	0	0	33	3	36
5:30 - 6:30	0	0	0	25	3	28	3	0	3	0	1	1	0	0	0	5	0	5	1	0	1	3	1	4	0	0	0	0	0	0	0	0	0	37	5	42
Peak **5:45 - 6:45**	**0**	**0**	**0**	**26**	**3**	**29**	**5**	**0**	**5**	**1**	**1**	**2**	**0**	**0**	**0**	**5**	**0**	**5**	**1**	**0**	**1**	**4**	**1**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**42**	**5**	**47**
6:00 - 7:00	0	0	0	18	2	20	4	0	4	2	0	2	0	0	0	4	0	4	1	0	1	3	1	4	0	0	0	0	0	0	0	0	0	32	3	35
6:15 - 7:15	0	0	0	15	2	17	3	0	3	2	0	2	0	0	0	2	0	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	23	2	25
6:30 - 7:30	0	0	0	11	0	11	2	0	2	2	0	2	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	16	0	16
6:45 - 7:45	0	0	0	12	0	12	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	14
7:00 - 8:00	0	0	0	10	0	10	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	11
7:15 - 8:15	0	0	0	3	1	4	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	6
7:30 - 8:30	0	0	0	4	1	5	1	0	1	0	0	0	0	0	0	2	0	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	7	2	9
7:45 - 8:45	0	0	0	2	2	4	1	0	1	0	0	0	0	0	0	1	1	2	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	5	4	9
8:00 - 9:00	0	0	0	2	2	4	1	0	1	0	0	0	0	0	0	1	1	2	0	0	0	3	1	4	0	0	0	0	0	0	0	0	0	7	4	11

Peak

Intersection of Leard Forest Road / Goonbri Road

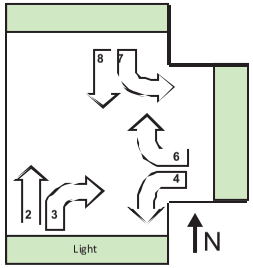
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Leard Forest Road
East Approach Goonbri Road
South Approach Leard Forest Road
West Approach -

Date 29/10/09

Classfication Light Heavy



PM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 15:15	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5
15:15 - 15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
15:30 - 15:45	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
15:45 - 16:00	0	0	0	3	0	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
16:00 - 16:15	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
16:15 - 16:30	0	0	0	4	0	4	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10
16:30 - 16:45	0	0	0	7	0	7	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	9	0	9
16:45 - 17:00	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	14	0	14	0	0	0	0	0	0	0	0	0	0	0	0	15	0	15
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	1	0	1	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
17:45 - 18:00	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	10	2	12
18:00 - 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
18:15 - 18:30	0	0	0	1	0	1	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
18:30 - 18:45	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
18:45 - 19:00	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	7	1	8
19:00 - 19:15	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
19:15 - 19:30	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
19:30 - 19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:45 - 20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Peak Σ	0	0	0	26	1	27	6	0	6	3	0	3	0	0	0	4	0	4	7	0	7	51	3	54	0	0	0	0	0	0	0	0	0	0	0	0	97	4	101

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 16:00	0	0	0	7	0	7	1	0	1	0	0	0	0	0	0	0	0	0	2	0	2	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	13	1	14
15:15 - 16:15	0	0	0	6	0	6	2	0	2	0	0	0	0	0	0	0	0	0	1	0	1	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	12	1	13
15:30 - 16:30	0	0	0	10	0	10	3	0	3	0	0	0	0	0	0	0	0	0	2	0	2	7	0	7	0	0	0	0	0	0	0	0	0	0	0	0	22	0	22
15:45 - 16:45	0	0	0	14	0	14	4	0	4	0	0	0	0	0	0	0	0	0	1	0	1	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	27	0	27
16:00 - 17:00	0	0	0	12	0	12	4	0	4	0	0	0	0	0	0	0	0	0	2	0	2	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	27	0	27
16:15 - 17:15	0	0	0	12	0	12	3	0	3	0	0	0	0	0	0	0	0	0	3	0	3	20	0	20	0	0	0	0	0	0	0	0	0	0	0	0	38	0	38
16:30 - 17:30	0	0	0	8	0	8	2	0	2	0	0	0	0	0	0	3	0	3	3	0	3	20	0	20	0	0	0	0	0	0	0	0	0	0	0	0	36	0	36
16:45 - 17:45	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	3	0	3	3	0	3	23	0	23	0	0	0	0	0	0	0	0	0	0	0	0	31	0	31
Peak 17:00 - 18:00	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	3	0	3	3	0	3	27	1	28	0	0	0	0	0	0	0	0	0	0	0	0	37	2	39
17:15 - 18:15	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	3	0	3	2	0	2	17	1	18	0	0	0	0	0	0	0	0	0	0	0	0	26	2	28
17:30 - 18:30	0	0	0	5	1	6	0	0	0	2	0	2	0	0	0	0	0	0	1	0	1	13	1	14	0	0	0	0	0	0	0	0	0	0	0	0	21	2	23
17:45 - 18:45	0	0	0	6	1	7	0	0	0	2	0	2	0	0	0	0	0	0	1	0	1	11	1	12	0	0	0	0	0	0	0	0	0	0	0	0	20	2	22
18:00 - 19:00	0	0	0	2	0	2	0	0	0	3	0	3	0	0	0	1	0	1	0	0	0	11	1	12	0	0	0	0	0	0	0	0	0	0	0	0	17	1	18
18:15 - 19:15	0	0	0	3	0	3	0	0	0	3	0	3	0	0	0	1	0	1	0	0	0	7	1	8	0	0	0	0	0	0	0	0	0	0	0	0	14	1	15
18:30 - 19:30	0	0	0	2	0	2	1	0	1	1	0	1	0	0	0	1	0	1	0	0	0	7	1	8	0	0	0	0	0	0	0	0	0	0	0	0	12	1	13
18:45 - 19:45	0	0	0	1	0	1	1	0	1	1	0	1	0	0	0	1	0	1	0	0	0	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	9	1	10
19:00 - 20:00	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3

Intersection of Leard Forest Road / Goonbri Road

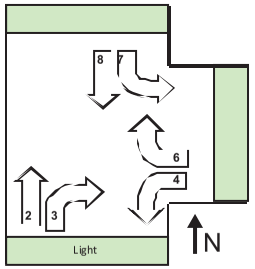
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach Leard Forest Road
East Approach Goonbri Road
South Approach Leard Forest Road
West Approach -

Date 29/10/09

Classfication Light Heavy



	Lookup L	5	8	11	14	17	20	23	26	29	32	35	38	41	
	Lookup H	6	9	12	15	18	21	24	27	30	33	36	39	42	
	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	AM-LV	0	26	5	1	0	5	1	4	0	0	0	0	42	
Peak	AM-HV	0	3	0	1	0	0	0	1	0	0	0	0	5	
	AM-Tota	0	29	5	2	0	5	1	5	0	0	0	0	47	OK

	Total														
Peak	AM-LV	0	44	7	2	0	7	1	7	0	0	0	0	68	
Peak	AM-HV	0	5	0	1	0	1	0	2	0	0	0	0	9	
	AM-Tota	0	49	7	3	0	8	1	9	0	0	0	0	77	OK

	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	PM-LV	0	4	0	0	0	3	3	27	0	0	0	0	37	
Peak	PM-HV	0	1	0	0	0	0	0	1	0	0	0	0	2	
	PM-Tota	0	5	0	0	0	3	3	28	0	0	0	0	39	OK

	Total														
Peak	PM-LV	0	26	6	3	0	4	7	51	0	0	0	0	97	
Peak	PM-HV	0	1	0	0	0	0	0	3	0	0	0	0	4	
	PM-Tota	0	27	6	3	0	4	7	54	0	0	0	0	101	OK

Intersection of Leard Forest Road / Boggabri Coal Mine Access Roa

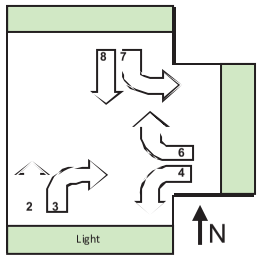
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach -
East Approach Harparary Road
South Approach Leard Forest Road
West Approach Harparary Road

Date 29/10/09

Classfication Light Heavy



AM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 - 5:30	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
5:30 - 5:45	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
5:45 - 6:00	0	0	0	0	0	0	6	1	7	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	8
6:00 - 6:15	0	0	0	0	0	0	15	0	15	2	1	3	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	19	1	20
6:15 - 6:30	0	0	0	0	0	0	6	3	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	9
6:30 - 6:45	0	0	0	0	0	0	3	0	3	1	0	1	0	0	0	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	8
6:45 - 7:00	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
7:00 - 7:15	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6
7:15 - 7:30	0	0	0	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
7:30 - 7:45	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
7:45 - 8:00	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
8:00 - 8:15	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
8:15 - 8:30	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
8:30 - 8:45	0	0	0	1	0	1	1	2	3	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	3	3	6
8:45 - 9:00	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Peak Σ	0	0	0	3	0	3	50	7	57	3	2	5	0	0	0	5	2	7	1	0	1	2	0	2	0	0	0	0	0	0	0	0	0	64	11	75

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 6:00	0	0	0	0	0	0	11	1	12	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	1	13
5:15 - 6:15	0	0	0	0	0	0	26	1	27	2	1	3	0	0	0	1	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	31	2	33
5:30 - 6:30	0	0	0	0	0	0	29	4	33	2	1	3	0	0	0	1	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	34	5	39
Peak 5:45 - 6:45	0	0	0	0	0	0	30	4	34	3	1	4	0	0	0	4	1	5	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	39	6	45
6:00 - 7:00	0	0	0	0	0	0	26	3	29	3	1	4	0	0	0	3	1	4	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	34	5	39
6:15 - 7:15	0	0	0	0	0	0	16	3	19	1	0	1	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	4	25
6:30 - 7:30	0	0	0	2	0	2	11	0	11	1	0	1	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	1	19
6:45 - 7:45	0	0	0	2	0	2	10	0	10	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	13
7:00 - 8:00	0	0	0	2	0	2	9	0	9	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	12
7:15 - 8:15	0	0	0	2	0	2	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	8
7:30 - 8:30	0	0	0	0	0	0	4	1	5	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	6
7:45 - 8:45	0	0	0	1	0	1	3	3	6	0	1	1	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	5	5	10
8:00 - 9:00	0	0	0	1	0	1	4	3	7	0	1	1	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	6	5	11

Peak

Intersection of Leard Forest Road / Boggabri Coal Mine Access Roa

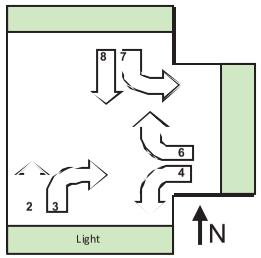
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach -
East Approach Harparary Road
South Approach Leard Forest Road
West Approach Harparary Road

Date 29/10/09

Classfication Light Heavy



PM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 15:15	0	0	0	3	0	3	1	0	1	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8
15:15 - 15:30	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4
15:30 - 15:45	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
15:45 - 16:00	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
16:00 - 16:15	0	0	0	0	0	0	1	0	1	3	0	3	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7	0	7
16:15 - 16:30	0	0	0	0	0	0	2	0	2	4	0	4	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8
16:30 - 16:45	0	0	0	1	0	1	5	0	5	1	0	1	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10
16:45 - 17:00	0	0	0	0	0	0	2	0	2	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5
17:00 - 17:15	0	0	0	0	0	0	1	0	1	16	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	17
17:15 - 17:30	0	0	0	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6
17:30 - 17:45	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
17:45 - 18:00	0	0	0	1	0	1	2	1	3	6	1	7	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	10	2	12
18:00 - 18:15	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
18:15 - 18:30	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
18:30 - 18:45	0	0	0	0	0	0	0	0	0	2	1	3	0	0	0	0	0	0	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	7
18:45 - 19:00	0	0	0	1	0	1	0	0	0	4	1	5	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	7
19:00 - 19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:15 - 19:30	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
19:30 - 19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:45 - 20:00	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Peak Σ	0	0	0	9	0	9	17	1	18	58	4	62	0	0	0	3	0	3	15	1	16	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	105	6	111

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 16:00	0	0	0	4	0	4	4	0	4	5	1	6	0	0	0	1	0	1	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	17	1	18
15:15 - 16:15	0	0	0	1	0	1	4	0	4	4	1	5	0	0	0	1	0	1	4	0	4	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	16	1	17
15:30 - 16:30	0	0	0	1	0	1	6	0	6	8	0	8	0	0	0	1	0	1	3	0	3	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	21	0	21
15:45 - 16:45	0	0	0	1	0	1	10	0	10	9	0	9	0	0	0	1	0	1	6	0	6	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	28	0	28
16:00 - 17:00	0	0	0	1	0	1	10	0	10	11	0	11	0	0	0	1	0	1	6	0	6	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	30	0	30
16:15 - 17:15	**0**	**0**	**0**	**1**	**0**	**1**	**10**	**0**	**10**	**24**	**0**	**24**	**0**	**0**	**0**	**1**	**0**	**1**	**4**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**40**	**0**	**40**
16:30 - 17:30	0	0	0	1	0	1	8	0	8	25	0	25	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	38
16:45 - 17:45	0	0	0	0	0	0	3	0	3	28	0	28	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	32
Peak 17:00 - 18:00	0	0	0	1	0	1	3	1	4	31	1	32	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	37	2	39
17:15 - 18:15	0	0	0	1	0	1	2	1	3	19	1	20	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	24	2	26
17:30 - 18:30	0	0	0	2	0	2	2	1	3	14	1	15	0	0	0	1	0	1	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	22	2	24
17:45 - 18:45	0	0	0	2	0	2	2	1	3	12	2	14	0	0	0	1	0	1	5	1	6	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	23	4	27
18:00 - 19:00	0	0	0	2	0	2	0	0	0	10	2	12	0	0	0	1	0	1	6	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	3	22
18:15 - 19:15	0	0	0	2	0	2	0	0	0	6	2	8	0	0	0	1	0	1	6	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	3	18
18:30 - 19:30	0	0	0	2	0	2	0	0	0	6	2	8	0	0	0	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	3	15
18:45 - 19:45	0	0	0	2	0	2	0	0	0	4	1	5	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	8
19:00 - 20:00	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2

Peak

Intersection of Leard Forest Road / Boggabri Coal Mine Access Roa

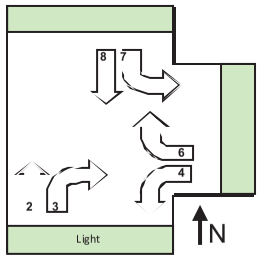
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach -
East Approach Harparary Road
South Approach Leard Forest Road
West Approach Harparary Road

Date 29/10/09

Classfication Light Heavy



	Lookup L	5	8	11	14	17	20	23	26	29	32	35	38	41	
	Lookup H	6	9	12	15	18	21	24	27	30	33	36	39	42	
	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	AM-LV	0	0	30	3	0	4	1	1	0	0	0	0	39	
Peak	AM-HV	0	0	4	1	0	1	0	0	0	0	0	0	6	
	AM-Tota	0	0	34	4	0	5	1	1	0	0	0	0	45	OK
	Total														
Peak	AM-LV	0	3	50	3	0	5	1	2	0	0	0	0	64	
Peak	AM-HV	0	0	7	2	0	2	0	0	0	0	0	0	11	
	AM-Tota	0	3	57	5	0	7	1	2	0	0	0	0	75	OK
	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	PM-LV	0	1	3	31	0	0	1	1	0	0	0	0	37	
Peak	PM-HV	0	0	1	1	0	0	0	0	0	0	0	0	2	
	PM-Tota	0	1	4	32	0	0	1	1	0	0	0	0	39	Check
	Total														
Peak	PM-LV	0	9	17	58	0	3	15	3	0	0	0	0	105	
Peak	PM-HV	0	0	1	4	0	0	1	0	0	0	0	0	6	
	PM-Tota	0	9	18	62	0	3	16	3	0	0	0	0	111	OK

Intersection of Leard Forest Road / Harparary Road

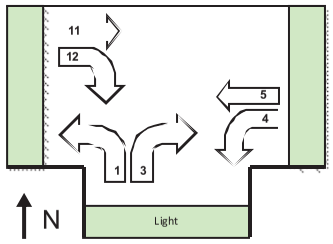
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach -
East Approach Harparary Road
South Approach Therribri Road
West Approach Harparary Road

Date 29/10/09

Classfication Light Heavy



AM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 - 5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 - 6:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
6:15 - 6:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
6:30 - 6:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 - 7:15	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
7:15 - 7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 - 7:45	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
7:45 - 8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
8:00 - 8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 - 8:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2
8:30 - 8:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2
Peak Σ	1	0	1	0	0	0	1	0	1	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	2	0	2	12	0	12

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
5:15 - 6:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
5:30 - 6:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Peak 5:45 - 6:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
6:00 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
6:15 - 7:15	1	0	1	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
6:30 - 7:30	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
6:45 - 7:45	1	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
7:00 - 8:00	1	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4	0	4
7:15 - 8:15	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2
7:30 - 8:30	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	0	3
7:45 - 8:45	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4	0	4
8:00 - 9:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**1**	**5**	**0**	**5**

Peak

Intersection of Leard Forest Road / Harparary Road

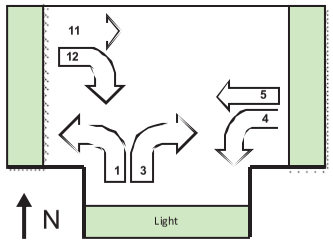
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach -
East Approach Harparary Road
South Approach Therribri Road
West Approach Harparary Road

Date 29/10/09

Classfication Light Heavy



PM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15 - 15:30	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	3	0	3
15:30 - 15:45	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2
15:45 - 16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00 - 16:15	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
16:15 - 16:30	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
16:30 - 16:45	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	2	0	2	5	1	6
16:45 - 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2
17:45 - 18:00	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2
18:00 - 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15 - 18:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2
18:30 - 18:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
18:45 - 19:00	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
19:00 - 19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:15 - 19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
19:30 - 19:45	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
19:45 - 20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Σ	4	0	4	0	0	0	1	0	1	3	0	3	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	9	3	0	3	23	1	24

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 16:00	1	0	1	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	5	0	5
15:15 - 16:15	1	0	1	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	6	0	6
15:30 - 16:30	1	0	1	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	4	0	4
15:45 - 16:45	1	0	1	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	2	0	2	7	1	8
16:00 - 17:00	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**	**4**	**2**	**0**	**2**	**8**	**1**	**9**
16:15 - 17:15	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4	2	0	2	7	1	8
16:30 - 17:30	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4	2	0	2	6	1	7
16:45 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	3	0	3
Peak 17:00 - 18:00	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	4	0	4
17:15 - 18:15	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	4	0	4
17:30 - 18:30	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	1	6	0	6
17:45 - 18:45	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	5	0	5
18:00 - 19:00	1	0	1	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	4	0	4
18:15 - 19:15	1	0	1	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	4	0	4
18:30 - 19:30	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	3	0	3
18:45 - 19:45	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	3	0	3
19:00 - 20:00	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2

Peak

Intersection of Leard Forest Road / Harparary Road

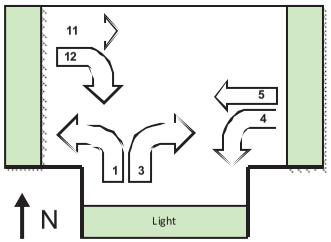
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach -
East Approach Harparary Road
South Approach Therribri Road
West Approach Harparary Road

Date 29/10/09

Classfication Light Heavy



	Lookup L	5	8	11	14	17	20	23	26	29	32	35	38	41	
	Lookup H	6	9	12	15	18	21	24	27	30	33	36	39	42	
	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	AM-LV	0	0	0	0	1	0	0	0	0	0	0	1	2	
Peak	AM-HV	0	0	0	0	0	0	0	0	0	0	0	0	0	
	AM-Tota	0	0	0	0	1	0	0	0	0	0	0	1	2	Check

	Total														
Peak	AM-LV	1	0	1	0	5	0	0	0	0	0	3	2	12	
Peak	AM-HV	0	0	0	0	0	0	0	0	0	0	0	0	0	
	AM-Tota	1	0	1	0	5	0	0	0	0	0	3	2	12	OK

	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	PM-LV	0	0	1	0	1	0	0	0	0	0	1	1	4	
Peak	PM-HV	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PM-Tota	0	0	1	0	1	0	0	0	0	0	1	1	4	Check

	Total														
Peak	PM-LV	4	0	1	3	4	0	0	0	0	0	8	3	23	
Peak	PM-HV	0	0	0	0	0	0	0	0	0	0	1	0	1	
	PM-Tota	4	0	1	3	4	0	0	0	0	0	9	3	24	OK

Intersection of Harparary Road / Therribri Road

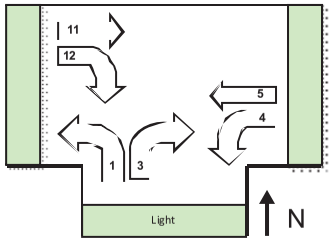
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach -
East Approach Harparary Road
South Approach Therribri Road
West Approach Harparary Road

Date 29/10/09

Classfication Light Heavy



AM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 - 5:30	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
5:30 - 5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 - 6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 - 6:15	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
6:15 - 6:30	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
6:30 - 6:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 - 7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 - 7:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
7:15 - 7:30	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
7:30 - 7:45	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
7:45 - 8:00	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
8:00 - 8:15	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
8:15 - 8:30	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
8:30 - 8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
8:45 - 9:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Σ	0	0	0	0	0	0	5	0	5	7	0	7	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	17	1	18

OK

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
5:00 - 6:00	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
5:15 - 6:15	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
5:30 - 6:30	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Peak 5:45 - 6:45	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
6:00 - 7:00	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
6:15 - 7:15	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
6:30 - 7:30	0	0	0	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
6:45 - 7:45	0	0	0	0	0	0	0	0	0	2	0	2	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	5
7:00 - 8:00	0	0	0	0	0	0	3	0	3	2	0	2	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	8
7:15 - 8:15	0	0	0	0	0	0	4	0	4	3	0	3	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	9	1	10
7:30 - 8:30	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**4**	**3**	**0**	**3**	**1**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**0**	**0**	**0**	**10**	**1**	**11**
7:45 - 8:45	0	0	0	0	0	0	4	0	4	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	9	0	9
8:00 - 9:00	0	0	0	0	0	0	1	0	1	3	0	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	7	0	7

Peak

Peak

Intersection of Harparary Road / Therribri Road

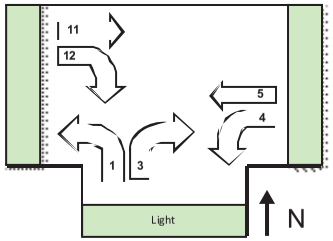
Thursday, 29 October 2009

Skyhigh

Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach -
East Approach Harparary Road
South Approach Therribri Road
West Approach Harparary Road

Date 29/10/09

Classfication Light Heavy



PM

TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1
15:15 - 15:30	0	0	0	0	0	0	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	4	0	4
15:30 - 15:45	0	0	0	0	0	0	1	0	1	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
15:45 - 16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00 - 16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
16:15 - 16:30	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	3	0	3
16:30 - 16:45	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	1	3
16:45 - 17:00	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	4	0	4
17:15 - 17:30	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
17:30 - 17:45	0	0	0	0	0	0	1	1	2	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4
17:45 - 18:00	1	0	1	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
18:00 - 18:15	0	0	0	0	0	0	1	0	1	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	5	0	5
18:15 - 18:30	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
18:30 - 18:45	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	6	0	6
18:45 - 19:00	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
19:00 - 19:15	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
19:15 - 19:30	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
19:30 - 19:45	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
19:45 - 20:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	2
Peak Σ	1	0	1	0	0	0	12	3	15	10	0	10	10	1	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	11	0	1	1	44	5	49

OK

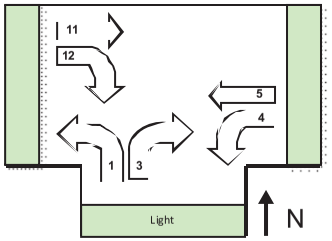
TIME PERIOD	VEHICLE MOVEMENT 1			2			3			4			5			6			VEHICLE MOVEMENT 7			8			9			10			11			12			GRAND TOTAL		
	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ	Light	Heavy	Σ
15:00 - 16:00	0	0	0	0	0	0	3	0	3	1	0	1	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	9	0	9
15:15 - 16:15	0	0	0	0	0	0	3	0	3	1	0	1	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	8	1	9
15:30 - 16:30	0	0	0	0	0	0	2	0	2	1	0	1	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	7	1	8
15:45 - 16:45	0	0	0	0	0	0	2	1	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	1	1	5	2	7
16:00 - 17:00	0	0	0	0	0	0	2	1	3	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	1	1	6	2	8
16:15 - 17:15	0	0	0	0	0	0	2	1	3	2	0	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	10	1	11
16:30 - 17:30	0	0	0	0	0	0	3	1	4	1	0	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	9	1	10
16:45 - 17:45	0	0	0	0	0	0	3	1	4	2	0	2	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	9	2	11
Peak 17:00 - 18:00	1	0	1	0	0	0	3	1	4	2	0	2	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	11	2	13
17:15 - 18:15	1	0	1	0	0	0	4	1	5	4	0	4	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	12	2	14
17:30 - 18:30	1	0	1	0	0	0	3	1	4	4	0	4	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	11	2	13
17:45 - 18:45	**1**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**2**	**4**	**0**	**4**	**4**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**4**	**0**	**0**	**0**	**15**	**0**	**15**
18:00 - 19:00	0	0	0	0	0	0	3	0	3	3	0	3	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	13	0	13
18:15 - 19:15	0	0	0	0	0	0	2	0	2	2	0	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	9	0	9
18:30 - 19:30	0	0	0	0	0	0	1	1	2	3	0	3	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	9	1	10
18:45 - 19:45	0	0	0	0	0	0	2	1	3	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	5
19:00 - 20:00	0	0	0	0	0	0	1	1	2	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	5	1	6

Peak

Intersection of Harparary Road / Therribri Road

Thursday, 29 October 2009

Skyhigh



Survey Start 5:00 AM 15:00 PM
Intersection Type Cross Junction
Intersection No. 1
North Approach -
East Approach Harparary Road
South Approach Therribri Road
West Approach Harparary Road

Date 29/10/09

Classfication Light Heavy

	Lookup L	5	8	11	14	17	20	23	26	29	32	35	38	41	
	Lookup H	6	9	12	15	18	21	24	27	30	33	36	39	42	
	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	AM-LV	0	0	0	2	0	0	0	0	0	0	0	0	2	
Peak	AM-HV	0	0	0	0	0	0	0	0	0	0	0	0	0	
	AM-Tota	0	0	0	2	0	0	0	0	0	0	0	0	2	Check

	Total														
Peak	AM-LV	0	0	5	7	3	0	0	0	0	0	2	0	17	
Peak	AM-HV	0	0	0	0	1	0	0	0	0	0	0	0	1	
	AM-Tota	0	0	5	7	4	0	0	0	0	0	2	0	18	OK

	1 Hr	1	2	3	4	5	6	7	8	9	10	11	12	Total	
Peak	PM-LV	1	0	3	2	3	0	0	0	0	0	2	0	11	
Peak	PM-HV	0	0	1	0	1	0	0	0	0	0	0	0	2	
	PM-Tota	1	0	4	2	4	0	0	0	0	0	2	0	13	Check

	Total														
Peak	PM-LV	1	0	12	10	10	0	0	0	0	0	11	0	44	
Peak	PM-HV	0	0	3	0	1	0	0	0	0	0	0	1	5	
	PM-Tota	1	0	15	10	11	0	0	0	0	0	11	1	49	OK

Peak period of each intersection

Peak — Actual intersection peak hour
"Peak" — Design Peak hour

AM	I-01		I-02		I-03		I-04		I-05		I-06		I-07		SUM	
5:00 - 6:00	34		23		28		20		13		1		1		120	
5:15 - 6:15	50		29		40		36		33		2		2		192	
5:30 - 6:30	68		34		46	Peak	42		39		2		2		233	
5:45 - 6:45	86	"Peak"	38	Peak	40	"Peak"	47	Peak	45	Peak	2	"Peak"	2	"Peak"	260	Peak
6:00 - 7:00	96		32		32		35		39		2		2		238	
6:15 - 7:15	89		25		20		25		25		3		2		189	
6:30 - 7:30	89		19		12		16		19		2		3		160	
6:45 - 7:45	86		19		11		14		13		3		5		151	
7:00 - 8:00	87		17		8		11		12		4		8		147	
7:15 - 8:15	97		18		12		6		8		2		10		153	
7:30 - 8:30	107		24		18		9		6		4		11	Peak	179	
7:45 - 8:45	120		20		18		9		10		4		9		190	
8:00 - 9:00	137	Peak	20		19		11		11		5	Peak	7		210	

PM	I-01		I-02		I-03		I-04		I-05		I-06		I-07		SUM	
15:00 - 16:00	143		35		22		14		18		5		9		246	
15:15 - 16:15	128		31		28		13		17		6		9		232	
15:30 - 16:30	134		40	Peak	29		22		21		4		8		258	
15:45 - 16:45	131		39		29		27		28		8		7		269	
16:00 - 17:00	139		37		31		27		30		9	Peak	8		281	
16:15 - 17:15	158	Peak	38		35		38		40	Peak	8		11		328	Peak
16:30 - 17:30	152		31		30		36		38		7		10		304	
16:45 - 17:45	157		34		39	Peak	31		32		3		11		307	
17:00 - 18:00	145	"Peak"	35	"Peak"	38	"Peak"	39	Peak	39	"Peak"	4	"Peak"	13	"Peak"	313	"Peak"
17:15 - 18:15	131		39		29		28		26		4		14		271	
17:30 - 18:30	121		36		25		23		24		6		13		248	
17:45 - 18:45	104		26		21		22		27		5		15	Peak	220	
18:00 - 19:00	109		28		19		18		22		4		13		213	
18:15 - 19:15	105		23		12		15		18		4		9		186	
18:30 - 19:30	96		15		14		13		15		3		10		166	
18:45 - 19:45	89		18		8		10		8		3		5		141	
19:00 - 20:00	70		11		5		3		2		2		6		99	

Appendix B

SIDRA analysis results

Page intentionally left blank

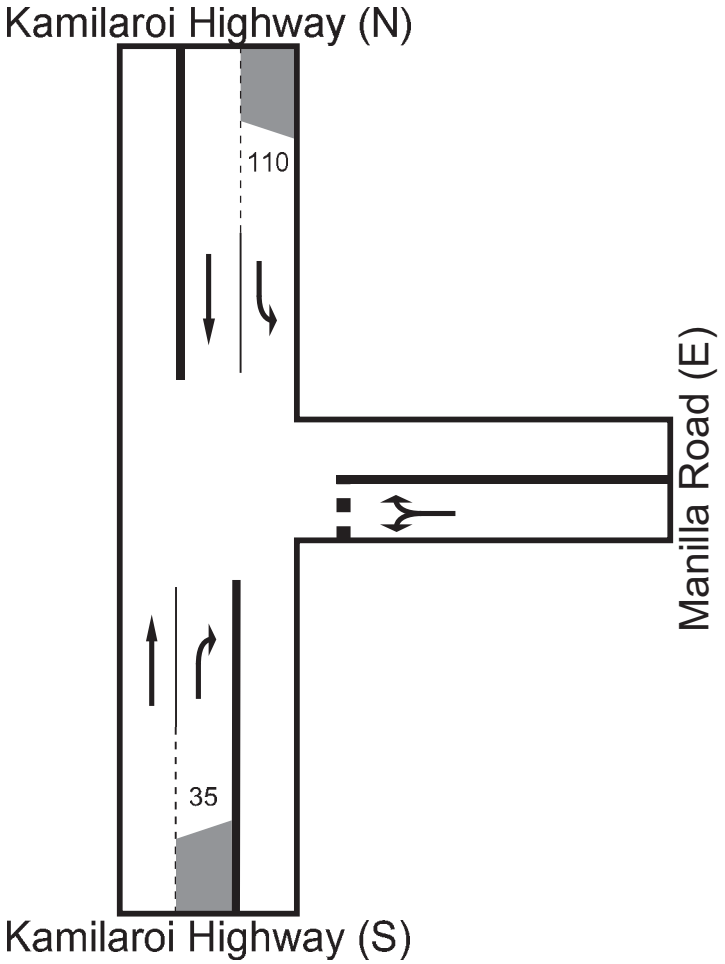
Boggabri Mine Traffic Impact Assessment

SIDRA Analysis results

Year 2009 Existing Case

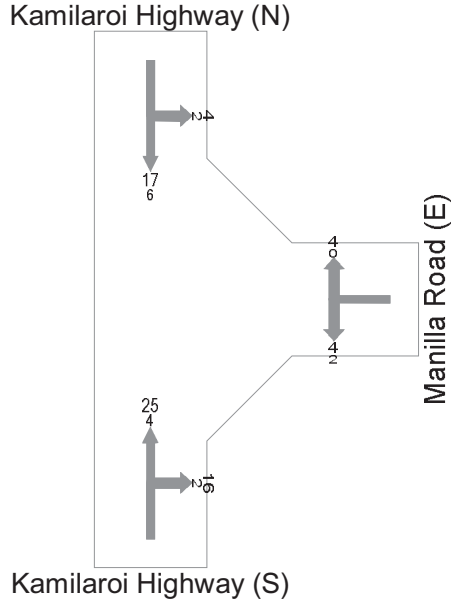
I-01 Kamilaroi Highway / Manilla Road

Intersection Layout

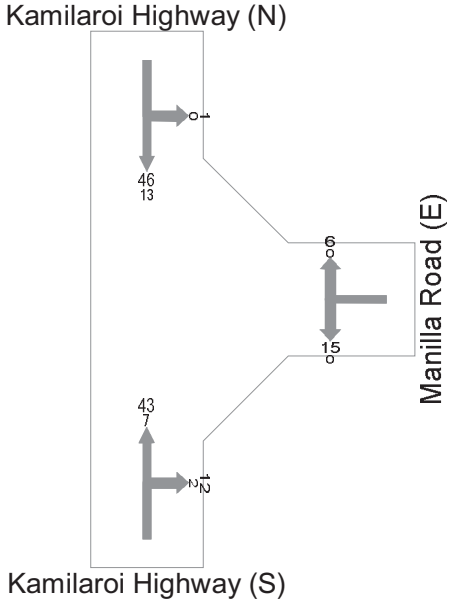


Traffic Volume

AM



PM



Movement Summary

AM Period

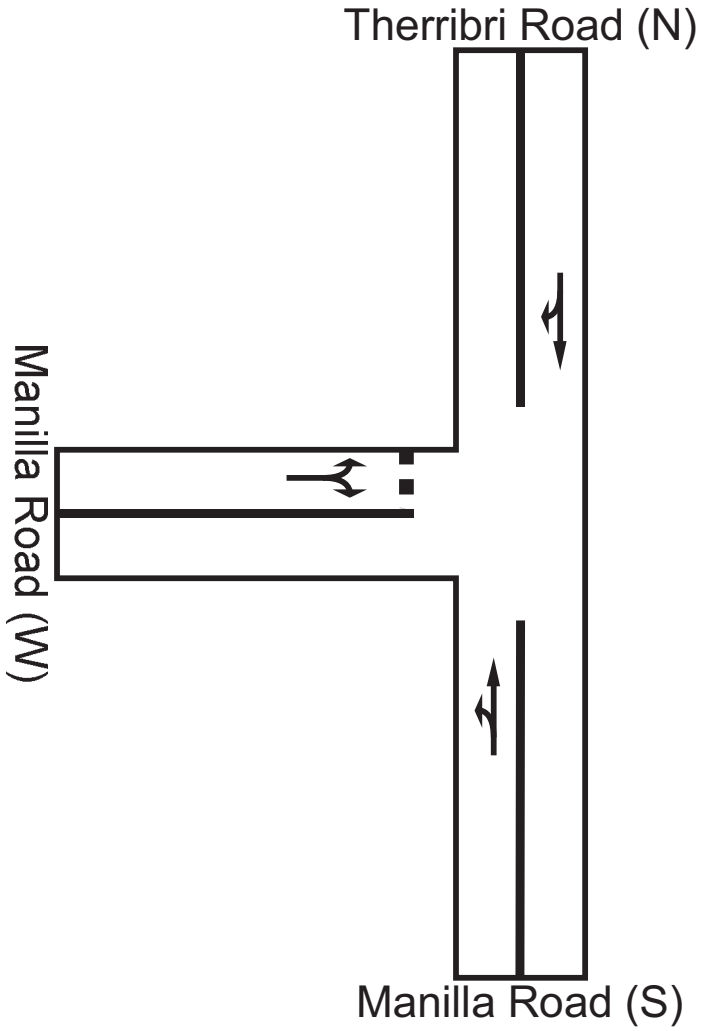
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Kamilaroi Highway (S)										
2	T	31	13.3	0.017	0.0	LOS A	0	0.00	0.00	100.0
3	R	19	10.5	0.019	13.0	LOS A	1	0.11	0.71	64.4
Approach		**49**	**12.2**	**0.019**	**5.0**	**LOS A**	**1**	**0.04**	**0.28**	**83.8**
Manilla Road (E)										
4	L	6	33.3	0.010	14.1	LOS A	0	0.12	0.69	62.6
6	R	4	0.0	0.010	11.5	LOS A	0	0.12	0.70	62.7
Approach		**10**	**20.0**	**0.010**	**13.1**	**LOS A**	**0**	**0.12**	**0.69**	**62.6**
Kamilaroi Highway (N)										
7	L	6	33.3	0.004	14.5	LOS A	0	0.00	0.76	64.8
8	T	24	25.0	0.014	0.0	LOS A	0	0.00	0.00	100.0
Approach		**30**	**26.7**	**0.014**	**2.9**	**LOS A**		**0.00**	**0.15**	**91.3**
All Vehicles		**89**	**18.0**	**0.019**	**5.2**	**Not Applicable**	**1**	**0.04**	**0.28**	**82.9**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Kamilaroi Highway (S)										
2	T	53	13.5	0.029	0.0	LOS A	0	0.00	0.00	100.0
3	R	15	13.3	0.015	13.4	LOS A	0	0.17	0.70	64.0
Approach		**67**	**13.4**	**0.029**	**3.0**	**LOS A**	**0**	**0.04**	**0.16**	**90.1**
Manilla Road (E)										
4	L	16	0.0	0.019	11.7	LOS A	1	0.17	0.67	62.3
6	R	6	0.0	0.019	11.6	LOS A	1	0.17	0.70	62.4
Approach		**22**	**0.0**	**0.019**	**11.7**	**LOS A**	**1**	**0.17**	**0.68**	**62.3**
Kamilaroi Highway (N)										
7	L	1	0.0	0.001	12.2	LOS A	0	0.00	0.75	64.8
8	T	62	22.6	0.036	0.0	LOS A	0	0.00	0.00	100.0
Approach		**63**	**22.2**	**0.036**	**0.2**	**LOS A**		**0.00**	**0.01**	**99.3**
All Vehicles		**152**	**15.1**	**0.036**	**3.1**	**Not Applicable**	**1**	**0.04**	**0.17**	**87.9**

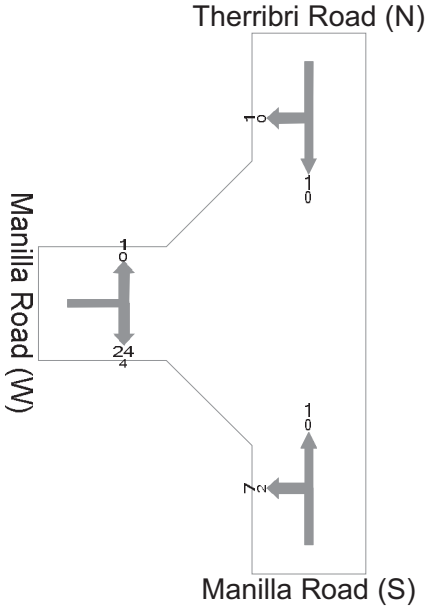
I-02 Manilla Road / Therribri Road

Intersection Layout

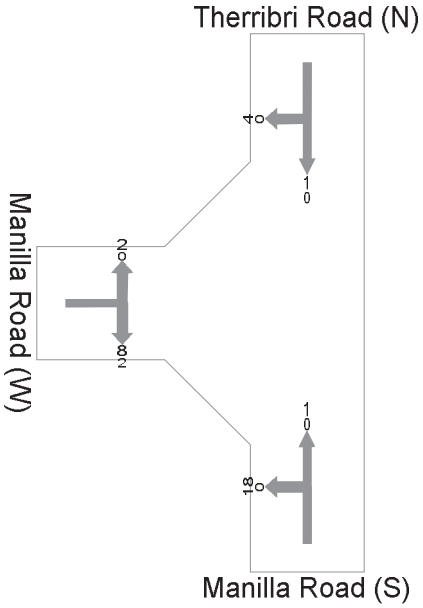


Traffic Volume

AM



PM



Movement Summary

AM Period

Vehicle Movements

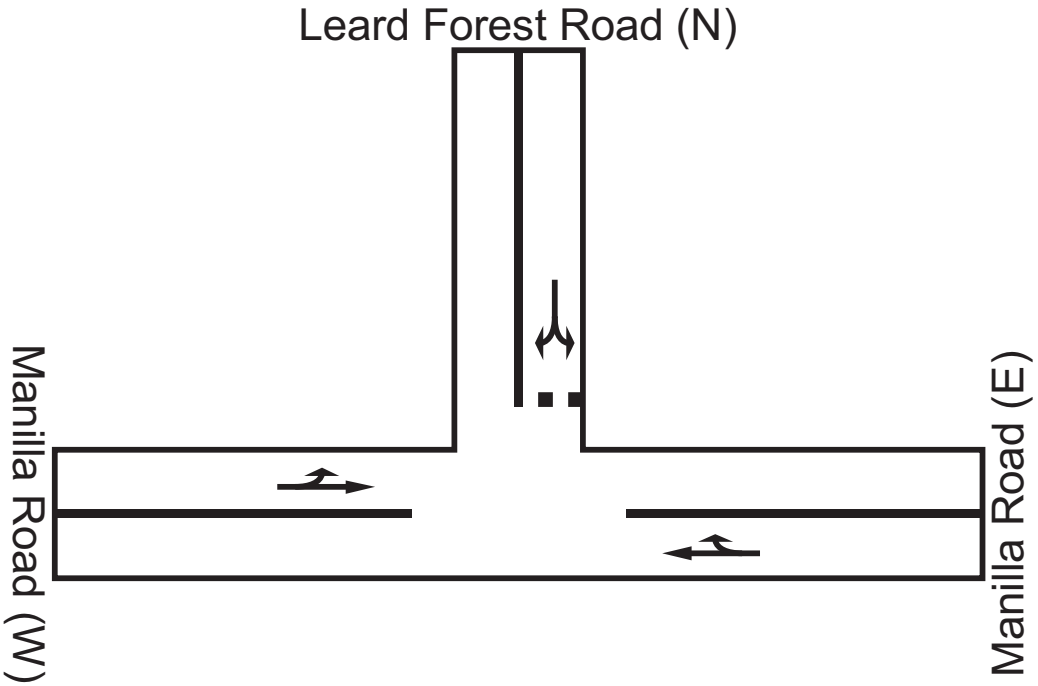
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Manilla Road (S)										
1	L	9	22.2	0.006	12.3	LOS A	0	0.00	0.73	58.9
2	T	1	0.0	0.006	0.0	LOS A	0	0.00	0.00	80.0
Approach		**10**	**20.0**	**0.006**	**11.0**	**LOS A**		**0.00**	**0.66**	**60.5**
Therribri Road (N)										
8	T	1	0.0	0.001	0.0	LOS A	0	0.06	0.00	78.6
9	R	1	0.0	0.001	10.8	LOS A	0	0.06	0.71	58.8
Approach		**2**	**0.0**	**0.001**	**5.4**	**LOS A**	**0**	**0.06**	**0.35**	**67.4**
Manilla Road (W)										
10	L	1	0.0	0.031	11.0	LOS A	1	0.05	0.70	58.6
12	R	29	13.8	0.032	11.8	LOS A	1	0.05	0.72	58.8
Approach		**30**	**13.3**	**0.032**	**11.7**	**LOS A**	**1**	**0.05**	**0.72**	**58.8**
All Vehicles		**42**	**14.3**	**0.032**	**11.3**	**Not Applicable**	**1**	**0.04**	**0.69**	**59.6**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Manilla Road (S)										
1	L	19	0.0	0.011	10.9	LOS A	0	0.00	0.73	58.9
2	T	1	0.0	0.011	0.0	LOS A	0	0.00	0.00	80.0
Approach		**20**	**0.0**	**0.011**	**10.4**	**LOS A**		**0.00**	**0.69**	**59.7**
Therribri Road (N)										
8	T	1	0.0	0.003	0.1	LOS A	0	0.08	0.00	78.1
9	R	4	0.0	0.003	10.9	LOS A	0	0.08	0.70	58.7
Approach		**5**	**0.0**	**0.003**	**8.7**	**LOS A**	**0**	**0.08**	**0.56**	**61.8**
Manilla Road (W)										
10	L	2	0.0	0.013	11.0	LOS A	0	0.07	0.69	58.5
12	R	11	20.0	0.013	12.2	LOS A	0	0.07	0.71	58.7
Approach		**12**	**16.7**	**0.013**	**12.0**	**LOS A**	**0**	**0.07**	**0.71**	**58.7**
All Vehicles		**37**	**5.4**	**0.013**	**10.7**	**Not Applicable**	**0**	**0.03**	**0.68**	**59.6**

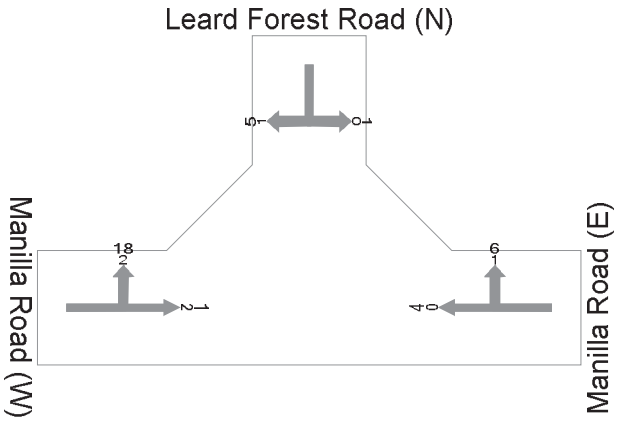
I-03 Manilla Road / Leard Forest Road

Intersection Layout

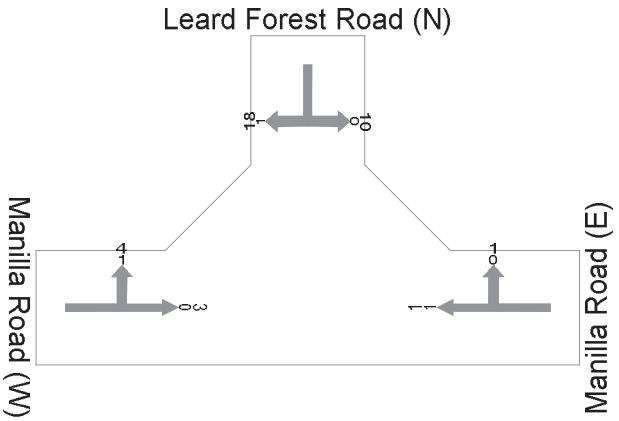


Traffic Volume

AM



PM



Movement Summary

AM Period

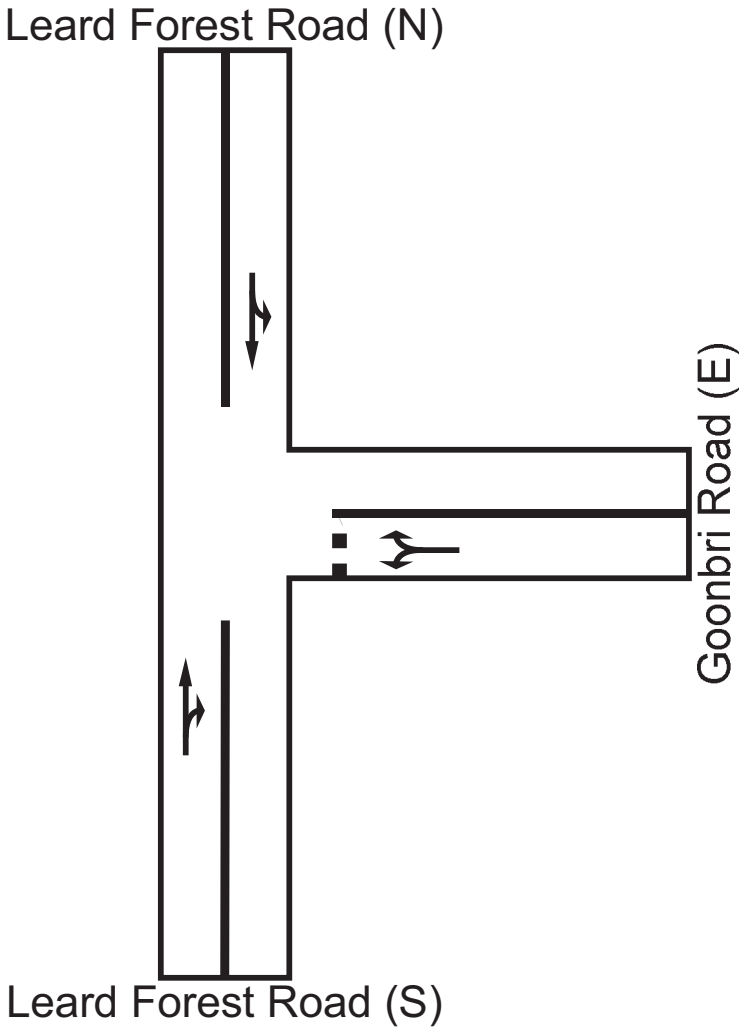
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Manilla Road (E)										
5	T	4	0.0	0.008	0.1	LOS A	0	0.10	0.00	77.6
6	R	7	14.3	0.008	11.8	LOS A	0	0.10	0.70	58.6
Approach		**11**	**9.1**	**0.008**	**7.6**	**LOS A**	**0**	**0.10**	**0.44**	**64.4**
Leard Forest Road (N)										
7	L	1	0.0	0.007	11.1	LOS A	0	0.09	0.68	58.4
9	R	6	16.7	0.007	12.0	LOS A	0	0.09	0.71	58.6
Approach		**7**	**14.3**	**0.007**	**11.9**	**LOS A**	**0**	**0.09**	**0.70**	**58.6**
Manilla Road (W)										
10	L	21	9.5	0.014	11.5	LOS A	0	0.00	0.73	58.9
11	T	3	66.7	0.014	0.0	LOS A	0	0.00	0.00	80.0
Approach		**24**	**16.7**	**0.014**	**10.1**	**LOS A**		**0.00**	**0.64**	**61.0**
All Vehicles		**42**	**14.3**	**0.014**	**9.7**	**Not Applicable**	**0**	**0.04**	**0.60**	**61.4**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Manilla Road (E)										
5	T	2	50.0	0.002	0.0	LOS A	0	0.05	0.00	78.9
6	R	1	0.0	0.002	10.8	LOS A	0	0.05	0.72	58.8
Approach		**3**	**33.3**	**0.002**	**3.6**	**LOS A**	**0**	**0.05**	**0.24**	**70.9**
Leard Forest Road (N)										
7	L	11	0.0	0.027	11.0	LOS A	1	0.04	0.70	58.7
9	R	20	5.0	0.027	11.2	LOS A	1	0.04	0.72	58.9
Approach		**31**	**3.2**	**0.027**	**11.1**	**LOS A**	**1**	**0.04**	**0.72**	**58.8**
Manilla Road (W)										
10	L	5	20.0	0.005	12.1	LOS A	0	0.00	0.73	58.9
11	T	3	0.0	0.005	0.0	LOS A	0	0.00	0.00	80.0
Approach		**8**	**12.5**	**0.005**	**7.6**	**LOS A**		**0.00**	**0.46**	**65.5**
All Vehicles		**42**	**7.1**	**0.027**	**9.9**	**Not Applicable**	**1**	**0.03**	**0.63**	**60.7**

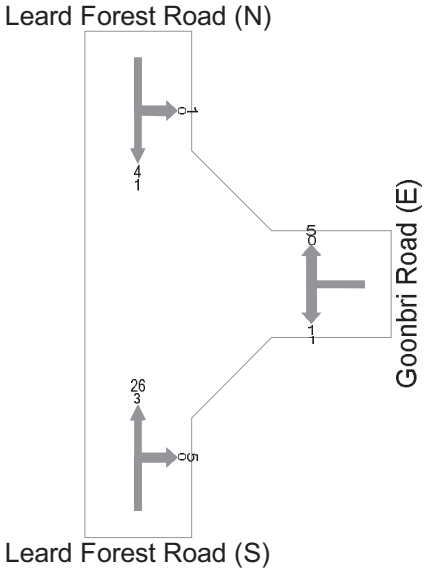
I-04 Leard Forest Road / Goonbri Road

Intersection Layout

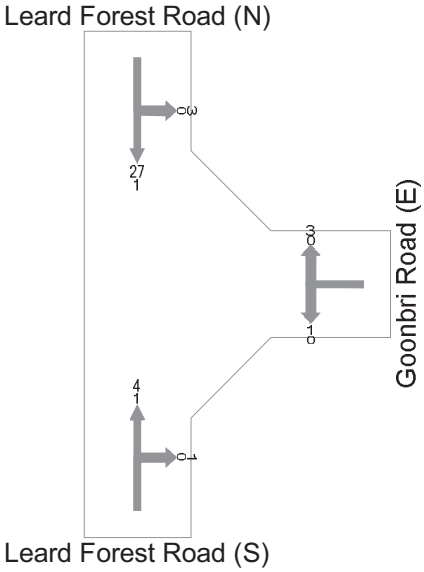


Traffic Volume

AM



PM



Movement Summary

AM Period

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
2	T	31	10.0	0.020	0.0	LOS A	1	0.04	0.00	78.9
3	R	5	0.0	0.020	10.8	LOS A	1	0.04	0.72	58.8
Approach		**35**	**8.6**	**0.020**	**1.6**	**LOS A**	**1**	**0.04**	**0.10**	**75.3**
Goonbri Road (E)										
4	L	2	50.0	0.007	14.1	LOS A	0	0.05	0.71	58.6
6	R	5	0.0	0.007	10.9	LOS A	0	0.05	0.72	58.8
Approach		**7**	**14.3**	**0.007**	**11.8**	**LOS A**	**0**	**0.05**	**0.72**	**58.7**
Leard Forest Road (N)										
7	L	1	0.0	0.003	10.9	LOS A	0	0.00	0.73	58.9
8	T	5	20.0	0.003	0.0	LOS A	0	0.00	0.00	80.0
Approach		**6**	**16.7**	**0.003**	**1.8**	**LOS A**		**0.00**	**0.12**	**75.6**
All Vehicles		**48**	**10.4**	**0.020**	**3.1**	**Not Applicable**	**1**	**0.04**	**0.19**	**72.4**

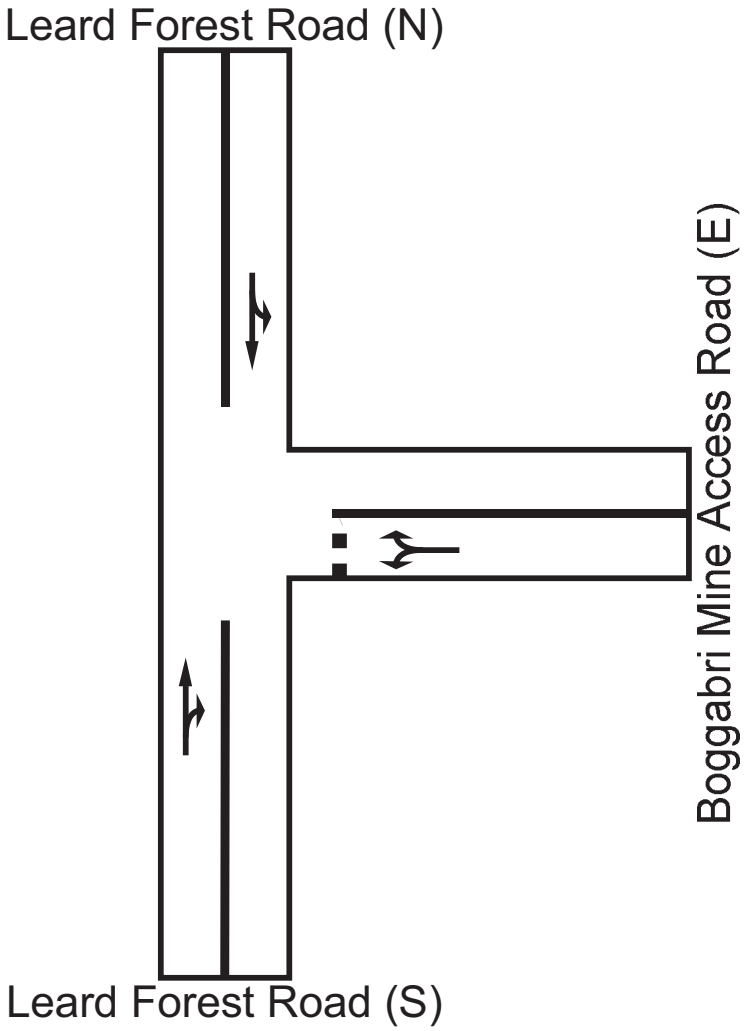
PM Period

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
2	T	5	20.0	0.004	0.1	LOS A	0	0.10	0.00	77.5
3	R	1	0.0	0.004	10.9	LOS A	0	0.10	0.69	58.5
Approach		**6**	**16.7**	**0.004**	**1.9**	**LOS A**	**0**	**0.10**	**0.11**	**73.6**
Goonbri Road (E)										
4	L	1	0.0	0.004	11.1	LOS A	0	0.10	0.67	58.3
6	R	3	0.0	0.004	10.9	LOS A	0	0.10	0.69	58.5
Approach		**4**	**0.0**	**0.004**	**11.0**	**LOS A**	**0**	**0.10**	**0.69**	**58.5**
Leard Forest Road (N)										
7	L	3	0.0	0.017	10.9	LOS A	0	0.00	0.73	58.9
8	T	29	3.4	0.017	0.0	LOS A	0	0.00	0.00	80.0
Approach		**32**	**3.1**	**0.017**	**1.0**	**LOS A**		**0.00**	**0.07**	**77.5**
All Vehicles		**42**	**4.8**	**0.017**	**2.1**	**Not Applicable**	**0**	**0.02**	**0.13**	**74.6**

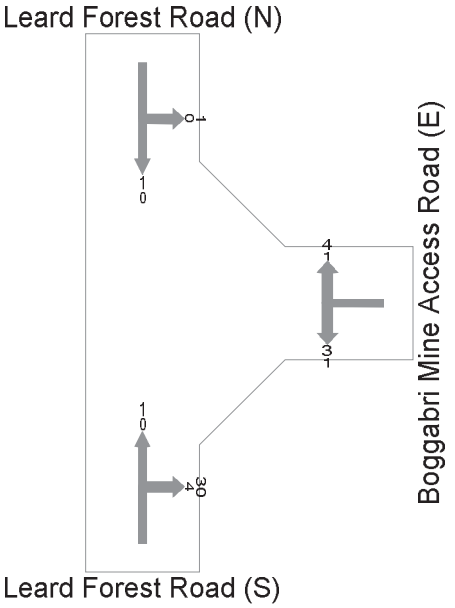
I-05 Leard Forest Road / Boggabri Mine Access Road

Intersection Layout

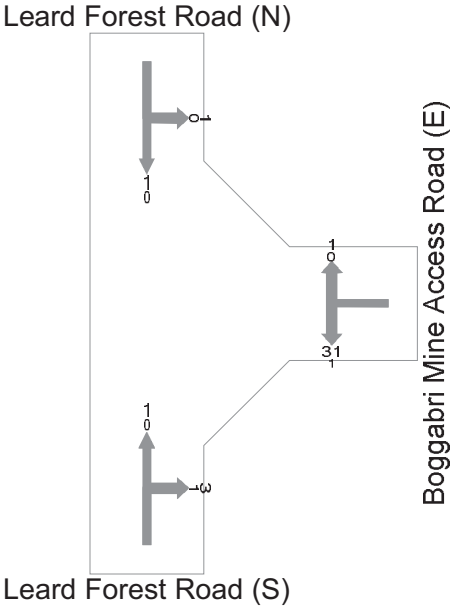


Traffic Volume

AM



PM



Movement Summary

AM Period

Vehicle Movements

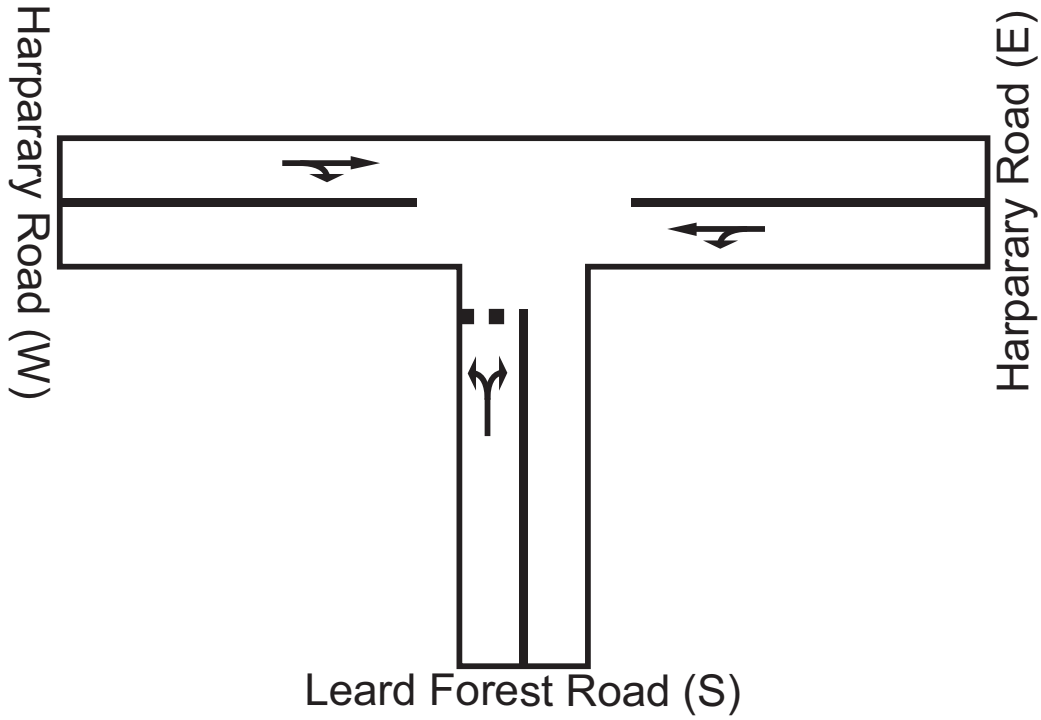
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
2	T	1	0.0	0.027	0.0	LOS A	1	0.02	0.00	79.5
3	R	36	11.1	0.027	11.6	LOS A	1	0.02	0.74	59.0
Approach		**37**	**10.8**	**0.027**	**11.2**	**LOS A**	**1**	**0.02**	**0.72**	**59.4**
Boggabri Mine Access Road (E)										
4	L	4	25.0	0.009	12.6	LOS A	0	0.01	0.73	45.6
6	R	5	20.0	0.009	12.2	LOS A	0	0.01	0.75	45.8
Approach		**9**	**22.2**	**0.009**	**12.4**	**LOS A**	**0**	**0.01**	**0.74**	**45.7**
Leard Forest Road (N)										
7	L	1	0.0	0.001	10.9	LOS A	0	0.00	0.73	58.9
8	T	1	0.0	0.001	0.0	LOS A	0	0.00	0.00	80.0
Approach		**2**	**0.0**	**0.001**	**5.5**	**LOS A**		**0.00**	**0.36**	**68.0**
All Vehicles		**48**	**12.5**	**0.027**	**11.2**	**Not Applicable**	**1**	**0.02**	**0.71**	**58.0**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
2	T	1	0.0	0.004	0.0	LOS A	0	0.02	0.00	79.5
3	R	4	25.0	0.004	12.4	LOS A	0	0.02	0.74	59.0
Approach		**5**	**20.0**	**0.004**	**10.0**	**LOS A**	**0**	**0.02**	**0.59**	**62.3**
Boggabri Mine Access Road (E)										
4	L	34	2.9	0.025	11.1	LOS A	1	0.02	0.72	45.8
6	R	1	0.0	0.024	10.8	LOS A	1	0.02	0.74	46.0
Approach		**35**	**2.9**	**0.025**	**11.1**	**LOS A**	**1**	**0.02**	**0.72**	**45.8**
Leard Forest Road (N)										
7	L	1	0.0	0.001	10.9	LOS A	0	0.00	0.73	58.9
8	T	1	0.0	0.001	0.0	LOS A	0	0.00	0.00	80.0
Approach		**2**	**0.0**	**0.001**	**5.5**	**LOS A**		**0.00**	**0.36**	**68.0**
All Vehicles		**42**	**4.8**	**0.025**	**10.7**	**Not Applicable**	**1**	**0.02**	**0.69**	**49.9**

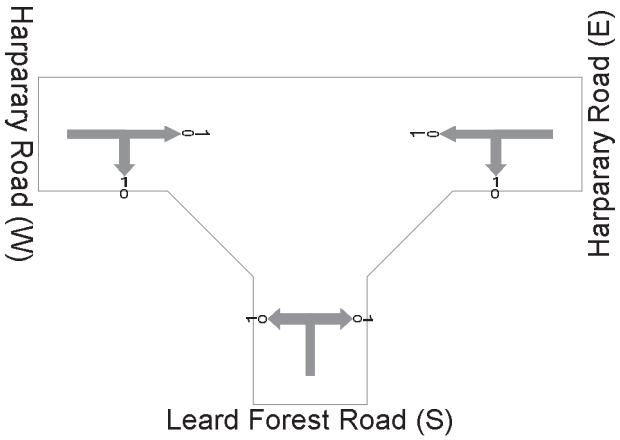
I-06 Harparary Road / Leard Forest Road

Intersection Layout

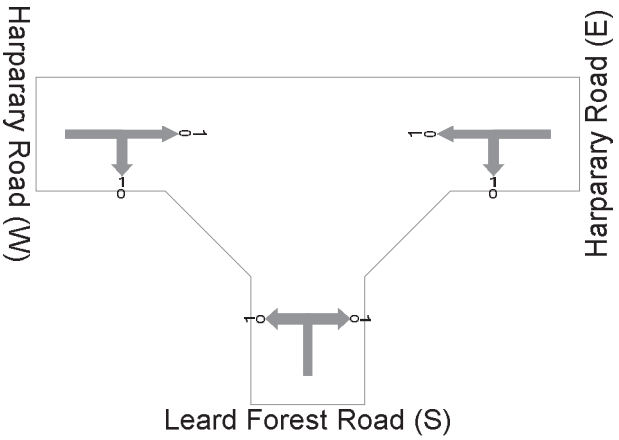


Traffic Volume

AM



PM



Movement Summary

AM Period

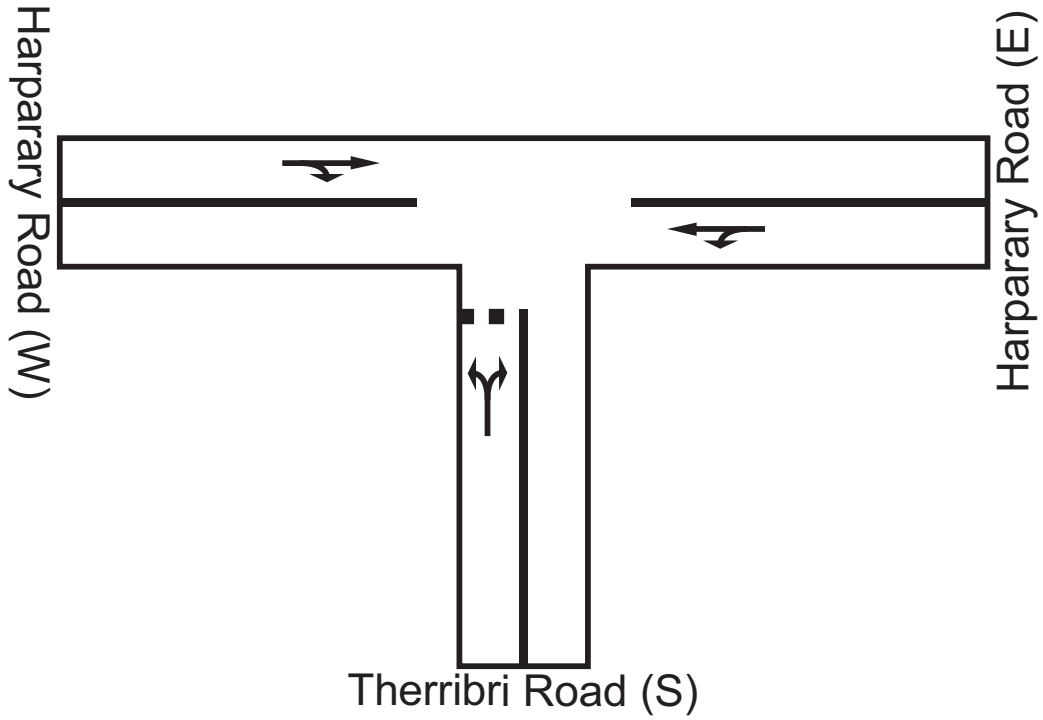
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
1	L	1	0.0	0.002	11.3	LOS A	0	0.02	0.72	63.2
3	R	1	0.0	0.002	11.1	LOS A	0	0.02	0.74	63.5
Approach		**2**	**0.0**	**0.002**	**11.2**	**LOS A**	**0**	**0.02**	**0.73**	**63.3**
Harparary Road (E)										
4	L	1	0.0	0.001	12.2	LOS A	0	0.00	0.75	64.8
5	T	1	0.0	0.001	0.0	LOS A	0	0.00	0.00	100.0
Approach		**2**	**0.0**	**0.001**	**6.1**	**LOS A**		**0.00**	**0.37**	**80.0**
Harparary Road (W)										
11	T	1	0.0	0.001	0.0	LOS A	0	0.02	0.00	99.3
12	R	1	0.0	0.001	12.0	LOS A	0	0.02	0.75	65.0
Approach		**2**	**0.0**	**0.001**	**6.0**	**LOS A**	**0**	**0.02**	**0.38**	**79.9**
All Vehicles		**6**	**0.0**	**0.002**	**7.8**	**Not Applicable**	**0**	**0.01**	**0.49**	**73.3**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
1	L	1	0.0	0.002	11.3	LOS A	0	0.02	0.72	63.2
3	R	1	0.0	0.002	11.1	LOS A	0	0.02	0.74	63.5
Approach		**2**	**0.0**	**0.002**	**11.2**	**LOS A**	**0**	**0.02**	**0.73**	**63.3**
Harparary Road (E)										
4	L	1	0.0	0.001	12.2	LOS A	0	0.00	0.75	64.8
5	T	1	0.0	0.001	0.0	LOS A	0	0.00	0.00	100.0
Approach		**2**	**0.0**	**0.001**	**6.1**	**LOS A**		**0.00**	**0.37**	**80.0**
Harparary Road (W)										
11	T	1	0.0	0.001	0.0	LOS A	0	0.02	0.00	99.3
12	R	1	0.0	0.001	12.0	LOS A	0	0.02	0.75	65.0
Approach		**2**	**0.0**	**0.001**	**6.0**	**LOS A**	**0**	**0.02**	**0.38**	**79.9**
All Vehicles		**6**	**0.0**	**0.002**	**7.8**	**Not Applicable**	**0**	**0.01**	**0.49**	**73.3**

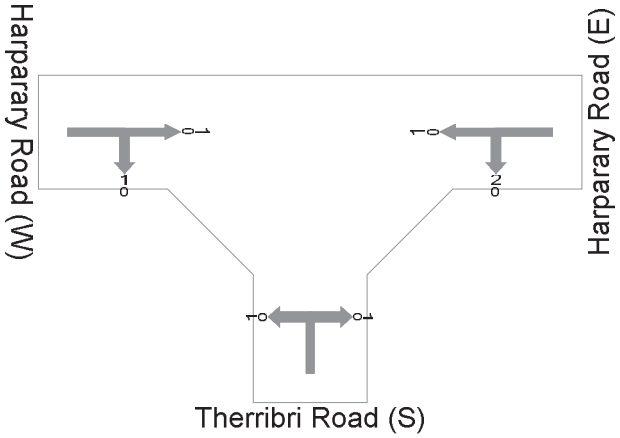
I-07 Harparary Road / Therribri Road

Intersection Layout

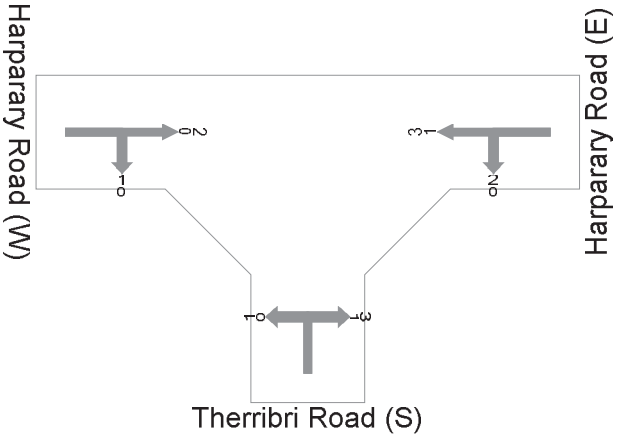


Traffic Volume

AM



PM



Movement Summary

AM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Therribri Road (S)										
1	L	1	0.0	0.002	11.3	LOS A	0	0.02	0.72	63.1
3	R	1	0.0	0.002	11.1	LOS A	0	0.02	0.74	63.5
Approach		**2**	**0.0**	**0.002**	**11.2**	**LOS A**	**0**	**0.02**	**0.73**	**63.3**
Harparary Road (E)										
4	L	2	0.0	0.002	12.2	LOS A	0	0.00	0.75	64.8
5	T	1	0.0	0.002	0.0	LOS A	0	0.00	0.00	100.0
Approach		**3**	**0.0**	**0.002**	**8.1**	**LOS A**		**0.00**	**0.50**	**74.5**
Harparary Road (W)										
11	T	1	0.0	0.001	0.0	LOS A	0	0.02	0.00	99.1
12	R	1	0.0	0.001	12.0	LOS A	0	0.02	0.75	64.9
Approach		**2**	**0.0**	**0.001**	**6.0**	**LOS A**	**0**	**0.02**	**0.37**	**79.8**
All Vehicles		**7**	**0.0**	**0.002**	**8.4**	**Not Applicable**	**0**	**0.01**	**0.53**	**72.0**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Therribri Road (S)										
1	L	1	0.0	0.005	11.4	LOS A	0	0.05	0.71	63.0
3	R	4	25.0	0.005	13.2	LOS A	0	0.05	0.74	63.4
Approach		**5**	**20.0**	**0.005**	**12.8**	**LOS A**	**0**	**0.05**	**0.73**	**63.3**
Harparary Road (E)										
4	L	2	0.0	0.003	12.2	LOS A	0	0.00	0.75	64.8
5	T	4	25.0	0.003	0.0	LOS A	0	0.00	0.00	100.0
Approach		**6**	**16.7**	**0.003**	**4.1**	**LOS A**		**0.00**	**0.25**	**86.1**
Harparary Road (W)										
11	T	2	0.0	0.002	0.0	LOS A	0	0.04	0.00	98.5
12	R	1	0.0	0.002	12.0	LOS A	0	0.04	0.74	64.8
Approach		**3**	**0.0**	**0.002**	**4.0**	**LOS A**	**0**	**0.04**	**0.25**	**85.3**
All Vehicles		**14**	**14.3**	**0.005**	**7.2**	**Not Applicable**	**0**	**0.03**	**0.42**	**76.0**

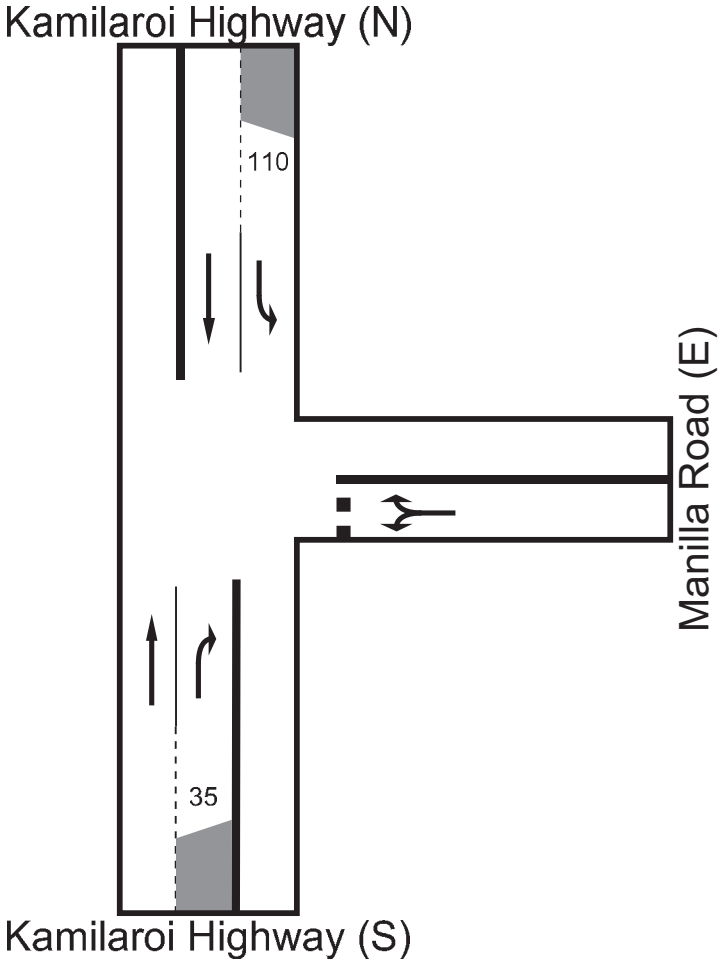
Boggabri Mine Traffic Impact Assessment

SIDRA Analysis results

Year 2016 Future Case

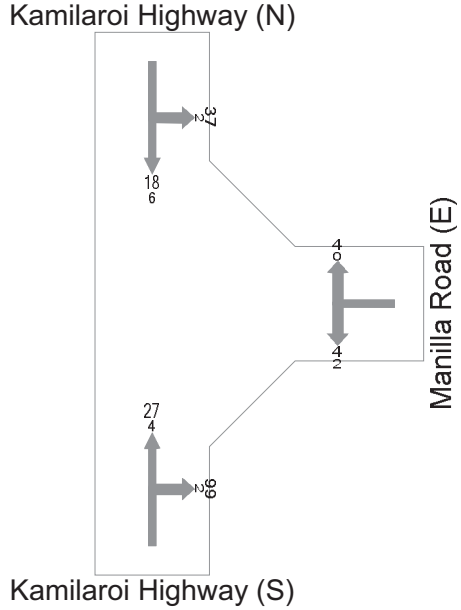
I-01 Kamilaroi Highway / Manilla Road

Intersection Layout

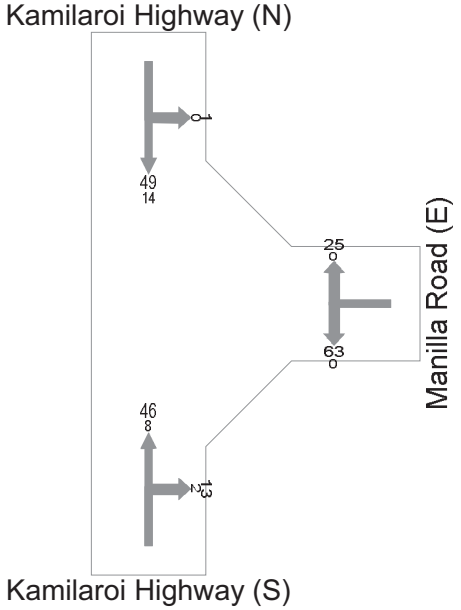


Traffic Volume

AM



PM



Movement Summary

AM Period

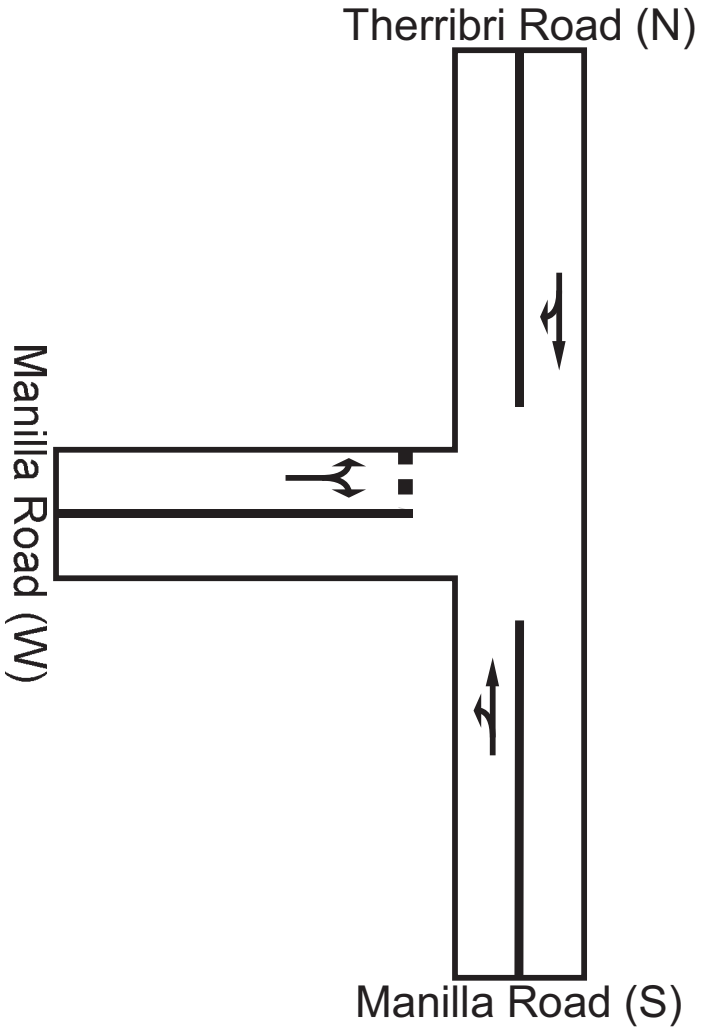
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Kamilaroi Highway (S)										
2	T	33	12.5	0.018	0.0	LOS A	0	0.00	0.00	100.0
3	R	106	1.9	0.098	12.4	LOS A	3	0.17	0.70	64.1
Approach		**138**	**4.3**	**0.098**	**9.5**	**LOS A**	**3**	**0.13**	**0.54**	**70.7**
Manilla Road (E)										
4	L	6	33.3	0.010	14.4	LOS A	0	0.16	0.68	62.4
6	R	4	0.0	0.010	11.8	LOS A	0	0.16	0.71	62.5
Approach		**10**	**20.0**	**0.010**	**13.4**	**LOS A**	**0**	**0.16**	**0.69**	**62.4**
Kamilaroi Highway (N)										
7	L	41	4.9	0.023	12.6	LOS A	0	0.00	0.75	64.8
8	T	25	24.0	0.015	0.0	LOS A	0	0.00	0.00	100.0
Approach		**66**	**12.1**	**0.023**	**7.8**	**LOS A**		**0.00**	**0.47**	**76.0**
All Vehicles		**214**	**7.5**	**0.098**	**9.2**	**Not Applicable**	**3**	**0.09**	**0.52**	**71.8**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Kamilaroi Highway (S)										
2	T	57	14.3	0.031	0.0	LOS A	0	0.00	0.00	100.0
3	R	16	12.5	0.016	13.3	LOS A	1	0.18	0.70	64.0
Approach		**72**	**13.9**	**0.031**	**3.0**	**LOS A**	**1**	**0.04**	**0.15**	**90.1**
Manilla Road (E)										
4	L	66	0.0	0.079	11.8	LOS A	3	0.19	0.67	62.2
6	R	26	0.0	0.079	11.7	LOS A	3	0.19	0.71	62.3
Approach		**92**	**0.0**	**0.079**	**11.8**	**LOS A**	**3**	**0.19**	**0.68**	**62.2**
Kamilaroi Highway (N)										
7	L	1	0.0	0.001	12.2	LOS A	0	0.00	0.75	64.8
8	T	66	22.4	0.039	0.0	LOS A	0	0.00	0.00	100.0
Approach		**68**	**22.1**	**0.039**	**0.2**	**LOS A**		**0.00**	**0.01**	**99.3**
All Vehicles		**232**	**10.8**	**0.079**	**5.6**	**Not Applicable**	**3**	**0.09**	**0.32**	**78.4**

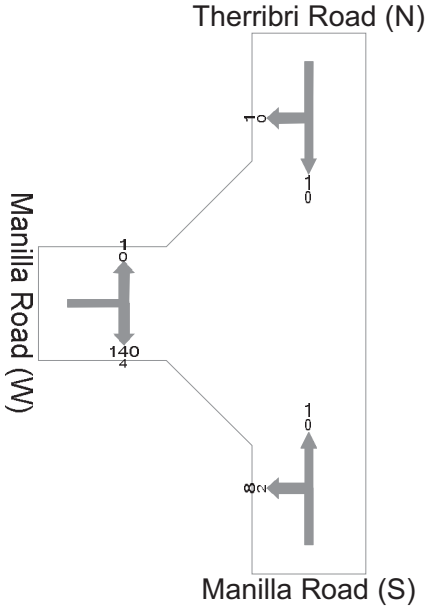
I-02 Manilla Road / Therribri Road

Intersection Layout

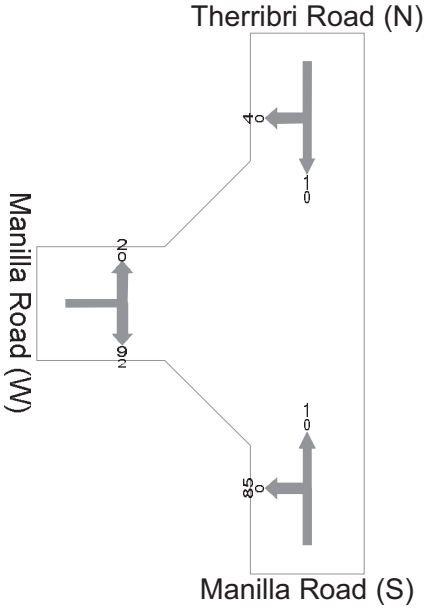


Traffic Volume

AM



PM



Movement Summary

AM Period

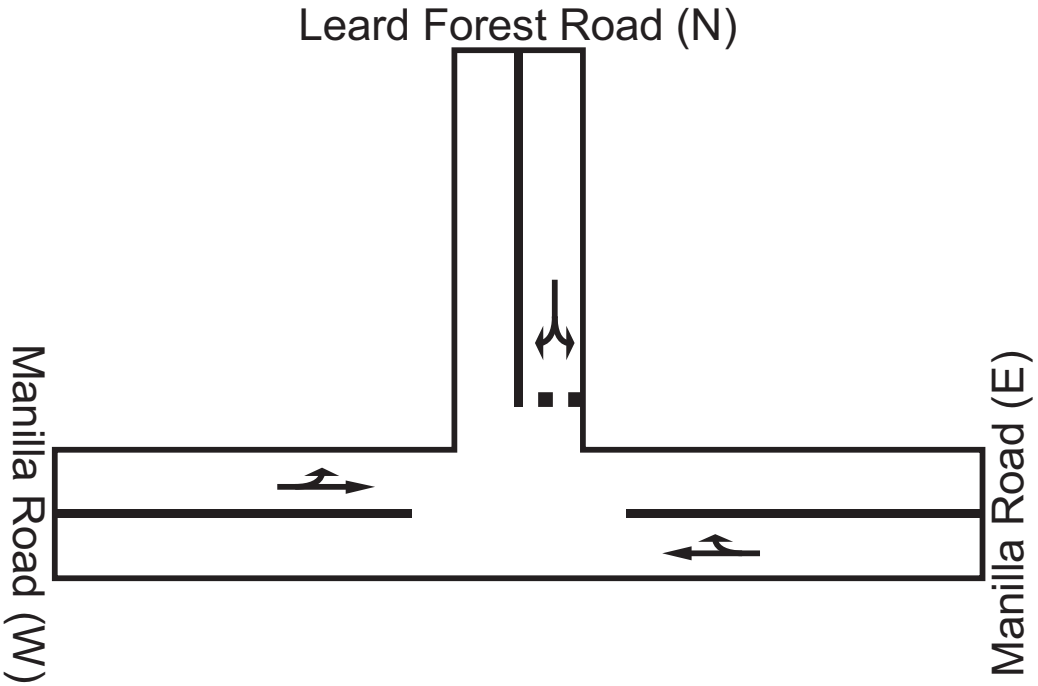
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Manilla Road (S)										
1	L	11	20.0	0.007	12.1	LOS A	0	0.00	0.73	58.9
2	T	1	0.0	0.007	0.0	LOS A	0	0.00	0.00	80.0
Approach		**11**	**18.2**	**0.007**	**11.0**	**LOS A**		**0.00**	**0.67**	**60.4**
Therribri Road (N)										
8	T	1	0.0	0.001	0.0	LOS A	0	0.06	0.00	78.6
9	R	1	0.0	0.001	10.8	LOS A	0	0.06	0.71	58.8
Approach		**2**	**0.0**	**0.001**	**5.4**	**LOS A**	**0**	**0.06**	**0.35**	**67.3**
Manilla Road (W)										
10	L	1	0.0	0.143	11.0	LOS A	5	0.05	0.70	58.6
12	R	152	2.6	0.149	11.0	LOS A	5	0.05	0.72	58.8
Approach		**152**	**2.6**	**0.149**	**11.0**	**LOS A**	**5**	**0.05**	**0.72**	**58.8**
All Vehicles		**165**	**3.6**	**0.149**	**11.0**	**Not Applicable**	**5**	**0.05**	**0.71**	**59.0**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Manilla Road (S)										
1	L	89	0.0	0.048	10.9	LOS A	0	0.00	0.73	58.9
2	T	1	0.0	0.048	0.0	LOS A	0	0.00	0.00	80.0
Approach		**90**	**0.0**	**0.048**	**10.8**	**LOS A**		**0.00**	**0.72**	**59.1**
Therribri Road (N)										
8	T	1	0.0	0.004	0.3	LOS A	0	0.18	0.00	75.6
9	R	4	0.0	0.004	11.1	LOS A	0	0.18	0.66	58.1
Approach		**5**	**0.0**	**0.004**	**8.9**	**LOS A**	**0**	**0.18**	**0.53**	**61.0**
Manilla Road (W)										
10	L	2	0.0	0.014	11.2	LOS A	0	0.14	0.66	58.1
12	R	12	18.2	0.014	12.3	LOS A	0	0.14	0.69	58.3
Approach		**13**	**15.4**	**0.014**	**12.1**	**LOS A**	**0**	**0.14**	**0.69**	**58.3**
All Vehicles		**108**	**1.9**	**0.048**	**10.9**	**Not Applicable**	**0**	**0.03**	**0.71**	**59.1**

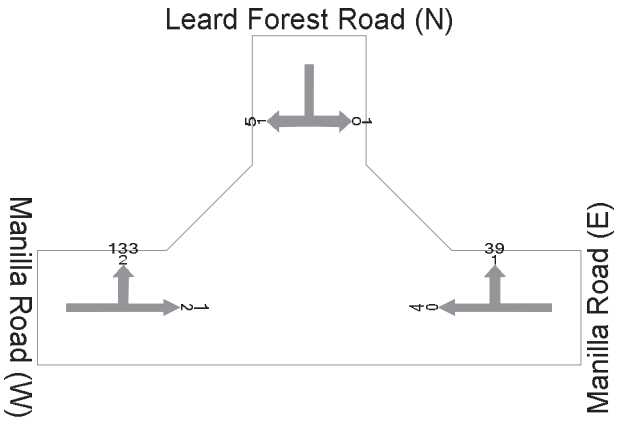
I-03 Manilla Road / Leard Forest Road

Intersection Layout

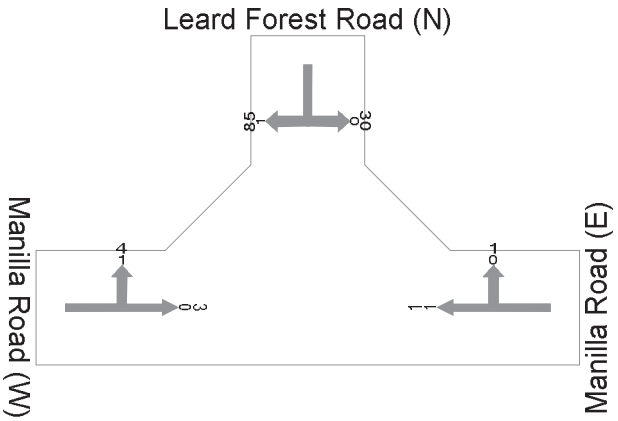


Traffic Volume

AM



PM



Movement Summary

AM Period

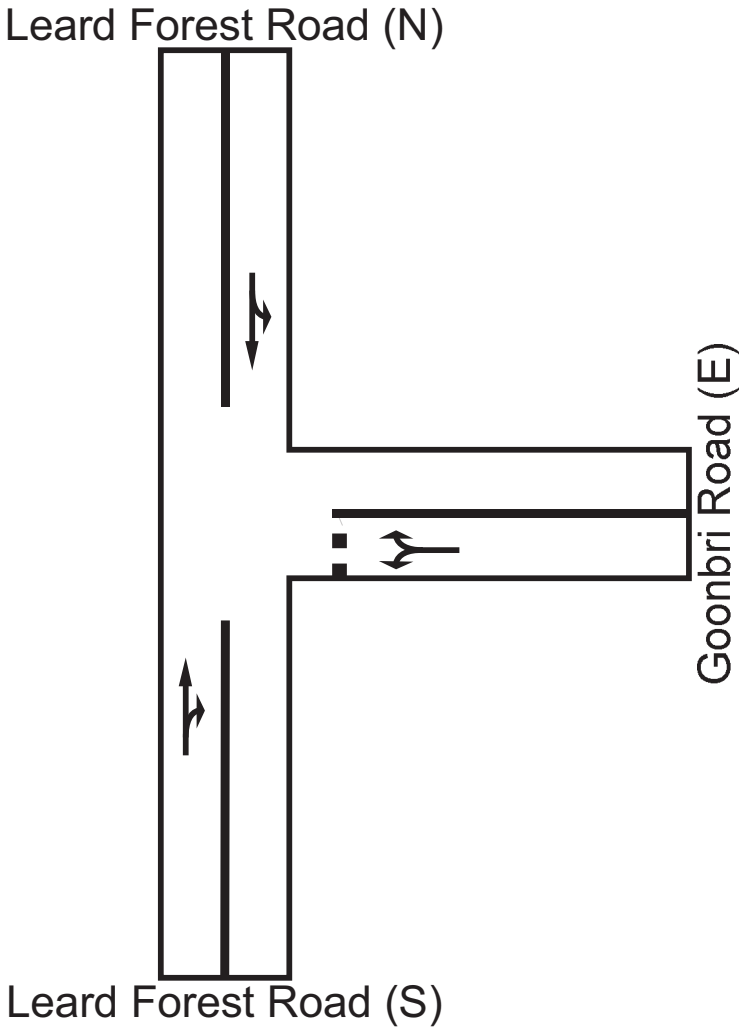
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Manilla Road (E)										
5	T	4	0.0	0.036	0.5	LOS A	1	0.25	0.00	74.2
6	R	42	2.4	0.036	11.5	LOS A	1	0.25	0.68	57.8
Approach		**46**	**2.2**	**0.036**	**10.5**	**LOS A**	**1**	**0.25**	**0.62**	**58.9**
Leard Forest Road (N)										
7	L	1	0.0	0.008	11.6	LOS A	0	0.22	0.64	57.7
9	R	6	16.7	0.008	12.6	LOS A	0	0.22	0.68	57.9
Approach		**7**	**14.3**	**0.008**	**12.4**	**LOS A**	**0**	**0.22**	**0.68**	**57.9**
Manilla Road (W)										
10	L	142	1.4	0.079	11.0	LOS A	0	0.00	0.73	58.9
11	T	3	66.7	0.079	0.0	LOS A	0	0.00	0.00	80.0
Approach		**145**	**2.8**	**0.079**	**10.8**	**LOS A**		**0.00**	**0.71**	**59.2**
All Vehicles		**198**	**3.0**	**0.079**	**10.8**	**Not Applicable**	**1**	**0.07**	**0.69**	**59.1**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Manilla Road (E)										
5	T	2	50.0	0.002	0.0	LOS A	0	0.05	0.00	78.9
6	R	1	0.0	0.002	10.8	LOS A	0	0.05	0.72	58.8
Approach		**3**	**33.3**	**0.002**	**3.6**	**LOS A**	**0**	**0.05**	**0.24**	**70.9**
Leard Forest Road (N)										
7	L	32	0.0	0.111	11.0	LOS A	4	0.05	0.70	58.6
9	R	91	1.1	0.111	10.9	LOS A	4	0.05	0.72	58.8
Approach		**122**	**0.8**	**0.111**	**10.9**	**LOS A**	**4**	**0.05**	**0.71**	**58.8**
Manilla Road (W)										
10	L	5	20.0	0.005	12.1	LOS A	0	0.00	0.73	58.9
11	T	3	0.0	0.005	0.0	LOS A	0	0.00	0.00	80.0
Approach		**8**	**12.5**	**0.005**	**7.6**	**LOS A**		**0.00**	**0.46**	**65.5**
All Vehicles		**133**	**2.3**	**0.111**	**10.6**	**Not Applicable**	**4**	**0.04**	**0.69**	**59.4**

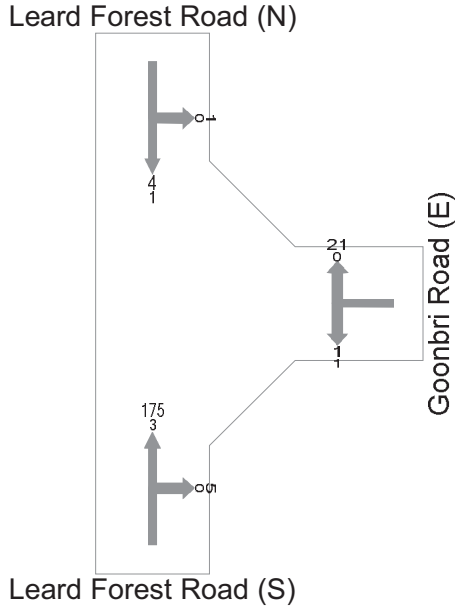
I-04 Leard Forest Road / Goonbri Road

Intersection Layout

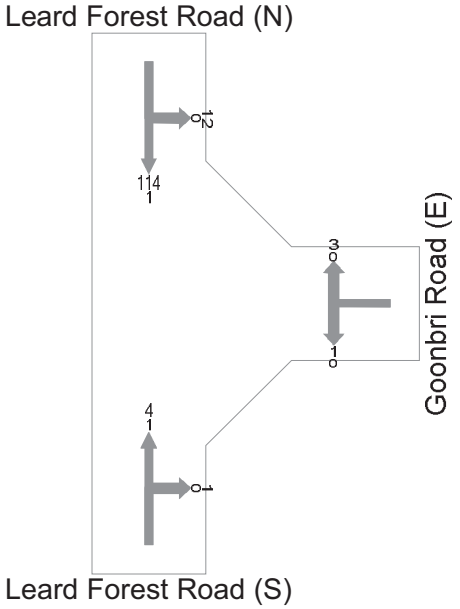


Traffic Volume

AM



PM



Movement Summary

AM Period

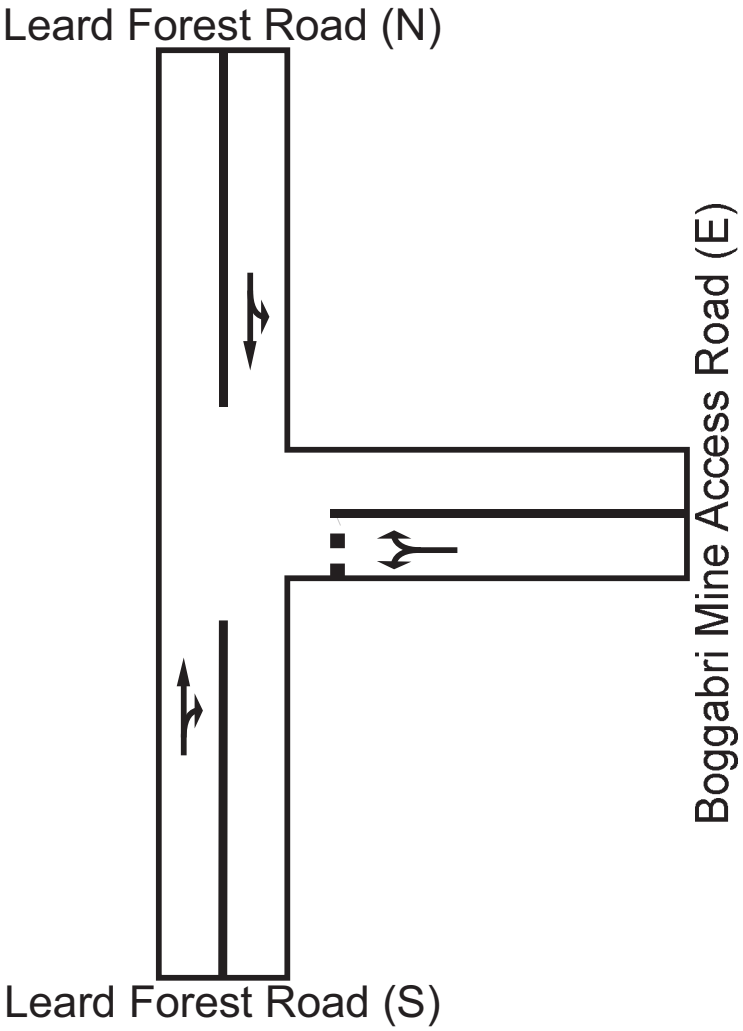
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
2	T	187	1.6	0.100	0.0	LOS A	5	0.05	0.00	78.8
3	R	5	0.0	0.100	10.8	LOS A	5	0.05	0.72	58.8
Approach		**192**	**1.6**	**0.100**	**0.3**	**LOS A**	**5**	**0.05**	**0.02**	**78.1**
Goonbri Road (E)										
4	L	2	50.0	0.029	15.0	LOS B	1	0.10	0.68	57.5
6	R	22	0.0	0.029	11.8	LOS A	1	0.10	0.73	57.6
Approach		**24**	**4.2**	**0.029**	**12.1**	**LOS A**	**1**	**0.10**	**0.72**	**57.6**
Leard Forest Road (N)										
7	L	1	0.0	0.003	10.9	LOS A	0	0.00	0.73	58.9
8	T	5	20.0	0.003	0.0	LOS A	0	0.00	0.00	80.0
Approach		**6**	**16.7**	**0.003**	**1.8**	**LOS A**		**0.00**	**0.12**	**75.6**
All Vehicles		**222**	**2.3**	**0.100**	**1.6**	**Not Applicable**	**5**	**0.05**	**0.10**	**75.2**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
2	T	5	20.0	0.004	0.5	LOS A	0	0.24	0.00	74.3
3	R	1	0.0	0.004	11.2	LOS A	0	0.24	0.65	57.8
Approach		**6**	**16.7**	**0.004**	**2.3**	**LOS A**	**0**	**0.24**	**0.11**	**71.0**
Goonbri Road (E)										
4	L	1	0.0	0.004	11.5	LOS A	0	0.23	0.64	57.6
6	R	3	0.0	0.004	11.4	LOS A	0	0.23	0.67	57.9
Approach		**4**	**0.0**	**0.004**	**11.4**	**LOS A**	**0**	**0.23**	**0.66**	**57.8**
Leard Forest Road (N)										
7	L	13	0.0	0.070	10.9	LOS A	0	0.00	0.73	58.9
8	T	121	0.8	0.069	0.0	LOS A	0	0.00	0.00	80.0
Approach		**134**	**0.7**	**0.069**	**1.1**	**LOS A**		**0.00**	**0.07**	**77.4**
All Vehicles		**144**	**1.4**	**0.070**	**1.4**	**Not Applicable**	**0**	**0.02**	**0.09**	**76.4**

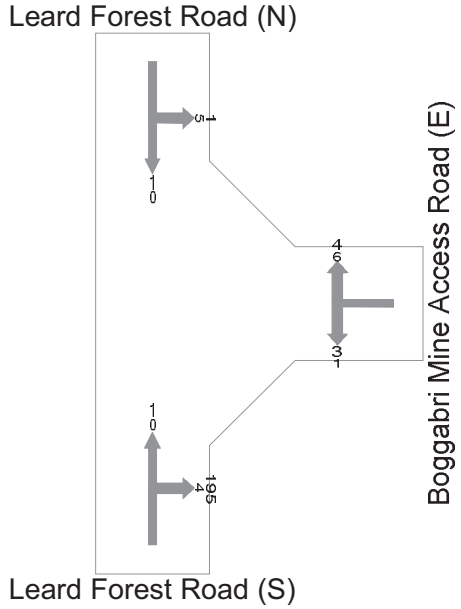
I-05 Leard Forest Road / Boggabri Mine Access Road

Intersection Layout

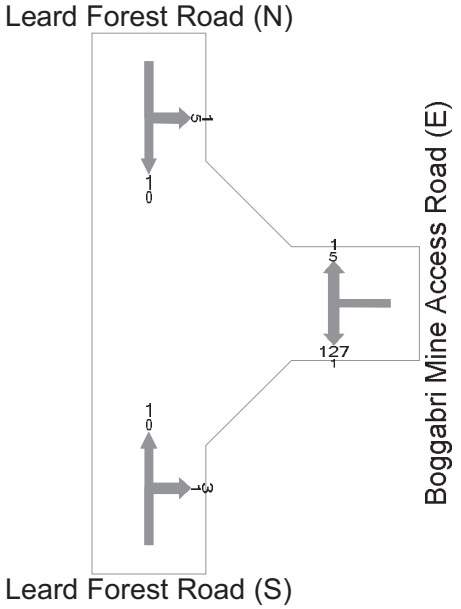


Traffic Volume

AM



PM



Movement Summary

AM Period

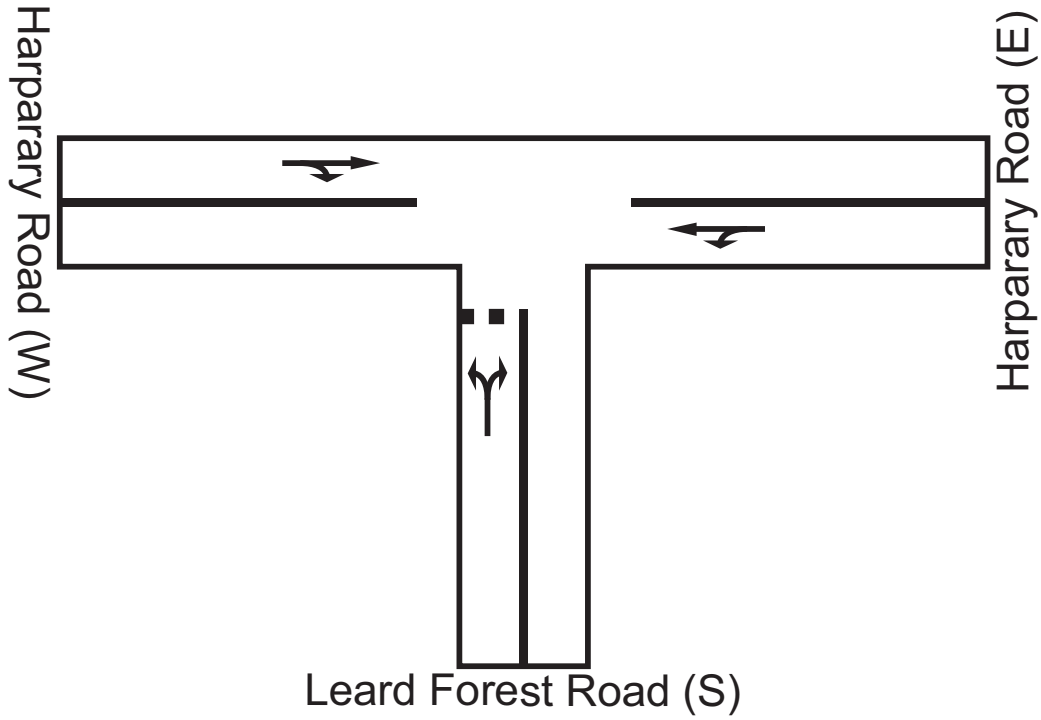
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
2	T	1	0.0	0.143	0.0	LOS A	6	0.06	0.00	78.5
3	R	209	1.9	0.147	10.9	LOS A	6	0.06	0.71	58.8
Approach		**210**	**1.9**	**0.147**	**10.9**	**LOS A**	**6**	**0.06**	**0.71**	**58.9**
Boggabri Mine Access Road (E)										
4	L	4	25.0	0.025	14.7	LOS B	1	0.06	0.70	42.2
6	R	11	60.0	0.025	17.0	LOS B	1	0.06	0.76	42.4
Approach		**14**	**50.0**	**0.025**	**16.3**	**LOS B**	**1**	**0.06**	**0.75**	**42.3**
Leard Forest Road (N)										
7	L	6	83.3	0.006	15.9	LOS B	0	0.00	0.74	58.9
8	T	1	0.0	0.006	0.0	LOS A	0	0.00	0.00	80.0
Approach		**7**	**71.4**	**0.006**	**13.7**	**LOS A**		**0.00**	**0.64**	**61.3**
All Vehicles		**231**	**6.9**	**0.147**	**11.3**	**Not Applicable**	**6**	**0.06**	**0.71**	**58.2**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
2	T	1	0.0	0.004	0.1	LOS A	0	0.06	0.00	78.5
3	R	4	25.0	0.004	12.5	LOS A	0	0.06	0.72	58.8
Approach		**5**	**20.0**	**0.004**	**10.0**	**LOS A**	**0**	**0.06**	**0.58**	**62.0**
Boggabri Mine Access Road (E)										
4	L	135	0.7	0.105	11.0	LOS A	4	0.04	0.70	45.6
6	R	6	83.3	0.105	16.3	LOS B	4	0.04	0.75	45.8
Approach		**141**	**4.3**	**0.105**	**11.2**	**LOS A**	**4**	**0.04**	**0.71**	**45.6**
Leard Forest Road (N)										
7	L	6	83.3	0.006	15.9	LOS B	0	0.00	0.74	58.9
8	T	1	0.0	0.006	0.0	LOS A	0	0.00	0.00	80.0
Approach		**7**	**71.4**	**0.006**	**13.7**	**LOS A**		**0.00**	**0.64**	**61.3**
All Vehicles		**153**	**7.8**	**0.105**	**11.3**	**Not Applicable**	**4**	**0.04**	**0.70**	**47.4**

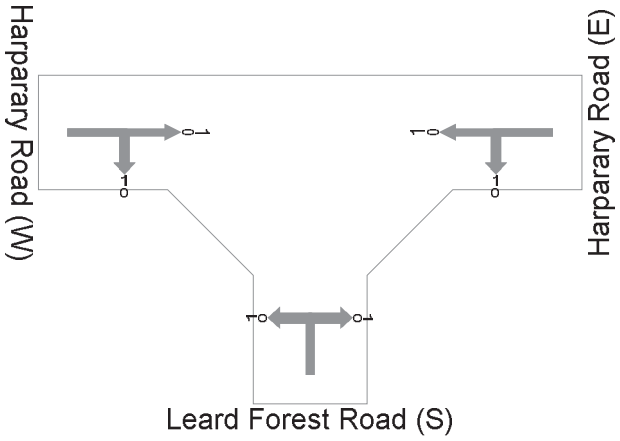
I-06 Harparary Road / Leard Forest Road

Intersection Layout

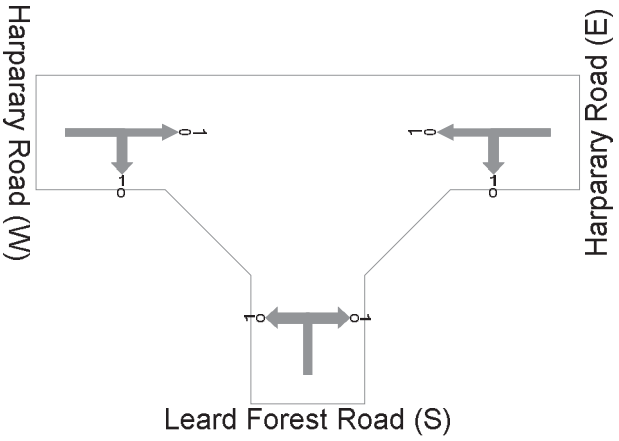


Traffic Volume

AM



PM



Movement Summary

AM Period

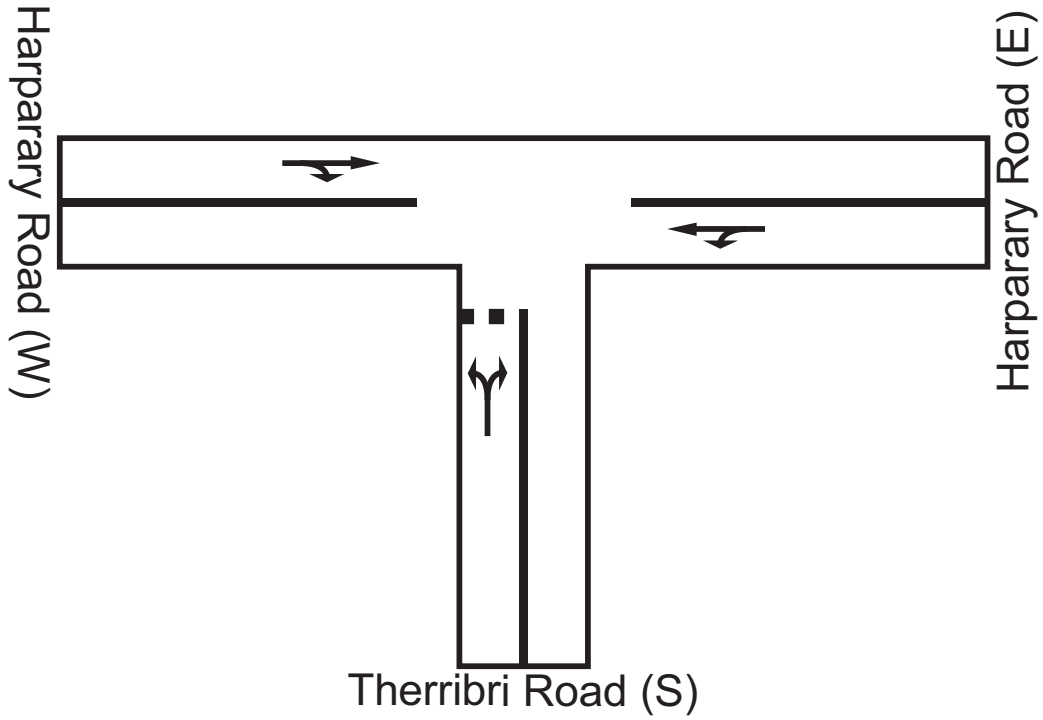
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
1	L	1	0.0	0.002	11.3	LOS A	0	0.02	0.72	63.2
3	R	1	0.0	0.002	11.1	LOS A	0	0.02	0.74	63.5
Approach		**2**	**0.0**	**0.002**	**11.2**	**LOS A**	**0**	**0.02**	**0.73**	**63.3**
Harparary Road (E)										
4	L	1	0.0	0.001	12.2	LOS A	0	0.00	0.75	64.8
5	T	1	0.0	0.001	0.0	LOS A	0	0.00	0.00	100.0
Approach		**2**	**0.0**	**0.001**	**6.1**	**LOS A**		**0.00**	**0.37**	**80.0**
Harparary Road (W)										
11	T	1	0.0	0.001	0.0	LOS A	0	0.02	0.00	99.3
12	R	1	0.0	0.001	12.0	LOS A	0	0.02	0.75	65.0
Approach		**2**	**0.0**	**0.001**	**6.0**	**LOS A**	**0**	**0.02**	**0.38**	**79.9**
All Vehicles		**6**	**0.0**	**0.002**	**7.8**	**Not Applicable**	**0**	**0.01**	**0.49**	**73.3**

PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leard Forest Road (S)										
1	L	1	0.0	0.002	11.3	LOS A	0	0.02	0.72	63.2
3	R	1	0.0	0.002	11.1	LOS A	0	0.02	0.74	63.5
Approach		**2**	**0.0**	**0.002**	**11.2**	**LOS A**	**0**	**0.02**	**0.73**	**63.3**
Harparary Road (E)										
4	L	1	0.0	0.001	12.2	LOS A	0	0.00	0.75	64.8
5	T	1	0.0	0.001	0.0	LOS A	0	0.00	0.00	100.0
Approach		**2**	**0.0**	**0.001**	**6.1**	**LOS A**		**0.00**	**0.37**	**80.0**
Harparary Road (W)										
11	T	1	0.0	0.001	0.0	LOS A	0	0.02	0.00	99.3
12	R	1	0.0	0.001	12.0	LOS A	0	0.02	0.75	65.0
Approach		**2**	**0.0**	**0.001**	**6.0**	**LOS A**	**0**	**0.02**	**0.38**	**79.9**
All Vehicles		**6**	**0.0**	**0.002**	**7.8**	**Not Applicable**	**0**	**0.01**	**0.49**	**73.3**

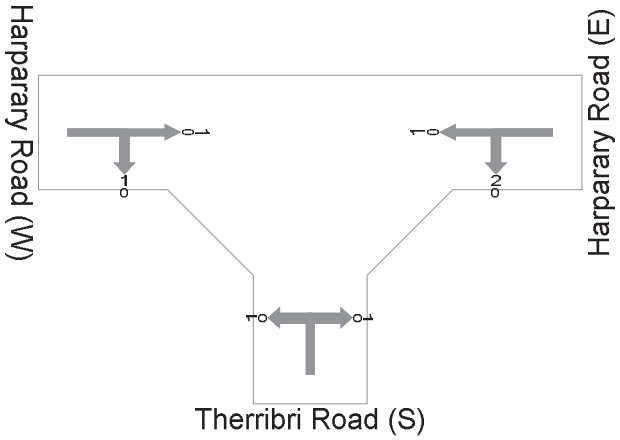
I-07 Harparary Road / Therribri Road

Intersection Layout

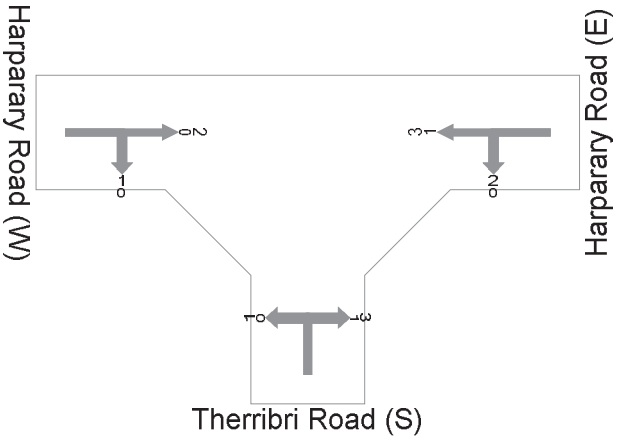


Traffic Volume

AM



PM



Movement Summary

AM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Therribri Road (S)										
1	L	1	0.0	0.002	11.3	LOS A	0	0.02	0.72	63.1
3	R	1	0.0	0.002	11.1	LOS A	0	0.02	0.74	63.5
Approach		**2**	**0.0**	**0.002**	**11.2**	**LOS A**	**0**	**0.02**	**0.73**	**63.3**
Harparary Road (E)										
4	L	2	0.0	0.002	12.2	LOS A	0	0.00	0.75	64.8
5	T	1	0.0	0.002	0.0	LOS A	0	0.00	0.00	100.0
Approach		**3**	**0.0**	**0.002**	**8.1**	**LOS A**		**0.00**	**0.50**	**74.5**
Harparary Road (W)										
11	T	1	0.0	0.001	0.0	LOS A	0	0.02	0.00	99.1
12	R	1	0.0	0.001	12.0	LOS A	0	0.02	0.75	64.9
Approach		**2**	**0.0**	**0.001**	**6.0**	**LOS A**	**0**	**0.02**	**0.37**	**79.8**
All Vehicles		**7**	**0.0**	**0.002**	**8.4**	**Not Applicable**	**0**	**0.01**	**0.53**	**72.0**

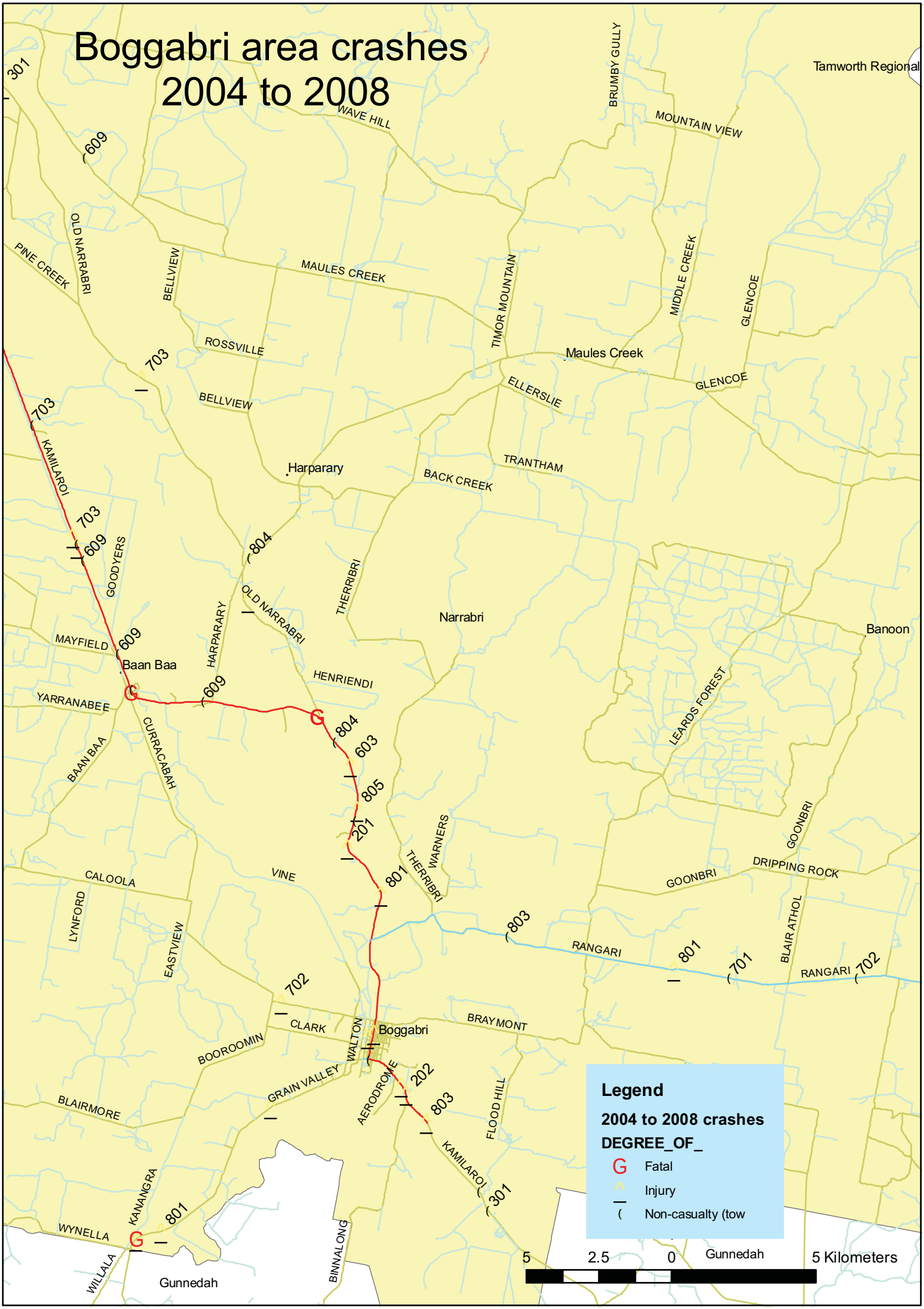
PM Period

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Therribri Road (S)										
1	L	1	0.0	0.005	11.4	LOS A	0	0.05	0.71	63.0
3	R	4	25.0	0.005	13.2	LOS A	0	0.05	0.74	63.4
Approach		**5**	**20.0**	**0.005**	**12.8**	**LOS A**	**0**	**0.05**	**0.73**	**63.3**
Harparary Road (E)										
4	L	2	0.0	0.003	12.2	LOS A	0	0.00	0.75	64.8
5	T	4	25.0	0.003	0.0	LOS A	0	0.00	0.00	100.0
Approach		**6**	**16.7**	**0.003**	**4.1**	**LOS A**		**0.00**	**0.25**	**86.1**
Harparary Road (W)										
11	T	2	0.0	0.002	0.0	LOS A	0	0.04	0.00	98.5
12	R	1	0.0	0.002	12.0	LOS A	0	0.04	0.74	64.8
Approach		**3**	**0.0**	**0.002**	**4.0**	**LOS A**	**0**	**0.04**	**0.25**	**85.3**
All Vehicles		**14**	**14.3**	**0.005**	**7.2**	**Not Applicable**	**0**	**0.03**	**0.42**	**76.0**

Appendix C

Crash data
2004 to 2008

Page intentionally left blank


Boggabri area crashes
2004 to 2008
Tamworth Regional
BRUMBY GULLY
MOUNTAIN VIEW
WAVE HILL
301
609
OLD NARRABRI
PINE CREEK
BELLVIEW
MAULES CREEK
TIMOR MOUNTAIN
MIDDLE CREEK
GLENCOE
ROSSVILLE
703
Maules Creek
ELLERSLIE
GLENCOE
BELLVIEW
KAMILAROI
Harparary
TRANTHAM
BACK CREEK
804
GOODYERS
THERRIBRI
OLD NARRABRI
HARPARARY
Narrabri
Banoon
MAYFIELD
Baan Baa
HENRIENDI
YARRANABEE
CURRACABAH
BAAN BAA
LEARDS FOREST
603
805
201
GOONBRI
DRIPPING ROCK
CALOOLA
VINE
801
THERRIBRI
WARNERS
GOONBRI
803
RANGARI
BLAIR ATHOL
LYNFORD
EASTVIEW
701
RANGARI
702
CLARK
BRAYMONT
BOOROOMIN
WALTON
Boggabri
GRAIN VALLEY
AERODROME
202
FLOOD HILL
BLAIRMORE
KANANGRA
KAMILAROI
WYNELLA
WILLALA
Gunnedah
BINNALONG
Legend
2004 to 2008 crashes
DEGREE_OF_
Fatal
Injury
Non-casualty (tow
5
2.5
0
5 Kilometers

Crashes in study area 2004 to 2008

)CA___COD	DCA__DESC	REPORTING_	ORIENTATIO	KEY_TU_TYP	SURFACE_CO	NATURAL_LI	DAY_OF_WEE	DEGREE_OF_	DATE_OF_CR	TIME_OF_CR
603	On path - Previous accid	2004	North	Car (sedan/hatch)	Dry	Daylight	Sunday	Injury	17/10/2004	1530
804	Off left bend into obj	2005	North	Semi-trailer	Snow or ice	Daylight	Wednesday	Non-casualty (tow	22/06/2005	1245
805	Out of control on bend	2006	North	Motorcycle	Wet	Daylight	Saturday	Injury	10/06/2006	1300
704	Right off cway into obj	2006	North	4 wheel drive	Dry	Daylight	Sunday	Non-casualty (tow	3/09/2006	1600
803	Off right bend into obj	2006	East	4 wheel drive	Dry	Daylight	Saturday	Non-casualty (tow	8/07/2006	1100
804	Off left bend into obj	2005	South	Car (sedan/hatch)	Dry	Daylight	Friday	Non-casualty (tow	30/09/2005	1630
301	Same - Rear end	2006	South	Utility	Dry	Daylight	Tuesday	Injury	21/11/2006	0810
801	Off cway right bend	2007	South	Artic tanker	Dry	Darkness	Saturday	Injury	26/05/2007	0400
201	Opp - Head on	2007	South	Motorcycle	Dry	Daylight	Friday	Injury	20/07/2007	1530
201	Opp - Head on	2007	South	Car (sedan/hatch)	Dry	Daylight	Sunday	Fatal	16/12/2007	1600

STREET_OF_	TREET_TY	ISTANC	DIRECTION	GEOCODING_	ALIGNMENT	ROAD_SURFA	WEATHER	SPEED_LIMI	RUM___DESC	FIRST_IMPA
KAMILAROI	HWY	5000	North	Actual	Straight	Sealed	Overcast	100	Accident	Other angle
KAMILAROI	HWY	10000	North	Actual	Curved	Sealed	Other	100	Off lft/lft bnd=>	Vehicle - Obje
KAMILAROI	HWY	45000	South	Estimated	Curved	Sealed	Raining	100	Out of cont on be	Rollover
KAMILAROI	HWY	3000	North	Estimated	Straight	Sealed	Fine	100	Off rd rght => ob	Vehicle - Obje
WEAN	ST	5390	East	Estimated	Curved	Unsealed	Fine	100	Off rt/rt bnd=>ob	Vehicle - Obje
HARPARARY	RD	5170	North	Estimated	Curved	Unsealed	Fine	100	Off lft/lft bnd=>	Vehicle - Obje
OLD NARRABRI	RD	5000	North	Actual	Straight	Unsealed	Fine	100	Rear end	Rear end
KAMILAROI	HWY	1700	North	Estimated	Curved	Sealed	Fine	100	Off left/right be	Rollover
KAMILAROI	HWY	3700	North	Actual	Curved	Sealed	Fine	100	Head on	Head-on
KAMILAROI	HWY	6000	South	Estimated	Straight	Sealed	Fine	100	Head on	Head-on

NO__OF_TRA	IO_KILLE	IO_INJURE	TU_TYPE	TU_TYPE_GR	SPEED_OF_T	MANOEUVRE	UNUSUAL_FA	ROAD_USER_	GENDER	AGE
2		4	Car (sedan/hatch)	Car/car deriva	Unk	Proceeding in		Motor vehicle driv	Male	82
1			Semi-trailer	Articulated tr	95	Proceeding in	Swaying	Motor vehicle driv	Male	35
2		3	Motorcycle	Motorcycle	100	Proceeding in		Motorcycle rider	Female	44
1			4 wheel drive	Car/car deriva	100	Proceeding in		Motor vehicle driv	Female	49
1			4 wheel drive	Car/car deriva	80	Proceeding in	Skidding/sliding	Motor vehicle driv	Male	49
1			Car (sedan/hatch)	Car/car deriva	80	Proceeding in		Motor vehicle driv	Female	67
2		1	Utility	Car/car deriva	Unk	Proceeding in		Motor vehicle driv	Male	21
1		1	Artic tanker	Articulated tr	100	Proceeding in		Motor vehicle driv	Male	45
2		1	Motorcycle	Motorcycle	80	Incorrect side		Motorcycle rider	Female	46
2	5	1	Car (sedan/hatch)	Car/car deriva	100	Incorrect side	Jack-knifing	Motor vehicle driv	Male	22

Appendix D

Stage 5 (Existing Road) - Road Safety Audit

Page intentionally left blank

Access Route to the Boggabri Coal Mine Site Road Safety Audit (Stage 5 - Existing Road)

December, 2009

Boggabri Coal Mine Limited

Parsons Brinckerhoff Australia Pty Limited
ABN 80 078 004 798

Level 27, Ernst & Young Centre
680 George Street
SYDNEY NSW 2000
GPO Box 5394
SYDNEY NSW 2001
Australia
Telephone +61 2 9272 5100
Facsimile +61 2 9272 5101
Email sydney@pb.com.au

2112805A-PR_2566_RevA

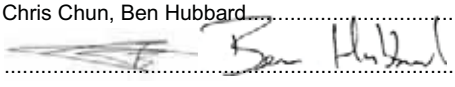
Certified to ISO 9001, ISO 14001, AS/NZS 4801

Revision	Details	Date	Amended By
	Original	16 December 2009	CC,BH
A	Original	15 October 2010	KD

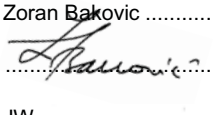
©Parsons Brinckerhoff Australia Pty Limited (PB) **[2010].**

Copyright in the drawings, information and data recorded in this document (the information) is the property of PB. This document and the information are solely for the use of the authorised recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that for which it was supplied by PB. PB makes no representation, undertakes no duty and accepts no responsibility to any third party who may use or rely upon this document or the information.

Author: Chris Chun, Ben Hubbard.....

Signed:  .....

Reviewer: Zoran Bakovic .....

Signed:  .....

Approved by: JW.....

Signed: .....

Date: 15 October 2010.....

Distribution: 1 copy client, 1 copy file.....

Please note that when viewed electronically this document may contain pages that have been intentionally left blank. These blank pages may occur because in consideration of the environment and for your convenience, this document has been set up so that it can be printed correctly in double-sided format.

Contents

Page number

1. Summary 1

1.1 Audit site 1
1.2 Site inspection 2
1.3 Audit photographs 2
1.4 Findings 2
1.5 Audit objectives and procedures 3
1.6 Supporting information 3
1.7 Procedures and reference material 3
1.8 Audit team 4

2. Road safety audit program 5

2.1 Commencement meeting 5
2.2 Completion meeting 5
2.3 Corrective action response 5
2.4 Disclaimer 5

3. Road Safety Audit findings 7

3.1 Priority risk rating 7
3.2 Explanation of terms 7
3.2.1 Likelihood 7
3.2.2 Severity 7
3.2.3 Priority 8
3.3 Deficiency and recommendations log 9

4. Formal statement 15

Contents (Continued)

Page number

List of tables

Page number

Table 3.1 Deficiency and recommendations log 9

List of figures

Page number

Figure 1.1 Locality plan 2

Appendices

Appendix A
Site inspection photos

1. Summary

Audited project:	Vehicular access route to the Boggabri Coal Mine
Audit for:	Boggabri Coal Mine Limited
Address:	“Hansen Bailey”, 6/127-129 John Street, Singleton, NSW 2330
Telephone:	02 65752009, 0419980468
Project manager:	Ben Eastwood
Auditors:	Ben Hubbard (Lead Level 3 auditor), Parsons Brinckerhoff Zoran Bakovic (Lead Level 3 auditor), Parsons Brinkerhoff Chris Chun (Level 1 auditor) , Parsons Brinckerhoff
Audit type:	Stage 5 - Existing road
Commencement meeting:	Not held
Site inspection date	1 December 2009
Audit date:	14 December 2009
Completion meeting:	Not held
Previous audit:	None

1.1 Audit site

This audit reviewed the access route used by traffic between Kamilaroi Highway and the Boggabri Coal Mine. The route is approximately 13.5 km long and includes sections of Manilla Road and Leard Forest Road as well as the following 5 intersections (refer to Figure 1-1):

- Kamilaroi Highway/Manilla Road intersection (I-01)
- Manilla Road/Therribri Road intersection (I-02)
- Manilla Road/Leard Forest Road intersection (I-03)
- Leard Forest Road/Goonbri Road intersection (I-04)
- Leard Forest Road/Boggabri Coal Mine Access Road intersection (I-05).

Source: Google map data 2008 MapData Sciences Pty Ltd PSMA

Figure 1.1 Locality plan

1.2 Site inspection

Both daylight and nigh time site inspections of the mine access route were carried out on Tuesday 1 December 2009 in fine weather conditions. The road sections were driven in each direction at an appropriate speed for the weather and visibility conditions to identify possible safety concerns. A walk over was undertaken to investigate identified concerns in detail. A number of photographs were taken.

1.3 Audit photographs

The photographs of specific and general road safety concerns taken during the site inspection are attached to this report in Appendix A.

1.4 Findings

This road safety audit identified a number of road safety concerns. These issues, along with recommendations, are listed in the safety deficiency log which can be found in Section 3 of this report.

1.5 Audit objectives and procedures

The objectives of this Road Safety Audit are:

- to identify whether the safety features of the road are compatible with the intended purpose of the road and at an appropriate level of safety
- to address any road safety concerns through the identification of potential solutions
- to make sure that measures to alleviate or reduce the concerns are fully considered.

1.6 Supporting information

As this is an audit of existing roads, supporting information was not required.

1.7 Procedures and reference material

The procedures used are those described in the Austroads' "Road Safety Audit – Second Edition", dated 2002. The *Existing Roads – Road Safety Audit Checklist (Checklist 6)* from this guidebook was used. The checklists were used by the audit team as a reference and a checklist was completed at each intersection during the site inspections. These checklists are included in Appendix B. *It should be noted that the positive attributes of the audited road sections have not been discussed.*

Key elements examined included:

- road alignment and cross section
- auxiliary lanes
- intersections
- signs and lighting
- markings and delineation
- crash barrier and clear zones
- provision for pedestrians and cyclists
- bridges and culverts
- pavement
- parking
- provision for heavy vehicles
- other safety concerns.

Other specific reference documents, papers and manuals utilised during the course of this audit are detailed as follows:

- Australian Standard AS1742 Manual of uniform traffic control devices
- Roads and Traffic Authority Road Design Guide
- AUSTROADS Guides to Traffic Engineering Practice
- AUSTROADS Road Safety Audit
- AUSTROADS Guides to Road Safety for Rural and Remote Areas (2006)
- RTA Accident Reduction Guide Part 2 Road Safety Audits (2005)
- RTA Road Safety Audit Manual.

1.8 Audit team

This is the existing road – Road Safety Audit carried out by the following team:

- Ben Hubbard, Parsons Brinckerhoff – Lead Level 3 auditor
- Zoran Bakovic, Parsons Brinckerhoff – Lead Level 3 auditor
- Chris Chun, Parsons Brinckerhoff – Level 1 auditor.

2. Road safety audit program

2.1 Commencement meeting

A formal inception meeting was not held prior to the field audits.

2.2 Completion meeting

A completion meeting was not held.

2.3 Corrective action response

The road safety audit is a formal process. The road safety audit report is not the end of the audit process. The audit report documents the Audit Team's identified concerns and recommendations made to improve the safety of the roads. This must be responded to by the client with a written response to each audit recommendation.

Audit recommendations are not mandatory. In the event of a crash, the audit documentation may be sought by representatives of an injured person. It is important that audit documentation is given due consideration. If it is not possible to adopt a recommendation, it is necessary to consider another effective way of addressing the problem or consider a solution staged over time. Reasons for not accepting a recommendation should be adequately documented.

2.4 Disclaimer

The findings, opinions and recommendations in the report are based on the examination of the specific road and environs, and might not address all concerns existing at the time of the audit. The Auditors have endeavoured to identify features of the road that could be modified or removed in order to improve safety, although it must be recognised that safety cannot be guaranteed since no road is absolutely safe. The problems identified have been noted in this report together with recommendations that should be studied for implementation. Where recommended actions are not taken, this should be reported in writing, providing the reason for the decision. Where required, specific advice on particular matters should be sought rather than relying solely on this report. This report is made available on the basis that anyone relying on it does so at their own risk without any liability to the Auditors.

3. Road Safety Audit findings

The audit findings have been documented in the deficiency log in Table 3-1.

The deficiency log provides:

- specific details of each safety deficiency identified during the audit
- a risk rating (high, medium or low) for each deficiency item
- a recommended action to address the deficiency item.

3.1 Priority risk rating

The following priority rating guide was adopted and modified from the Austroads Road Safety Audits Manual (2002) as there is no referenced methodology for this in the RTA guide.

Likelihood / Severity	Improbable	Occasional	Highly Probable
Minor	Low	Low	Medium
Moderate	Low	Medium	High
Major	Medium	High	High

Note: It should be noted that this risk matrix has been modified and is not the same as the Austroads manual. There has been much debate about the adequacy of the Austroads version with some main road jurisdictions prohibiting its use.

3.2 Explanation of terms

3.2.1 Likelihood

- Highly probable: It is likely that more than one crash of this type could occur within a five year period
- Occasional: It is likely that less than one crash of this type could occur within a five year period
- Improbable: Less than one crash of this type could occur within a 10 year period.

3.2.2 Severity

- Major: The crash is likely to result in a fatality or serious injuries
- Moderate: The crash is likely to result in minor injuries or large scale of property damage
- Minor: The crash is likely to result in minor property damage or many near miss crash events.

3.2.3 Priority

- High: Very important, and needs to be addressed urgently
- Medium: Important, and needs to be addressed as soon as possible
- Low: Needs to be considered as part of regular maintenance/planning program.

3.3 Deficiency and recommendations log

Table 3.1 Deficiency and recommendations log

Item Number	Location	Description of deficiency and recommendations	Priority
Kamilaroi Highway/Manilla Road intersection (I-01)			
1	The northern side of Manilla Road, and the west side of the Kamilaroi Highway north of Manilla Road	Significant bleeding on the wheel paths is clearly visible (refer to Photo 1). A film of asphalt binder on the pavement surface masks the micro-texture of the aggregates and can become quite sticky, causing problems such as loss of skid resistance, especially when wet. Furthermore in warm and hot weather, excess binder will become soft and sticky, and can be trafficked onto adjoining sections of the road. This process may lead to masking of the micro-texture of the adjoining pavement surface. Ultimately, this will result in further loss of skid resistance especially when wet and would increase the likelihood of a crash to occur. Recommendation: ▪ Consider proper and timely road pavement maintenance to prevent further pavement deterioration.	High
2	The east side of the Kamilaroi Highway, deceleration lane on approach to the Manilla Road intersection	There is loose gravel on the edge of the left turn auxiliary lane, which if tracked on the road surface could adversely affect the controllability of a vehicle, and thus could increase the chance of a driver error and the likelihood of a crash (refer to Photo 2). This gravel would eventually lead to road surface deterioration. Recommendation: ▪ Consider proper and timely road surface cleaning.	High
3	Culvert under Manilla Road, on approach to the intersection with Kamilaroi Highway	A large unprotected culvert is located approximately 20 m from the Manilla Road/Kamilaroi Highway intersection (refer to Photo 6). It poses a serious risk because of the height of the drop-off that could cause serious injuries or even fatalities if a motorist ran-off the road. Recommendation: ▪ Consider the use of safety barriers or other measures to protect motorists who may run-off the road.	High

Item Number	Location	Description of deficiency and recommendations	Priority
4	The culverts under the Kamilaroi Highway and under the Kamilaroi Highway/Manilla Road intersection	The maintenance of the drainage facilities is quite poor (refer to Photo 3 and Photo 6). The culverts are not durable and may have insufficient capacity to carry away the required volume of water in given time. Ditches are blocked with debris, vegetation or sediment. It is likely that there is no stable velocity that allows a proper flow capacity of water to be carried out of ditches. Standing water may saturate the subsurface material beneath the roadway, preventing the road from draining and in the next storm event, the roadway could be washed out. Recommendations: ▪ Consider proper and timely maintenance of the drainage facilities to ensure sufficient hydraulic capacity to carry water out and avoid overflowing and washout. ▪ Grass that obstructs the water flow to be removed.	Medium
5	The northern and southern side of Manilla Road on the approach to the Kamilaroi Highway	There are dangerous pavement edge drop-offs (greater than 40 mm in height) that could cause some serious safety concerns (refer to Photo 4 and Photo 5). If a vehicle leaves the road, the current edge drop-offs could make it difficult to drive back onto the road, increasing the crash risk. Furthermore, a significant difference in elevation between shoulder and pavement may cause drivers to overcorrect when attempting lane re-entry, causing vehicles to cross the centreline and impact traffic. Recommendations: ▪ Assess depth of drop-off and develop strategies to ensure that road surface and shoulder are levelled. ▪ Monitoring and addressing pavement edge drop-offs.	Medium
6	The east side of the Kamilaroi Highway, within the southbound deceleration lane, on approach to Manilla Road	Longitudinal surface cracking occurred in several areas within the auxiliary lane. This cracking, if left untreated, could lead to the rapid formation of potholes which would be a hazard to traffic. Currently the size of the cracks is unlikely to be hazard to motorists. Recommendation: ▪ Consider proper and timely road pavement maintenance to prevent further pavement deterioration.	Low

Item Number	Location	Description of deficiency and recommendations	Priority
Manilla Road/Therribri Road intersection (I-02)			
7	At the intersection	Significant bleeding on the wheel paths is clearly visible (refer to Photo 7). A film of asphalt binder on the pavement surface masks the micro-texture of the aggregates and can become quite sticky, causing problems such as loss of skid resistance, especially when wet. Furthermore in warm and hot weather, excess binder will become soft and sticky, and can be trafficked onto adjoining sections of the road. This process may lead to masking of the micro-texture of the adjoining pavement surface. Ultimately, this will result in further loss of skid resistance especially when wet and would increase the likelihood of a crash to occur. Recommendation: ▪ Consider proper and timely road pavement maintenance to prevent further pavement deterioration.	High
8	Manilla Road, on approach to the intersection, within the central area not overrun by vehicles	There is loose gravel in the centre of the intersection, which if tracked on the road surface could adversely affect the controllability of a vehicle and thus could increase the chance of a driver error and the likelihood of a crash (refer to Photo 8). This gravel would eventually lead to road surface deterioration. Recommendation: ▪ Consider proper and timely road surface cleaning.	High
9	At the intersection	The double centreline marking is faded and difficult to see (refer to Photo 9). This results in poor road delineation and could be a contributing factor in a vehicle collision. This line marking is hard to see at night. Recommendation: ▪ Consider proper and timely road marking maintenance to prevent further road marking deterioration.	High
10	Manilla Road, on approach to the intersection	Several of the marker posts have been damaged with reduced retro reflectivity, being less visible or even invisible during the night and not providing a good edge of road delineation. Recommendation: ▪ Consider proper and timely road maintenance of the marker posts.	Medium

Item Number	Location	Description of deficiency and recommendations	Priority
Manilla Road/Leard Forest Road intersection (I-03)			
11	At the intersection	There is evidence of fatigue cracking most likely caused by a fatigue failure of the road surface under repeated traffic loading (refer to Photo 11). This fatigue cracking will eventually result in the formation of pot holes. These potholes may cause serious vehicle damage if driven over at high speed. The cracks allow moisture penetration resulting in further road deterioration. Recommendation: ▪ Consider proper and timely road pavement maintenance to prevent further pavement deterioration.	High
12	Leard Forest Road, on approach to the intersection	The double centreline marking on the Leard Forest Road approach to the intersection is faded and difficult to see especially at night (refer to Photo 12). This results in poor road delineation and could be a contributing factor in a vehicle collision. Recommendation: ▪ Consider proper and timely road marking maintenance to prevent further road marking deterioration.	High
13	Leard Forest Road, on approach to the intersection	There is no give way line on Leard Forest Road (refer to Photo 13). The lack of a give way line could result in vehicles approaching the intersection on Leard forest Road failing to give way to traffic on Manilla Road. Recommendation: ▪ Consider proper and timely road marking maintenance to prevent further road marking deterioration and to maintain the required level of road user safety.	High
14	At the intersection	There is loose gravel in the centre of the intersection, which if tracked on the road surface could adversely affect the controllability of a vehicle and thus could increase the chance of a driver error and the likelihood of a crash (refer to Photo 14). This gravel would eventually lead to road surface deterioration. Recommendation: ▪ Consider proper and timely road surface cleaning.	High
15	Leard Forest Road, left hand side, on approach to the intersection	A hazard marker post has fallen over on the right hand side of the Leard Forest Road on the approach to the intersection. Marker posts provide important visual information to vehicle drivers about the geometry of the road, particularly at night and in periods of bad weather. Damage to marker posts can increase the risk of a crash. Recommendation: ▪ Consider proper and timely road maintenance of the marker posts	Low
16	Leard Forest Road, on approach to the intersection on	Several of the signs on the approach to the intersection have diminished retro reflectivity. Recommendation: ▪ Consider proper and timely road signs maintenance and replacement of the faded signs.	Low

Item Number	Location	Description of deficiency and recommendations	Priority
17	Between I-02 and I-03	Two marker posts between I-02 and I-03 were found to be damaged during the night inspection. These posts provide key information on the road geometry particularly at night and in bad weather. Recommendation: ▪ Consider proper and timely road maintenance of the marker posts.	Low
Leard Forest Road/Goonbri Road intersection (I-04)			
18	Goonbri Road, on approach to the intersection	There is neither a priority control sign nor a yield line on Goonbri Road (refer to Photo 15). It could result in vehicles approaching the intersection on Goonbri Road failing to yield to traffic on Leard Forest Road. Recommendation: ▪ Consider yield line and installation of a priority control sign on Goonbri Road on approach to its intersection with Leard Forest Road.	High
19	At the intersection	There is loose gravel in the centre of the intersection, which if tracked on the road surface could adversely affect the controllability of a vehicle and thus could increase the chance of a driver error and the likelihood of a crash(refer to Photo 16). This gravel would eventually lead to road surface deterioration. Recommendation: ▪ Consider proper and timely road surface cleaning.	High
Leard Forest Road/Mine access road intersection (I-05)			
20	Mine Access Road, the centre area on approach to the intersection	There is loose gravel in the centre of the intersection, which if tracked on the road surface could adversely affect the controllability of a vehicle and thus could increase the chance of a driver error and the likelihood of a crash (refer to Photo 17). This gravel would eventually lead to road surface deterioration. Recommendation: ▪ Consider proper and timely road surface cleaning.	High
21	Leard Forest Road, southbound traffic lane, near the intersection	The batter slope on the side of the road is approximately 45 degrees (1:1) and about 80 cm in height. This batter slope is steeper than the desirable recommended maximum (1:4) and may cause a vehicle to overturn if a vehicle runs off the road (refer to Photo 18). Recommendation: ▪ Consider provision of traversable batter slopes.	Medium

Item Number	Location	Description of deficiency and recommendations	Priority
22	At the intersection	There is no sight board signs installed opposite the end of the Mine Access Road (refer to Photo 19). This type of sign helps drivers understand the geometry of the road by providing a visual cue which can be viewed at a distance. The use of bi-directional signs aids driver understanding of the road layout ahead, particularly at night when line marking may be harder to see. Recommendation: ▪ Consider installation of the sight board signs.	Low

4. Formal statement

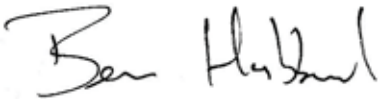
We, the undersigned, declare that we have reviewed the material and data listed in this report and identified the previously detailed safety and operational deficiencies.

This road safety audit was carried out by the audit team by undertaking a site inspection and using available information.

The safety audit findings and suggested actions are the opinions and judgement of the audit team. It should be noted that this report does not claim to have identified every deficiency.

The safety concerns identified have been noted in this report, together with recommendations, which should be studied for implementation. Where recommended actions are not taken, this should be reported in writing, providing the reasons for that decision.

We recommend that points of concern be investigated and corrective actions implemented as soon as is practicable.



……

Ben Hubbard

Lead Road Safety Auditor (Level 3)

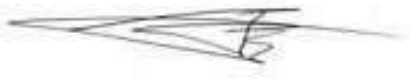
16 December 2009…….

……

Zoran Bakovic

Lead Road Safety Auditor (Level 3)

16 December 2009…….



……

Chris Chun

Road Safety Auditor (Level 1)

16 December 2009…….

Page intentionally left blank

Appendix A

Site inspection photos

Kamilaroi Highway/Manilla Road intersection (I-01)

Photo 1 Bleeding at the Kamilaroi Highway/Manilla Road intersection

Photo 2 Loose gravel on the edge of the left turn auxiliary lane

Photo 3 Poor maintenance of the drainage facilities

Photo 4 The edge drop-off, northern side of Manilla Road

Photo 5 **The edge drop-off, southern side of Manilla Road on the approach to the Kamilaroi Highway**

Photo 6 **Culvert under Manilla Road near the intersection with Kamilaroi Highway**

Manilla Road/Therribri Road intersection (I-02)

Photo 7 Bleeding at the Manilla Road/Therribri Road intersection

Photo 8 A pile of loose gravel collected in the centre of the intersection

Photo 9 **Faded centre line marking at the Manilla Road/Therribri Road intersection**

Photo 10 **Damaged marker posts with reduced retro-reflectivity**

Manilla Road/Leard Forest Road intersection (I-03)

Photo 11 Fatigue cracking at the Manilla Road/Leard Forest Road intersection

Photo 12 Faded centreline marking at the Manilla Road/Leard Forest Road intersection

Photo 13 No give way line on Leard Forest Road

Photo 14 A pile of loose gravel collected in the centre of the intersection

Leard Forest Road/Goonbri Road intersection (I-04)

Photo 15 **No priority sign on Goonbri Road on approach to its intersection with Leard Forest Road**

Photo 16 **A pile of loose gravel collected in the centre of the intersection**

Leard Forest Road/Mine Access Road intersection (I-05)

Photo 17 A pile of loose gravel collected in the centre of the intersection

Photo 18 Batter slope steeper than the desirable 1:4 recommended

Photo 19 No sight board sign installed opposite to Mine Access Road

Appendix E

Train operations traffic impact study

Page intentionally left blank

MEMO

Date:	28 June, 2010
To:	Zoran Bakovic (PB)
Copy:	
From:	Ben Hubbard (PB)
Job no:	2112805A
Subject:	**Traffic impacts of increased coal train movements on railway crossings in Curlewis, Gunnedah and Boggabri**

Parsons Brinckerhoff Australia Pty Limited
ABN 80 078 004 798

Level 27, Ernst & Young Centre
680 George Street
SYDNEY NSW 2000
GPO Box 5394
SYDNEY NSW 2001
Australia
Telephone +61 2 9272 5100
Facsimile +61 2 9272 5101
Email sydney@pb.com.au

Certified to ISO 9001, ISO 14001, AS/NZS 4801

1. Traffic impact of increased coal train demand on railway crossings

The expansion of the Boggabri Coal Mine will see an increase in coal production from 1.5 Mtpa to 7 Mtpa. This coal will be transported by train from the Boggabri coal loader loop to Newcastle.

The purpose of this study was:

- to assess the current impact on road traffic by coal trains at the rail crossings in Boggabri, Gunnedah and Curlewis
- to assess the likely future impact on road traffic, of the increased number of the coal trains on the Northern Rail Corridor at the rail crossings in Boggabri, Gunnedah and Curlewis.

Figure 1.1 shows the study area and the locations of the four railway crossings.

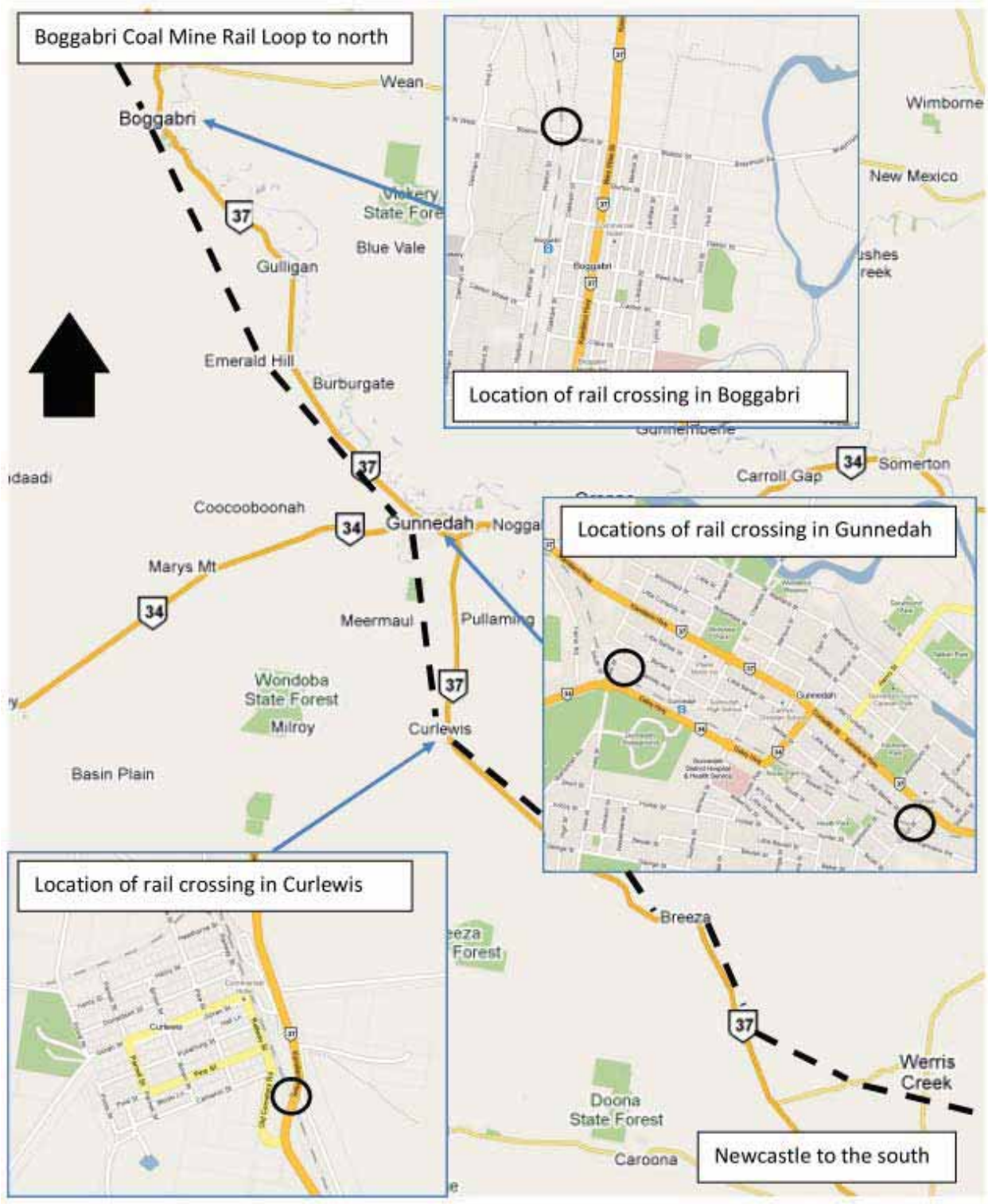


Figure 1.1 Locations of studied rail crossings

2. Existing train movements

The Boggabri/Narrabri region has two main industries; coal mining and agriculture (mainly grain, cotton and beef). Both these primary industries use the Australian Rail Track Corporation (ARTC) Northern rail Corridor which joins the Hunter Region (Dartbrook) railway line to transport their product to Newcastle and beyond. In addition, to the products being exported from the region, freight trains transport fuel and bulk goods into the region.

There are no regular scheduled freight train services operating on the ARTC Northern Rail Corridor. The various mines, along with the grain, cotton and livestock cooperatives, order trains to match the demand for transporting their products to market. Likewise suppliers of bulk goods and fuel, in the region, arrange deliveries to suit their demand.

The *2009-2018 Hunter Valley Corridor Capacity Strategy Consultation Document, (ARTC 2009)* outlines the rail operations within the region:

- between Werris Creek (which is south of Gunnedah) and Gunnedah, background freight traffic is up to 12 train movements per day in both directions
- between Gunnedah and Narrabri background freight train traffic is up to six movements per day in both directions
- additional to the background freight traffic, the railway line between Narrabri and Curlewis provides for a passenger service once a day in each direction
- one coal train a day currently uses the railway line in each direction. However, the number of coal trains per day depends on the availability of trains and the needs of the coal producers. The rail line between Gunnedah and Narrabri can currently accommodate up to six coal trains per day.

Table 2.1 summaries the capacity of train movements per day past Curlewis, Gunnedah and Boggabri.

Table 2.1 Train movements at rail crossing in Curlewis, Gunnedah and Boggabri

Train type	Boggabri (Boston Street)	Gunnedah (New Street)	Gunnedah (Carroll Street)	Curlewis (Kamilaroi Highway)
General freight	6	6	12	12
Coal	6	6	6	6*
Passenger	2	2	2	2
Total	**14**	**14**	**20**	**20**

Note: *Boggabri Coal Mine currently requires on average one coal train per day to transport the 1.5 Mtpa of the mine produced. This one coal train passes all of the studied railway crossings twice a day, once in each direction.

3. Existing vehicular traffic

The Annual Average Daily Traffic (AADT) volumes for the two count sites on the Kamilaroi Highway were extracted from the RTA Traffic Volume Data 2004 – Northern Region and are shown in Table 3.1.

Table 3.1 Annual average daily traffic

Count station/Location	AADT 1998	AADT 2001	AADT 2004
92.440/Kamilaroi Highway west of Abbot Street, Gunnedah	8590	7909	8513
92.162/Kamilaroi Highway at the railway crossing in Curlewis	2105	2157	2077

Source: RTA (2004)

From Table 3.1 the following can be concluded:

- The AADT volumes at the count site 92.440 west of Abbott Street in Gunnedah on the Kamilaroi Highway (between the Carroll Street and New Street Railway Crossings) were approximately 8000 veh/day. This count site is located in the centre of Gunnedah and west of the Oxley Highway, recording some traffic that circulates the town of Gunnedah and some traffic that will have joined Kamilaroi Highway from the Oxley Highway. The circulating traffic and the additional traffic from the Oxley Highway accounts for the traffic volumes at this count site being approximately four times that recorded at the Curlewis railway crossing. An AADT of 8000 veh/day equals approximately 330 veh/hour or, again assuming 10% of the AADT occurs in the AM peak hour, approximately 800 vehicles in the AM peak hour in both directions. This equals approximately one vehicle every 5 seconds.

- The AADT volumes at the Curlewis railway crossing on the Kamilaroi Highway are low, with approximately 2000 veh/day in both directions. This equals approximately 83 veh/hour in both directions. From studies on similar roads it is known that approximately 10% of the AADT occurs in the AM peak hour. This equals 200 veh/hour in both directions during the AM peak hour or one vehicle every 20 seconds.

- The AADT at both sites has generally remained constant from 1998 to 2004, with a growth in traffic of less than 1%.

The RTA does not report traffic volumes for Boston Streets, Boggabri, New Street and Carroll Street in Gunnedah. However, these streets are all classified as local roads and are expected to have an AADT of less than 500 veh/day.

A traffic survey at Boston Street, Boggabri on the Tuesday 1 December 2009 from 4:00 pm to 4:30 pm recorded a total of 30 vehicles. From this an AADT of 750 veh/day and an AM peak hour traffic volume of 75 veh/hour can be estimated based on:

- a typical rural PM peak hour factor of 8%

- a typical rural AM peak hour factor of 10%

- doubling the half hour count to represent the hour.

The approach adopted for estimating the AADT volume from a half hour count should be considered conservative and likely to over-estimate traffic volumes. However, for the purpose of providing a comparative assessment this approach is considered reasonable.

The traffic volumes at the railway crossing on New Street and Carroll Street in Gunnedah are assumed to be similar to the traffic volumes at the railway crossing at Boston Street in Boggabri.

A traffic survey was also carried out on Wednesday 2 December 2009 the Kamilaroi Highway at the Curlewis railway crossing between 10:00 am and 11:00 am. This survey recorded a total of 79 vehicles in both directions within the hour. Of the total traffic recorded 83% where light vehicles and 17% where heavy vehicles.

4. Future rail improvements

Coal transport demand on the ARTC Northern Rail Corridor is reported to have increased significantly in the past few years and is forecast to continue to rapidly increase. Along with expanded operations at the Boggabri Coal Mine, additional coal loader loops are planned for Marulla, Caroona, Watermark and Narrabri. These additional coal loader loops will service new mining activity which will produce additional tonnages of coal beyond the 7 Mtpa being produced at Boggabri. All the coal mines in the region will need to share the available rail capacity.

- ARTC propose to increase capacity of the Northern Rail Corridor by implementing the following measures by 2015
- upgrading the track to carry 30-tonne wagons (currently 25-tonne)
- introducing a Centralised Train Control System (recently completed)
- increase the length of some passing loops (currently 1200 m) to accommodate trains up to 1300 m in length
- increase the capacity of coal train movements to seven in both directions per day (only one of these coal train movements is currently used by Boggabri Coal Mine).

The current 1.5 Mtpa of coal production requires approximately 560 train movements per year (approximately 1.5 per day). The increased coal production of 7 Mtpa will require up to 2000 train movements per year (approximately 5.5 per day) for the Boggabri Coal Mine.

The Boggabri Coal Mine expansion will require approximately five of the available seven train movements to transport the increased quantity of 7 Mtpa of coal. This leaves approximately two train movements available for use by other coal producers (currently reported to be producing approximately 1.2 Mtpa).

5. Forecast future traffic volumes

Estimated traffic volumes for the future mine operation Years 1, 5, 10 and 21 of the extended mine operations have been calculated based on the traffic volumes obtained from published RTA traffic data (2004) and from the surveys carried out on site on Tuesday 1 December 2009.

For each of the future mine operation years, traffic volumes have been estimated based on traffic growth scenarios of 1%, 2% and 5%. The forecast traffic volumes are shown in Table 5.1.

Table 5.1 Forecast traffic volumes for mine operation years 1, 5, 10 and 21

	Year 1	Year 5	Year 10	Year 21
	AADT	AADT	AADT	AADT
Boston Street, Boggabri New Street, Gunnedah Carroll Street, Gunnedah (1% traffic growth)	758	796	836	933
Kamilaroi Highway, Curlewis (1% traffic growth)	2020	2123	2231	2489
Boston Street, Boggabri New Street, Gunnedah Carroll Street, Gunnedah (2% traffic growth)	765	844	933	1159
Kamilaroi Highway, Curlewis (2% traffic growth)	2040	2252	2487	3090
Boston Street, Boggabri New Street, Gunnedah Carroll Street, Gunnedah (5% traffic growth)	788	1005	1282	2190
Kamilaroi Highway, Curlewis (5% traffic growth)	2100	2680	3420	5850

6. Measured delay to traffic for various train types

A survey of the delay to traffic was undertaken at each of the four railway crossings studied at various times of day on Tuesday 1 December 2009. The survey recorded:

- the time from the railway crossing alarm bell sounding and the barrier closing (for the sites with barriers)
- the time from the barrier closing till the train arrived at the railway crossing
- the time for the train to pass
- the approximate length of the train
- the time the end of the train passed

- the time the barrier was raised or the first car moved off
- the time taken for the queues of vehicles to disperse.

The results of the surveys are shown in Table 6.1.

Table 6.1 Existing delays to vehicles at rail crossings in Curlewis, Gunnedah and Boggabri

Railway crossing/ train type	Estimated train length (metres)	Time in seconds				
		Barrier closing or alarm sounding to start of train (A)	Start of train to end of train (B)	End of the train till barrier raised or first vehicle moves off (C)	Vehicle queues to disperse	Total delay from barrier closing or alarm sounding to barrier raised or first vehicle moves off (A+B+C)
Boggabri (Boston Street)– Passenger train	80	190	10	10	5	**210**
Curlewis (Kamilaroi Highway) – Freight train	1200	160	80	20	8	**260**
Curlewis (Kamilaroi Highway) - Passenger train	80	132	3	4	11	**139**
Gunnedah (New Street) – Freight train	1200	195	203	10	0	**611**
Gunnedah (Carroll Street) – Coal train	1200	120	325	10	0	**455**

The results from the railway crossing delay surveys suggests:

- the time taken, from a vehicle being stopped at the railway crossing to the arrival of the train at the railway crossing varied from approximately 120 to 190 seconds (2 to 3 minutes)
- a freight/coal train of approximately 1200 m could delay traffic by approximately 260 and 610 seconds (4 to 10 minutes)
- a coal train of approximately 1200 m in length could delay traffic by up to approximately 450 seconds (7 minutes 30 seconds).

7. Railway crossing closures associated with coal trains serving Boggabri Coal Mine

The 1.5 Mtpa of product coal that is currently transported by rail from the Boggabri rail loop requires, on average, one coal train per day. This coal train is currently approximately 1200 m long and stops traffic at each of the four studied railway crossings for approximately 450 seconds (7minutes 30seconds) each twice a day.

The impact of an increasing the production of coal up to 7 Mtpa, on vehicular traffic at railway crossings in Curlewis Gunnedah and Boggabri, will be:

- an increase in the time traffic is held at the railway crossing, to allow for the additional 100 m of train
- an additional closure of the railway crossing each day at each of the four railway crossing studied.

The proposed increase in coal production, up to 7 Mtpa, would require the use of five 1300 m long coal trains. Each of these coal trains would stop traffic for approximately 480 seconds at each of the railway crossings studied on average five to six times per day.

8. Forecast vehicles delays

Because coal trains are not scheduled to a set timetable this assessment has been based on the daily average number of delayed vehicles. During peak hours the number of vehicles delayed could be greater than the average and conversely during off peak times the number of vehicles delayed could be less than the average due to the unknown time of the specific train movements

The daily average number of vehicles delayed by trains serving the Boggabri Coal Mine was calculated for each of the three traffic growth scenarios and the Years 1, 5, 10 and 21. The average number of delayed vehicles was calculated by multiplying the time vehicles would be delayed at the railway crossings each day by the AADT volume. The calculation of the average number of vehicles delayed assumed:

- each coal train passes each railway crossings twice a day
- a single coal train per day in 2010

- an existing coal train, of approximate length 1200 m, causes a delay to traffic of 450 seconds (7.5 minutes) per train
- on average 5.5 coal train movements per day in the year 5, and on average 4.5 coal train movements per day in the years 10 and 21
- a future coal train, of approximate length 1300 m, would cause a delay to traffic of approximately 480 seconds (8 minutes) per train. This was calculated by factoring up the delay proportional to the increase in train length.

Table 8.1 Forecast vehicles delayed by the trains serving the Boggabri Coal Mine for the years 1, 5, 10 and 21

	Average number of delayed vehicles per day (vehicles)						
	Year 1	Year 5		Year 10		Year 21	
	1.5 Mtpa	1.5 Mtpa	7 Mtpa	1.5 Mtpa	7 Mtpa	1.5 Mtpa	7 Mtpa
Boston Street, Boggabri New Street, Gunnedah Carroll Street, Gunnedah (1% traffic growth)	8	8	44	9	46	10	52
Kamilaroi Highway, Curlewis (1% traffic growth)	21	21	118	23	124	26	138
Boston Street, Boggabri New Street, Gunnedah Carroll Street, Gunnedah (2% traffic growth)	8	8	47	10	52	12	64
Kamilaroi Highway, Curlewis (2% traffic growth)	21	21	125	26	138	32	172
Boston Street, Boggabri New Street, Gunnedah Carroll Street, Gunnedah	8	8	56	13	71	23	122
Kamilaroi Highway, Curlewis (5% traffic growth)	22	22	149	36	190	61	325

Table 8.2 shows the average number of vehicles queuing at each railway crossing per train movement per approach to the crossing. For the 1.5 Mtpa scenario (do nothing) the average daily delayed vehicles was divided by two train movements and the two traffic approach directions to give the average number of queued vehicles on each approach. For the 7 Mtpa scenario the average daily delayed vehicles was divided by five train movements and the two approach directions to give the average number of queued vehicles on each approach.

Table 8.2 Forecast average queued vehicles at the Curlewis, Gunnedah and Boggabri railway crossings

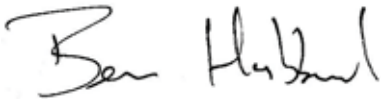
	Average number of vehicles queuing in each direction per train movement						
	Year 1	Year 5		Year 10		Year 21	
	1.5 Mtpa	1.5 Mtpa	7 Mtpa	1.5 Mtpa	7 Mtpa	1.5 Mtpa	7 Mtpa
Boston Street, Boggabri New Street, Gunnedah Carroll Street, Gunnedah (1% traffic growth)	2	2	2	2	2	2	3
Kamilaroi Highway, Curlewis (1% traffic growth)	5	6	6	6	6	6	7
Boston Street, Boggabri New Street, Gunnedah Carroll Street, Gunnedah (2% traffic growth)	2	2	2	2	3	3	3
Kamilaroi Highway, Curlewis (2% traffic growth)	5	6	6	6	7	8	9
Boston Street, Boggabri New Street, Gunnedah Carroll Street, Gunnedah	2	2	3	3	4	6	4
Kamilaroi Highway, Curlewis (5% traffic growth)	5	5	7	9	10	15	16

9. Conclusions

The analysis of the traffic impacts associated with the increased number of train movements for the increased production at the Boggabri Coal Mine shows that:

- The expansion of coal production at the Boggabri Coal Mine from 1.5 Mtpa to 7 Mtpa would increase the number of coal trains required from one train per day to two to three coal trains per day.
- ARTC propose to upgrade both track and coal trains by 2015. These upgrades will improve rail capacity by increasing the total load of each coal train, increasing the length of each coal train and adding an additional coal train path per day to the Northern Rail Corridor.
- The increased length of coal trains serving the Boggabri Coal Mine could increase the time vehicles are held at the four studied railway crossings by 30 seconds.

- The existing single coal train per day serving Boggabri Coal Mine closes the railway crossings on average twice a day with each closure causing delays to traffic of approximately 450 seconds (7 minutes 30 seconds).
- Two to three coal trains required to transport the 7 Mtpa of coal from the Boggabri Coal Mine would close each of the railway crossings in the study area a total of five to six times. Each of these closures could delay traffic by up to 480 seconds (8 minutes).
- The impact, of the increased length and number of coal trains, on traffic on the railway crossings on Boston Street Boggabri, New Street and Carroll Street, Gunnedah is likely to be minimal. Average traffic queues at these railway crossings could increase by approximately three vehicles in each direction per train with a high growth scenario of 5%. All these crossings have sufficient space for significantly more than three vehicles.
- The impact, of the increased length and number of coal trains, on traffic at the railway crossing on the Kamilaroi Highway, Curlewis would be minor. Average traffic queues at this intersection could increase to approximately 16 vehicles per direction per train with a high growth scenario of 5%. The Kamilaroi Highway has road space to accommodate this length of queue.



Ben Hubbard
Senior Traffic Engineer
Parsons Brinckerhoff Australia Pty Limited

MEMO

Date:	29 November 2010
To:	Ben Eastwood, Hansen Bailey Environmental Consultants
Copy:	
From:	Zoran Bakovic (PB)
Job no:	2112805B
Subject:	**Continuation of Boggabri Coal Mine: Worst Case Cumulative Impact Traffic Assessment**

Parsons Brinckerhoff Australia Pty Limited
ABN 80 078 004 798

Level 27, Ernst & Young Centre
680 George Street
SYDNEY NSW 2000
GPO Box 5394
SYDNEY NSW 2001
Australia
Telephone +61 2 9272 5100
Facsimile +61 2 9272 5101
Email sydney@pb.com.au

Certified to ISO 9001, ISO 14001, AS/NZS 4801
A+ GRI Rating: Sustainability Report 2009

1. Introduction

Parsons Brinckerhoff Pty Ltd (PB) prepared a Traffic Impact Assessment dated September 2010 for the Continuation of Boggabri Coal Mine Project Environmental Assessment (EA). This assessment included the cumulative impacts of known projects in the vicinity of Boggabri Coal Mine. Since preparing the assessment, further information, however limited, has become available on other large scale coal mining projects proposed in the immediate vicinity of Boggabri Coal Mine. The Department of Planning (DoP) has requested that this additional information be considered for the potential cumulative impacts in the vicinity of the Leard State Forest. The following is a high level assessment of cumulative impacts associated with the Continuation of Boggabri Coal Mine Project and these other projects.

This memo is an addendum to the *Traffic Impact Assessment: Boggabri Coal Mine* (PB, 2010) and builds on that earlier work. This addendum specifically addresses the traffic assessment requested by the DoP which included:

> *Ensure that the assessment incorporates worst case cumulative traffic impact scenarios associated with the simultaneous operation of the project together with the Tarrawonga and Maules Creek Coal Mines. This applies to both road and rail traffic impact assessments. The train operations traffic impact study (Appendix E of Appendix T) does not adequately assess the potential impacts of the project (or the potential cumulative impacts of coal mining) on the local road network. Consequently, a revised assessment must be included in the EA that accurately reflects the current and future volumes of trains on the Werris Creek – Mungindi Rail Line from both coal mining and non-coal mining sources.*

1.1 Background

In August 2009 Boggabri Coal Pty Limited commenced consultation with DoP regarding a new project approval for the continuation of the existing Boggabri Project. To progress that proposal, the following steps were taken:

1. 26 August 2009 Preliminary Environmental Assessment (PEA) submitted
2. 9 September 2009 Planning focus meeting
3. 25 September 2009 Revised PEA and Project Application submitted
4. 15 December 2009 EPBC Referral submitted
5. 17 December 2009 Director-Generals Requirements (DGRs) issued
6. 2 July 2010 EA submitted for adequacy
7. 20 August 2010 NSW DoP letter requesting further information.

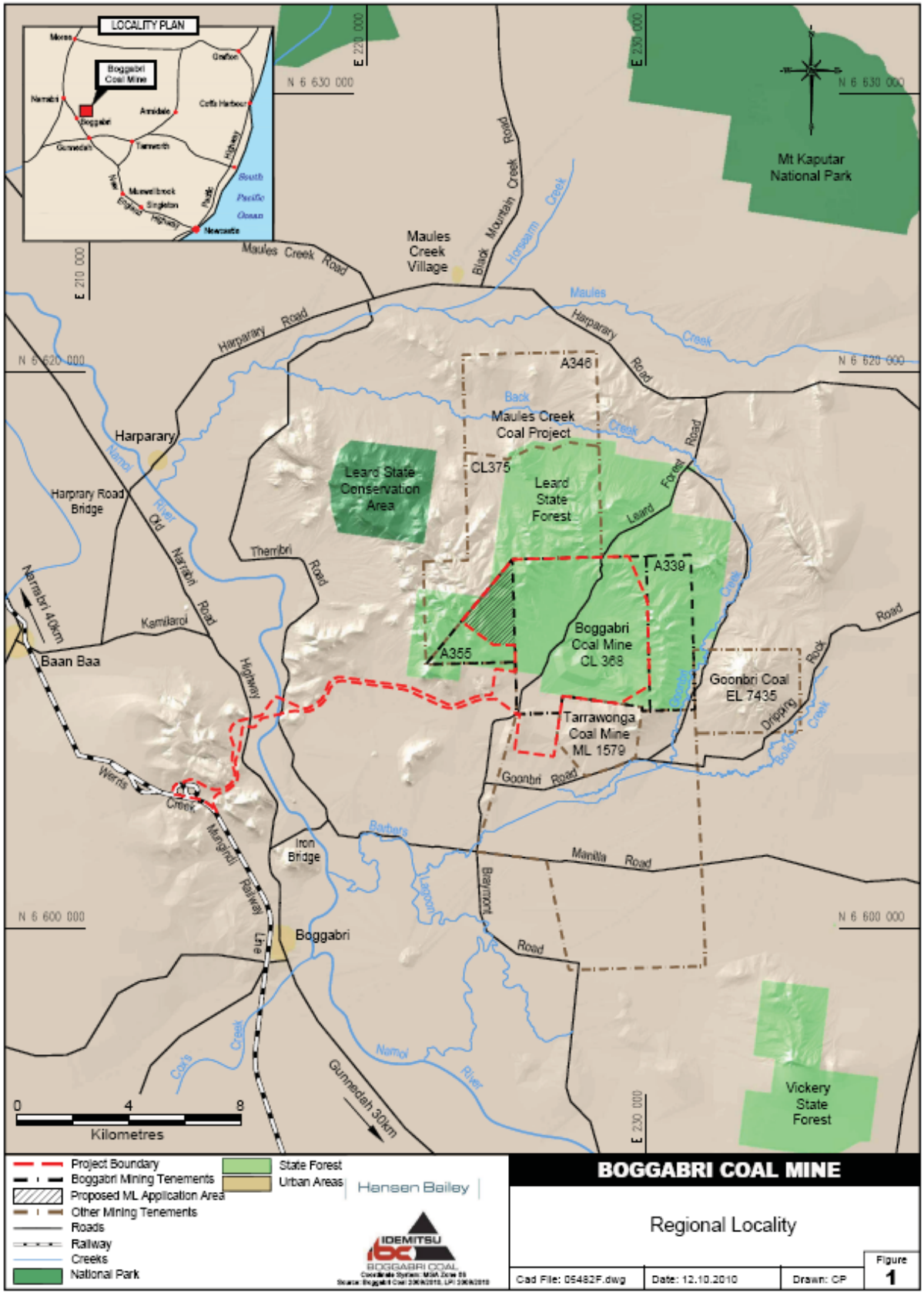
During the course of the above approval process further information has come to the attention of Boggabri Coal relating to other large scale coal mining projects in the immediate vicinity of the Boggabri Project. Some of these Other Projects have since sought or may seek approval at some time in the future.

Accordingly, a Simultaneous Worst Cast Cumulative Impact Scenario (SWCCIS) review has been undertaken in order to attempt to gain a very high level appreciation of the potential worst case cumulative impacts if all of the Continuation of the Boggabri Cone Mine and Other Projects were to proceed in conjunction with the Boggabri Coal project.

The appreciation is necessarily high level and based upon some highly speculative assumptions which are detailed in this review.

The SWCCIS review is separate to the EA for the Boggabri Coal Project. Whilst it draws upon the findings made from the assessments in the Boggabri EA, this review is prepared on a different basis to the quantitative environmental assessments in the Boggabri EA as it is making qualitative assessments for the purposes of a high level review.

This cumulative traffic impact assessment forms part of the SWCCIS review.



Source: Hansen Bailey

Figure 1.1 Proposed mine developments in close proximity to Boggabri Coal Mine

1.2 Scope

This addendum to the traffic impact assessment for Boggabri Coal Mine includes:

- a cumulative traffic volume forecast for 2016, that includes the traffic from each of the mines seeking approvals: Boggabri, Tarrawonga and Maules Creek
- an updated assessment of the traffic performance and traffic impact on the road network in the vicinity of these mines
- an updated assessment of likely impact on traffic at rail crossings within Gunnedah, Boggabri and Curlewis. Traffic impact at these crossing is a result of increased rail movements to transfer coal to the port of Newcastle.

2. Description of coal mining projects in close proximity to the Boggabri Coal Mine

Continuation of Boggabri Coal Mine

The continuation of Boggabri Coal mine from a ROM coal of 5 Mtpa to 7 Mtpa is expected to require an additional 353 staff. This would increase the work force from the current 147 staff to 500 staff at the peak of production in year 5 (2016). The additional 353 staff could generate up to 527 vehicle trips per day.

Continuation of Tarrawonga Coal Mine

Tarrawonga Coal Mine project is located to the south of the Boggabri Coal Mine coal lease area. The Tarrawonga Coal Mine project was approved in 2005 to extract up to 12.4 Million tonnes of coal over an eight to ten year period (up to 2015) with a maximum ROM of 2 Mtpa. The mine operator, Whitehaven Coal, is now seeking to expand the mine to extract a further 4 million tonnes of coal. This would be achieved without extending the life of the mine or the maximum ROM.

The *Tarrawonga Coal Mine Modification Environmental Assessment* (Whitehaven Coal, 2010) reported that the number of staff would not be increased by the modification. Therefore as product coal is hauled to the rail loop at Whitehaven Coal Handling and Preparation Plant (CHPP) to the north of Gunnedah via a private haul road, the modified mine would not generate additional traffic onto the road network and therefore would not have a further traffic impact.

Maules Creek Coal Mine

Maules Creek Mine project is seeking a Project Approval under Part 3A of the EP&A Act to develop surface infrastructure and open cast mining activities generally within its current mining tenements for a period of up to 21 years. This mine is expected to have a ROM up to 13 Mtpa and employ up to 400 permanent staff.

Maules Creek Coal Project Preliminary Environmental Assessment (Hansen Bailey, 2010) identified that a traffic and transport impact assessment would need be prepared as part of the project application EA.

To understand the likely cumulative impact of Maules Creek and Boggabri mine projects some assumptions regarding the traffic generation for Maules Creek mine have been made including:

- a trip generation rate of 1.8 vehicles per day per person. This equates to 2 trips per day multiplied by 90% and assumes that 10% of staff would not be at work on a given day (e.g. sick or on annual leave). This is the same generation rate assumed for the Boggabri Coal Mine
- a vehicle occupancy of 1.2 persons per vehicle which is equal to 1/1.2 = 0.83 vehicles per person. This is the same vehicle occupancy assumed for the Boggabri Coal Mine
- all workers split between two shifts (i.e. 50% arriving and departing in the AM peak and 50% arriving and departing in the PM peak hour)
- all workers using the mine access road onto Therribri Road
- the directional distribution of traffic shown in Figure 2.1.

The above assumptions are conservative and should be considered as a worst case. Using these assumptions, 400 mine staff for the Maules Creek Mine project could add approximately an additional 598 vehicle trips per day to the local road network.

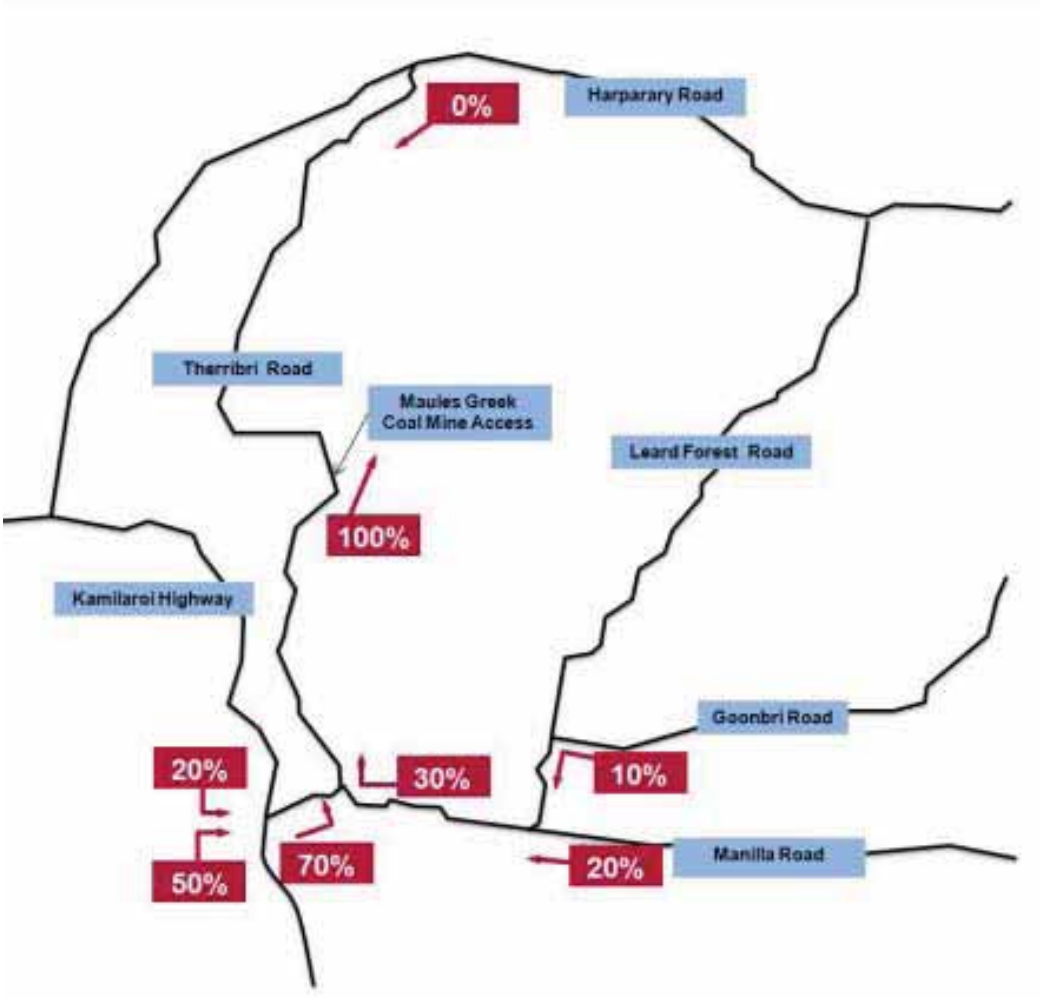


Figure 2.1 Assumed directional distribution of inbound traffic to the Maules Creek Coal Project

2.1 Future coal mine projects

Tarrawonga Extension

It is possible that Tarrawonga Coal Mine will be expanded further into Exploration Lease (EL) 5967, whether by new project approval or further modification of the existing approvals. There have been no approvals issued or applications made for this proposal to date that are publically available. All that is known of this proposal at this time is the existence of EL 5967. As such, a project description is not available.

Goonbri Project

It is possible that a future open cut or underground coal mine will be developed within EL 7435 under a new project approval which may be made at some time in the future. There have been no approvals issued or applications made for this proposal to date that are publically available. All that is known of this proposal at this time is the existence of EL 7435. As such, a project description is not available.

3. Cumulative traffic impact

The proposed Other Projects will attract additional vehicle trips onto the existing road network that surrounds the Leard State Forest.

The Boggabri Project and Other Projects are located away from local townships where mine workers will reside so will generate journey to work trips. Traffic generated by the Other Projects will need to share the existing road infrastructure with existing traffic.

3.1 Existing conditions

The existing conditions on the road network and traffic performance are described within the *Boggabri Coal Mine Traffic Impact Assessment* (PB, 2010). From this report the 2009 traffic conditions can be summarised as follows:

- traffic volumes on the road network surrounding Boggabri coal mine are low. Kamilaroi Highway which is the main arterial road connecting Narrabri, Boggabri, Gunnadah and Curlewis has an Annual Average Daily Traffic (AADT) of approximately 2,000 vehicles. Manilla Road which connects the Kamilaroi Highway with Manilla has an AADT of approximately 300 vehicles
- all the key intersections have a LoS A in the peak hours.

Figure 3.1 shows the existing traffic volumes at each of the key intersections in the AM and PM peak hours.

3.2 Peak hours

Because the existing background traffic on the studied road network is low the traffic generated by the mine staff at the change of shifts in the AM and PM would be the most significant peak hours. The peak hours selected for this assessment are:

- for the AM between 5:45 am and 6:45 am
- for the PM between 5:00 pm and 6:00 pm

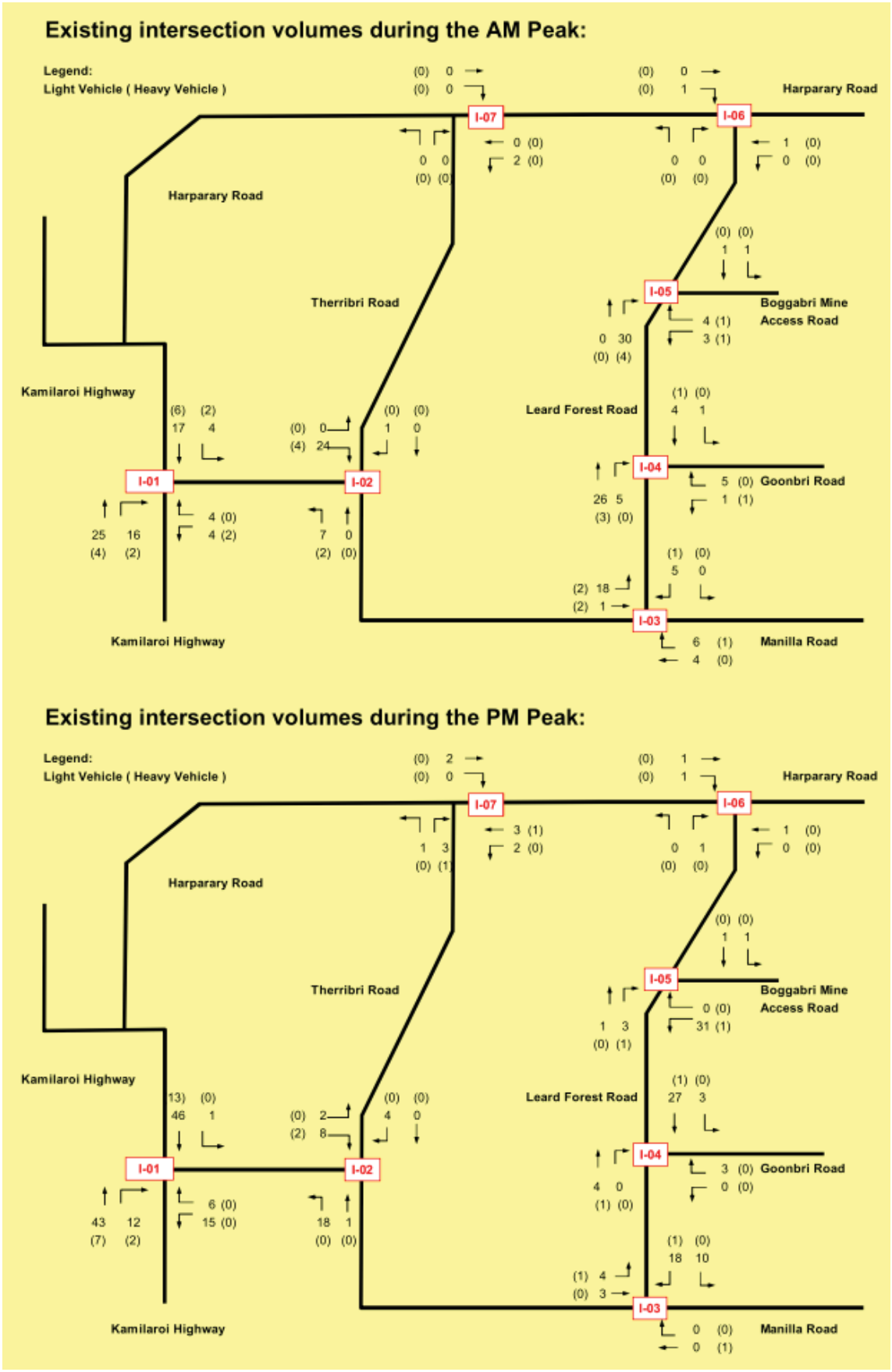


Figure 3.1 Existing traffic volumes at intersections on the studied road network in 2009

3.3 Potential Cumulative mine traffic

The Do-nothing scenario for traffic is shown in Figure 3.2 which includes the existing traffic volumes plus traffic growth at 1% up to 2016. The cumulative generated traffic volumes for the Boggabri, Maules Creek and Tarrawonga Mine projects, along with the existing traffic and traffic growth up to 2016 are shown in Figure 3.3.

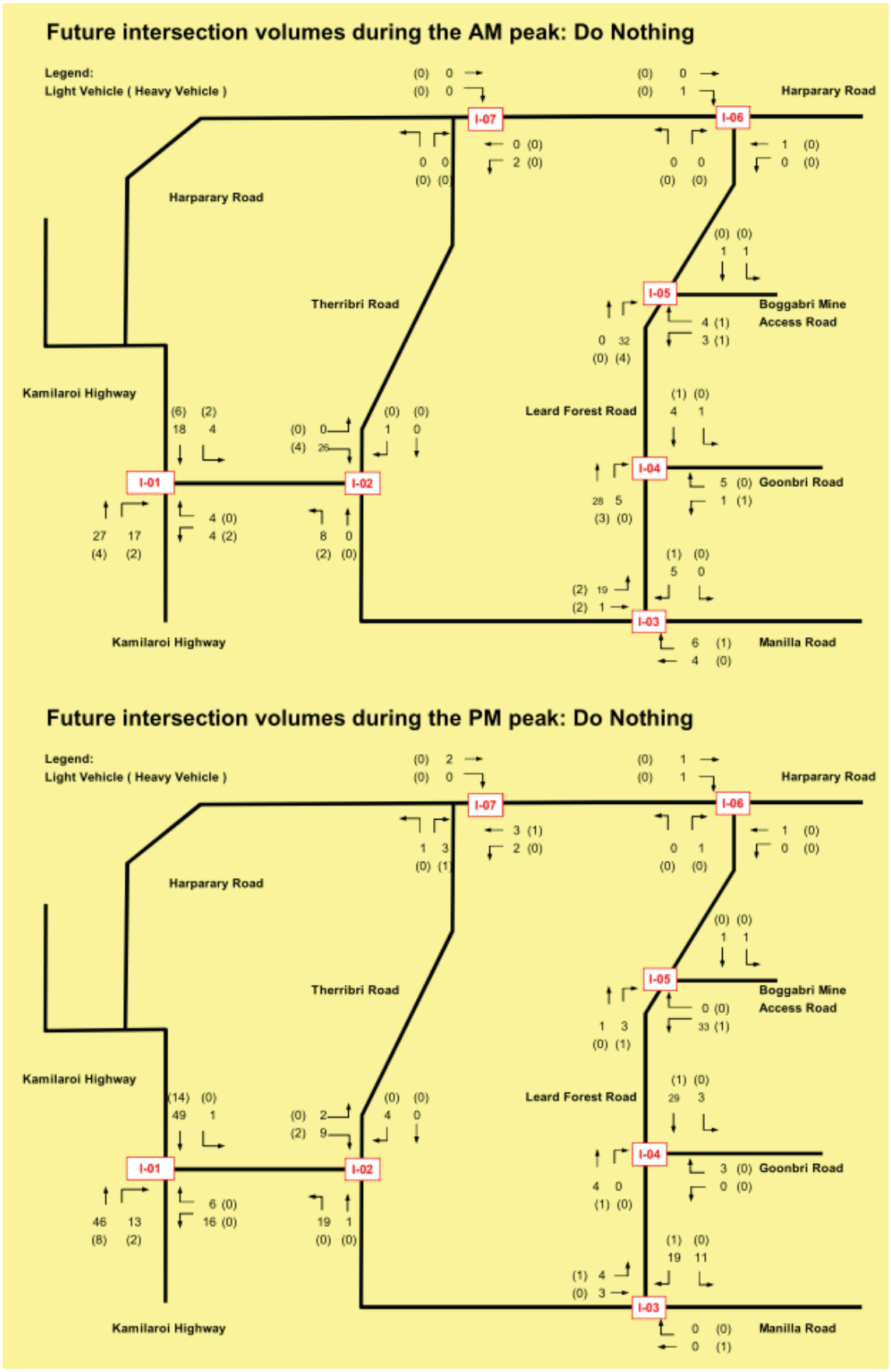


Figure 3.2 Modelled traffic volumes in 2016 for the Do Nothing scenario

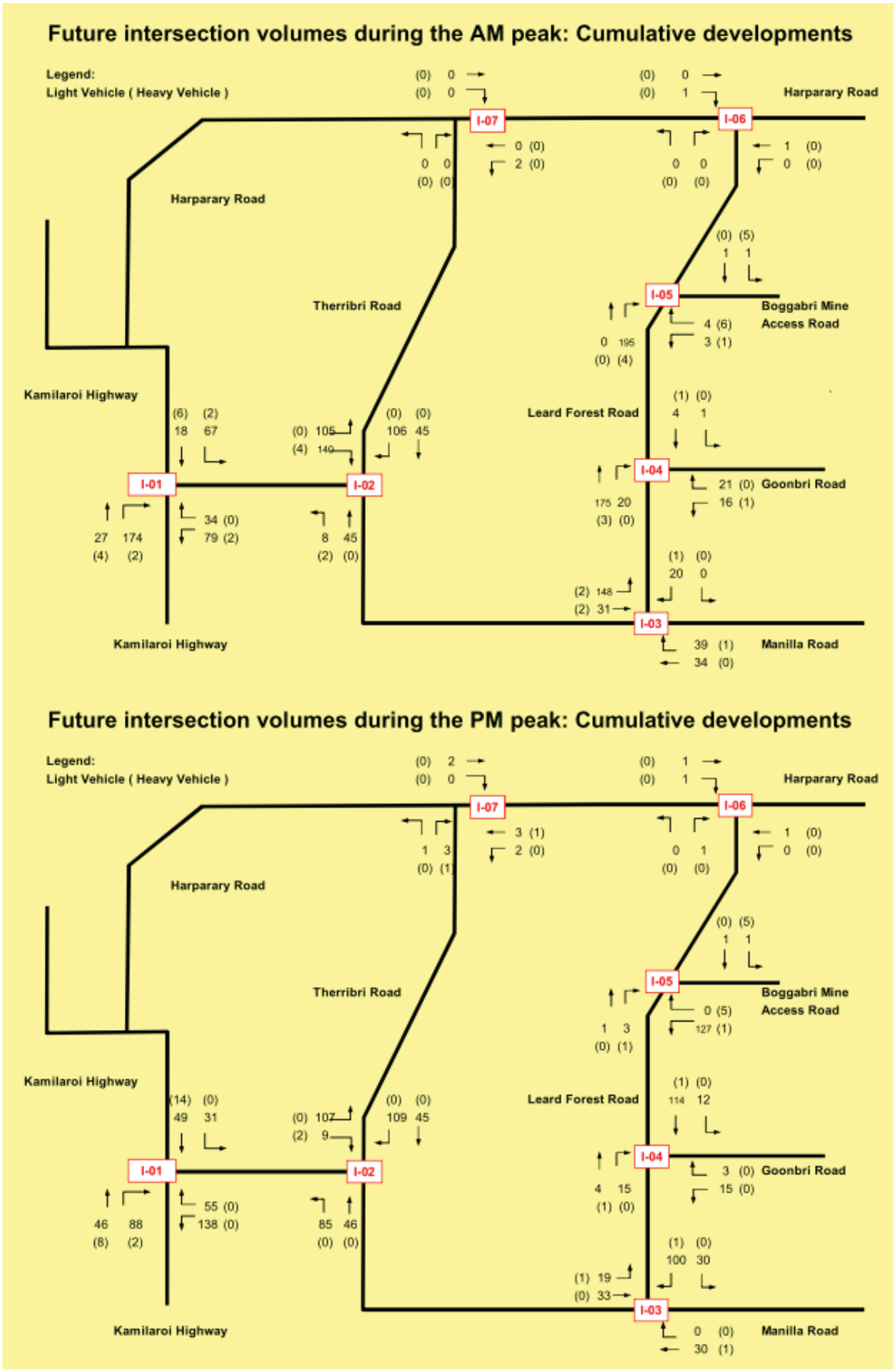


Figure 3.3 Modelled traffic volumes in 2016 for the cumulative development scenario

3.4 Intersection traffic performance

Intersection traffic performance for the Do-nothing and cumulative traffic scenarios that could result from the Continuation of the Boggabri Coal mine and Other Projects is summarised in Tables 3.1 and 3.2.

Table 3.1 Modelled traffic performance 2016 – do nothing scenario

Intersection	Control	Peak period	DoS	Delay (sec)	LoS	Queue (m)
Kamilaroi Highway/ Manilla Road	Priority	AM	0.020	14	A	1
	Priority	PM	0.004	13	A	1
Manilla Road/Therribri Road	Priority	AM	0.003	12	A	1
	Priority	PM	0.002	13	A	1
Manilla Road/Leard Forest Road	Priority	AM	0.002	12	A	1
	Priority	PM	0.003	12	A	1
Leard Forest Road/ Goonbri Road	Priority	AM	0.002	14	A	1
	Priority	PM	0.002	11	A	1
Leard Forest Road/ Boggabri Mine Access Road	Priority	AM	0.003	12	A	1
	Priority	PM	0.003	12	A	1
Harparary Road/Leard Forest Road	Priority	AM	0.002	12	A	1
	Priority	PM	0.002	12	A	1
Harparary Road/ Therribri Road	Priority	AM	0.002	12	A	1
	Priority	PM	0.006	12	A	1

Table 3.2 Modelled traffic performance 2016 – cumulative peak operation

Intersection	Control	Peak period	DoS	Delay (sec)	LoS	Queue (m)
Kamilaroi Highway/ Manilla Road	Priority	AM	0.172	13	A	5
	Priority	PM	0.184	13	A	7
Manilla Road/Therribri Road	Priority	AM	0.267	12	A	10
	Priority	PM	0.115	13	A	5
Manilla Road/Leard Forest Road	Priority	AM	0.104	12	A	2
	Priority	PM	0.136	11	A	5
Leard Forest Road/ Goonbri Road	Priority	AM	0.112	12	A	6
	Priority	PM	0.069	11	A	1
Leard Forest Road/ Boggabri Mine Access Road	Priority	AM	0.150	17	B	6
	Priority	PM	0.105	18	B	4
Harparary Road/Leard Forest Road	Priority	AM	0.002	12	A	1
	Priority	PM	0.002	12	A	1
Harparary Road/ Therribri Road	Priority	AM	0.002	12	A	1
	Priority	PM	0.006	13	A	1

These tables show:

- without the Continuation of the Boggabri Coal Mine and Other Projects in the Boggabri area by 2016 the key intersections are likely to have a LoS A in both of the peak hours
- with the cumulative traffic from the Continuation of the Boggabri Coal Mine and Other Projects the key intersections are likely to have a LoS A in both peak hours, except the Leard Forest Road/Boggabri Mine Access Road which is likely to have a LoS B in both peak hours.

All the key intersections are likely to have significant spare capacity to accommodate additional traffic generation from the Other Projects within the area. Spare capacity would also be available for future projects such as the Tarrawonga Extension and Goonbri Coal Projects.

3.5 Traffic impact

Traffic performance

The results of the cumulative traffic assessment on intersection performance clearly show that there will be no significant impact from the continuation of Boggabri Coal Mine and the Other Projects. This is largely due to the low level of existing traffic volumes. The increase in traffic from the Boggabri Coal Mine and the Other Projects is modest and all the intersections within the study area have significant spare capacity to accommodate additional traffic volumes generated by the Other Projects.

Road safety impact

The majority of the studied road network has a low crash record (i.e. good crash history) with few or no crashes reported to the police. Some crashes have occurred on the Kamilaroi Highway to the north of the Kamilaroi Highway/Manilla Road intersection. However, only a small proportion, approximately 20%, of the increased traffic will use this section of the road network. Therefore the potential increase in crashes due to the proposed development is unlikely.

Public bus services

Apart from the School bus service on the Kamilaroi Highway, Manilla Road and Harparary Road, there are no public bus services in the vicinity of the proposed developments. Due to the existing road network capacity and results from the Continuation of Boggabri Coal Mine Traffic Impact Assessment (PB 2010) it is not anticipated that the existing school bus services would be adversely impacted by the cumulative impacts of the Other Projects.

4. Cumulative impacts at rail crossings

This section considers the potential cumulative impact of increased coal production from the Other Projects on vehicle traffic at level crossings in Boggabri, Gunnedah and Curlewis. The locations of the studied railway level crossings are shown in Figure 4.1.

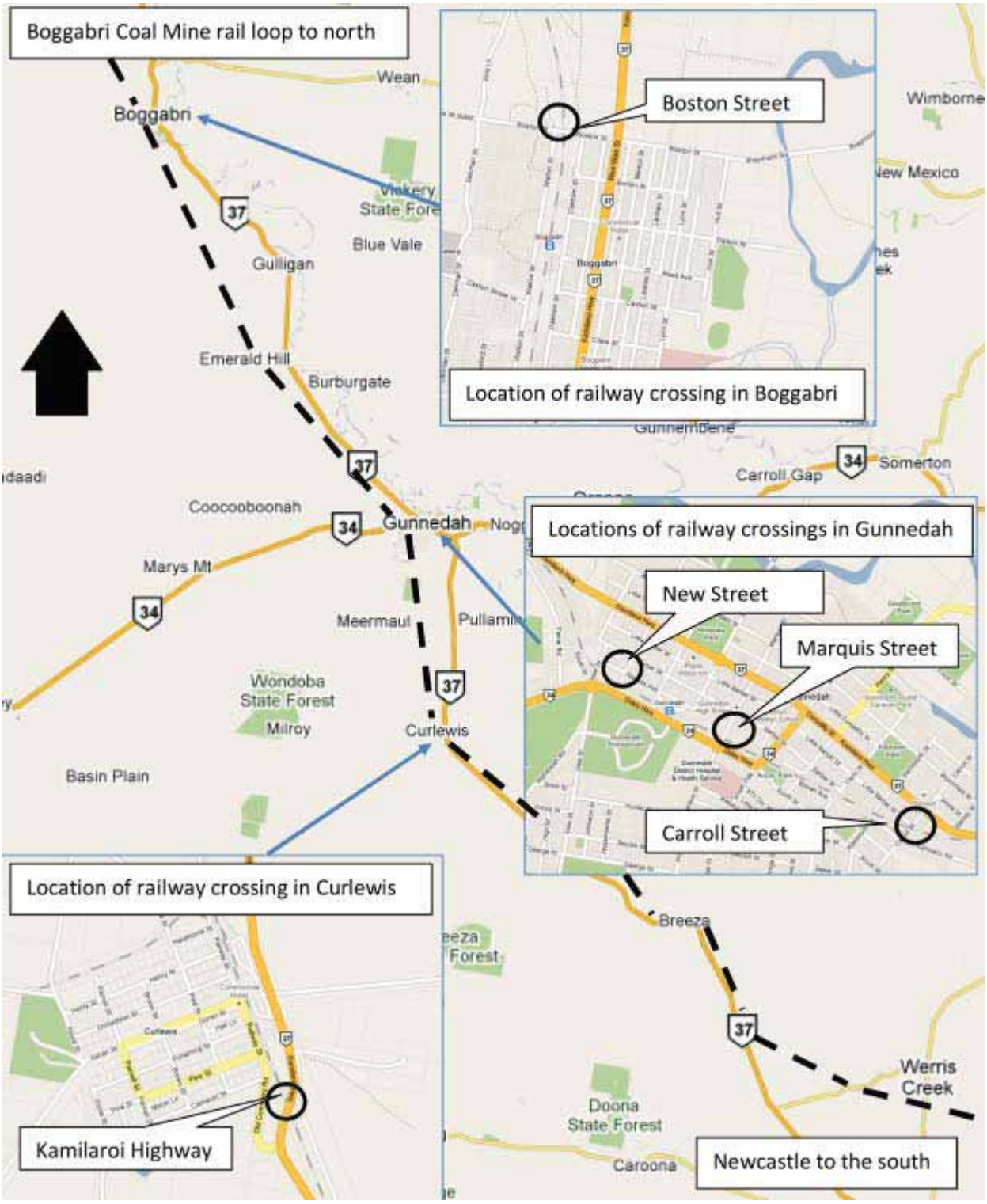


Figure 4.1 Location of studied level crossings

According to the *2009-2018 Hunter Valley Corridor Capacity Strategy – Consultation Document* (ARTC, 2009), the tonnage of coal that needs to be transported by rail, to the port of Newcastle is forecast to increase significantly over the next 10 years. The coal mines in the Gunnedah Basin are forecast to produce by 2018 up to:

- 30 Mtpa between Gunnedah the Boggabri
- 18 Mtpa between Boggabri and Narrabri.

The Boggabri Project, Maules Creek Coal Project and Tarrawonga Modification at could add up to:

- 7 Mtpa from the Boggabri Project
- 13 Mtpa from the Maules Creek Coal Project
- 2 Mtpa from the Tarrawonga Coal Project.

4.1 Existing (2010) train movements

The use of the single track rail line that connects Muswellbrook via Werris Creek with Narrabri and passes through Boggabri, Gunnedah and Curlewis is highly complex and includes trains transporting coal, grain, fuel, cotton and flour as well as CityRail and CountryLink passenger service. The *2009-2018 Hunter Valley Corridor Capacity Strategy – Consultation Document* (ARTC, 2009) reports the background movements of:

- 12 trains each way per day as far as Scone
- nine trains each way per day as far as Werris Creek
- seven trains each way to Gunnedah
- six trains each way to Narrabri.

There are no scheduled freight train services operating on the Northern Rail Corridor. The various mines, along with grain, cotton and livestock cooperatives, order trains to match demand for transporting their product to market. Likewise suppliers of bulk goods and fuel in the region arrange deliveries to suit their demand. Table 4.1 summarises the maximum daily train movements past the level crossing at Curlewis, Gunnedah and Boggabri.

Table 4.1 Train movements at level crossings in 2009

Train type	Boggabri (Boston Street)	Gunnedah (New Street)	Gunnedah (Marquis Street)	Gunnedah (Carroll Street)	Curlewis (Kamilaroi Highway)
General freight	6	6	12	12	12
Coal[1]	6	6	6	6	6
Passenger	2	2	2	2	2
Total	14	14	20	20	20

Note: 1. Boggabri Coal Mine currently requires on average approximately one coal train per day to transport the 1.5 Mtpa of product coal. This coal train passes all of the studied railway crossings twice a day, once in each direction.

4.2 Existing vehicle traffic

The *Boggabri Coal Mine Traffic impact Assessment (PB, 2009)* reports an estimated AADT of 2000 veh/day on the Kamilaroi Highway at the railway level crossing in Curlewis based on:

- the AADT published by the RTA in 2004 for the count site at this location
- a worst case traffic growth of approximately 1%.

PB undertook traffic counts on Tuesday 1 December 2009 and on Wednesday the 2 December 2009 at each of the five level crossing sites. At each of the level crossings in Boggabri and Gunnedah a half hour count was undertaken. At the level crossing on the Kamilaroi Highway in Curlewis a one hour count was undertaken. The number of vehicles and times of the counts are shown in Table 4.2.

Table 4.2 Number of vehicles recorded passing level crossing sites

Count site	Date	Times of day	Number of vehicles (both directions)	Number of vehicles used in Traffic Model (worst case)	Number of vehicles per day used in Traffic Model – AADT (worst case)
Boston Street, Boggabri	01/12/2009	4:00 pm to 4:30 pm	30	30	750
New Street, Gunnedah	01/12/2009	4:45 pm to 5:15 pm	8	30	750
Marquis Street, Gunnedah	02/12/2009	8:00 am to 8:30 am	2	30	750
Carroll Street, Gunnedah	02/12/2009	1:00 pm to 1:30 pm	4	30	750
Kamilaroi Highway, Curlewis	02/12/2009	10:00 am to 11:00 am	79	79	1975

The actual recorded traffic volumes in Gunnedah were considered low. The highest recorded traffic volume at the railway level crossing in Gunnedah and Boggabri was on Boston Street in Boggabri. However, despite these findings, highest traffic volumes in Gunnedah were used for modelling purposes to represent a worst case scenario. Up to 30 vehicles per half an hour travelling in both directions were adopted for traffic model (Table 4.2).

This is equivalent to 60 vehicles per hour or on average one vehicle every minute crossing railway level crossing during the peak period.

From this an AADT of 750 veh/day can be estimated based on:

- a typical rural PM peak hour factor of 8%
- doubling the half hour count to represent the hour.

This approach adopted for estimating the AADT volume from a half hour count should also be considered conservative and would likely over-estimate traffic volumes. However, for the purposes of providing a comparative assessment this approach is considered reasonable.

4.3 Forecast cumulative coal train movements Year 5 (2016)

ARTC recognise that the capacity of the rail network within the Gunnedah Basin will need to increase significantly to meet the demand of increased coal production from new and expanding coal mines in the area. ARTC have commited to increase rail capacity to match demand and will include measures such as:

- increasing the length of coal trains up to 1300 m (up to 72 wagons)
- increasing the tonnes per wagon from 100 tonnes to 120 tonnes
- constructing additional passing loops
- duplicating the existing single track line.

Assuming these upgrades have occurred by year 5 (2016) then the 22 Mtpa of coal to be transported to Newcastle could require on average up to 13.5 trains trips per day (each trip being a movement from an origin to a destination). Of these 3.5 train trips per day will be required for the Boggabri Project.

4.4 Forecast future traffic volumes Year 5 (2016)

Table 4.3 shows the future AADT traffic volumes for Year 5 (2016) which is when the Boggabri Project will reach its peak production capacity. The forecast AADT have been estimated for each of the level crossings and are based on traffic growth rates of 1%, 2% and 5%. The one percent growth rate is considered a worst case scenario with the higher growth rates used to provide a sensitivity test.

Table 4.3 Forecast AADT for Year 5 (2016)

Railway level crossing site	AADT (1% growth)	AADT (2% growth)	AADT (5% growth)
Boston Street, Boggabri	796	844	1005
New Street, Gunnedah	796	844	1005
Marquis Street, Gunnedah	796	844	1005
Carroll Street, Gunnedah	796	844	1005
Kamilaroi Highway	2123	2252	2680

4.5 Delay to vehicles at level crossings

A survey of delay to vehicles by trains at level crossings was undertaken on Tuesday 1 December 2009. This survey found that the delay to vehicles at a level crossing by a 1,200 m long coal train could be up to 450 seconds or 7.5 minutes.

For the purpose of this survey the delay for a 1,300 m long coal train has been estimated at 480 seconds or 8 minutes.

4.6 Forecast vehicle delays

Because coal trains are not scheduled to a set time table, this assessment has been based on the daily average number of delayed vehicles. During the peak hour traffic times the number of vehicles delayed could be greater and conversely during the off peak the number could be less. Coal trains also run over night when there are very few vehicles and these trains would cause very little delay to traffic.

Table 4.4 shows the average number of vehicles delayed by coal trains per day in Year 5 (2016) based on 1%, 2% and 5% traffic growth and on the following three scenarios:

- Scenario 1: Boggabri Coal Mine continues to produce up to 1.5 Mtpa product coal requiring an average of 1.2 coal train trips per day with an average delay per train of 7.5 minutes
- Scenario 2: The Continuation of Boggabri Coal Mine Project at up to 7 Mtpa product coal is approved with an average of 4.3 coal train trips per day (an additional 3.1 coal train trips) with an average delay per train of 8 minutes
- Scenario 3: The worst case cumulative impact scenario from Continuation of the Boggabri Coal Project and the Other Projects producing up to 22 Mtpa product coal requiring an average of 13.5 coal train trips per day with an average delay per train of 8 minutes.

Table 4.5 shows the average number of estimated vehicles delayed per train per day at each of the level crossings for the above traffic growth rates and development scenarios. The average number of delayed vehicles per train was calculated by dividing the vehicles delayed per day by the number of train trips.

Table 4.4 Forecast average number of delayed vehicles[1] per day by Year 5 (2016)

Railway level crossing site	Scenario 1: Without development			Scenario 2: Boggabri Project			Scenario 3: With Continuation of Boggabri and Other Projects		
Traffic growth rate	1%	2%	5%	1%	2%	5%	1%	2%	5%
Boston Street, Boggabri	5	6	7	14	15	17	60	63	75
New Street, Gunnedah	5	6	7	14	15	17	60	63	75
Marquis Street, Gunnedah	5	6	7	14	15	17	60	63	75
Carroll Street, Gunnedah	5	6	7	14	15	17	60	63	75
Kamilaroi Highway, Curlewis	13	14	17	38	40	48	159	169	201

Note: number of vehicles includes vehicles in both directions rounded to the nearest whole number.

Table 4.5 Forecast average number of vehicles delayed at each level per day for each passing train by Year 5 (2016)

Railway level crossing site	Scenario 1: Without development			Scenario 2: Boggabri Project			Scenario 3: With Continuation of Boggabri and Other Projects		
Traffic growth rate	1%	2%	5%	1%	2%	5%	1%	2%	5%
Boston Street, Boggabri	4	4	5	4	5	6	5	5	6
New Street, Gunnedah	4	4	5	4	5	6	5	5	6
Marquis Street, Gunnedah	4	4	5	4	5	6	5	5	6
Carroll Street, Gunnedah	4	4	5	4	5	6	5	5	6
Kamilaroi Highway, Curlewis	11	12	14	12	13	15	14	15	17

4.7 Cumulative traffic impact at rail crossings

The analysis of impact on traffic associated with the increased number of coal train trips that could result from the worst case cumulative impact scenario from Continuation of Boggabri and the Other Projects shows that:

- the impact on traffic, at the studied level crossing at Boston Street, Boggabri and New Street, Marquis Street and Carroll Street in Gunnedah, would be minimal. This is because the volume of vehicles using these roads is low and the traffic volume is unlikely to increase significantly in the near future. Therefore, few vehicles will be delayed by the additional coal train trips. On average, the worst case scenario would potentially increase coal trains delay to traffic by an additional 60 vehicles at each of the crossings daily or approximately 5 vehicles per train. All the roads on approaches to the studied level crossings have capacity to accommodate these delayed vehicles. This potential impact could be minimised if the majority of coal trains were travelling outside of high traffic peak times e.g. at night

- impact on traffic on the Kamilaroi Highway in Curlewis would also be minimal. Again, this is because the traffic volumes of the Kamilaroi Highway are relatively low. The worst case cumulative scenario could potentially cause additional coal trains to delay up to 159 vehicles per day or approximately 14 vehicles per train. The Kamilaroi Highway has space to accommodate these delayed vehicles. This potential impact could be minimised if the majority of coal trains were travelling outside of high traffic peak times e.g. at night.

5. Limitations

The Other Projects are constructed from a combination of published information and from the author's speculation as described above.

The results of this assessment are therefore speculative, qualitative in nature and should not be relied upon to predict accurate environmental impacts.

This is not a fully quantitative report created using the normal scientific methodology for preparing formal environmental assessments in the context of a known, detailed project (because project descriptions of the Other Projects are speculative). Detailed traffic modelling incorporating the Other Projects has not been undertaken as part of this assessment.

However, quantitative information has been used where possible. The methodology is sound. However, base data relies on assumptions (described above) and not on legal commitments inherent in approved conditions or obligations.

6. Conclusions

The traffic impact assessments found that:

- the worst case cumulative impact scenario for traffic volumes generated by the Boggabri Project and Other Projects would be unlikely to have any significant impact on the performance or safety of the local road network

- the worst case cumulative impact scenario from the increased number of trains needed for the proposed maximum product coal up to 22 Mtpa from the Boggabri Project and Other Projects would be unlikely to have a significant impact on the level crossings in Boggabri, Gunnedah and Curlewis.

The traffic performance of all the key intersections would remain excellent. The worst performing would be the Leard Forest Road/Boggabri Mine Access Road intersection (which is a private access) with DoS of 0.3 and a LoS B in both the AM and PM peak hour periods.

Traffic safety is unlikely to be significantly affected by the increased cumulative traffic volumes. The majority of the studied road network has a low crash record (good crash history). Some crashes occurred on the Kamilaroi Highway to the north of the Kamilaroi Highway/Manilla Road intersection. However, only a small proportion, approximately 20%, of the increased traffic will use this section of the road network. Therefore the potential increase in crashes due to the Other Projects is small.

No public transport services were identified in the vicinity of the Boggabri Project that would be adversely impact by the simultaneous operation of the Other Projects.

The worst case cumulative traffic impact scenario at level crossings on the Mungindi to Merriwa Railway in Boggabri, Gunnedah and Curlewis would not be significant. The increase in the number of trains, from an average of 1.2 coal train trips per day to transport 1.5 Mtpa of coal from the existing Boggabri Coal Mine up to 13.5 coal train trips per day to service the 22 Mtpa from the Continuation of the Boggabri Coal Mine and Other Projects would increase the daily delay to traffic at these crossings. However, because existing traffic volumes are low and coal trains often run over night when traffic volumes are lower still the impact of the increase in trains is likely to be small.

While some road users may notice additional delays at level crossings due to an increase in rail movements, it should be noted that the capacity of the road network to accommodate these delays is sufficient.

7. References

The following references have been used in the preparation of this Addendum to the Boggabri Coal Mine Traffic Impact Assessment:

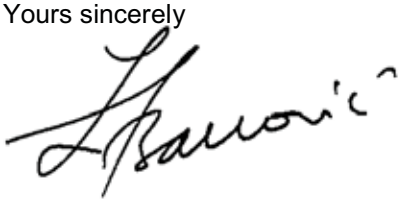
- Boggabri Coal Mine Traffic Impact Assessment (PB, 2009)

- Aston Resources Maules Creek Coal Project Preliminary Environmental Assessment (Hansen Bailey, 2009)

- 2009 – 2018 Hunter Valley Corridor Capacity Strategy Consultation Document (ARTC, 2009)

- Cumulative Impacts – A good practice guide for the Australian Coal Mining Industry (ACARP, 2010)
- Tarrawonga Coal Mine Modification Environmental Assessment (Whitehaven Coal, 2010)
- East Boggabri Joint Venture Environmental Impact Statement Proposed East Boggabri Coal Mine (R.W. Corkery & Co. Pty Ltd)
- Guide to Traffic Generating Developments (RTA, 2002).

Yours sincerely



Zoran Bakovic
Principal Traffic Engineer
Parsons Brinckerhoff Australia Pty Limited