

Appendix L

Traffic and transport study



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Warkworth Continuation 2014 and Mount Thorley Operations 2014

Traffic and transport study

Prepared for Warkworth Mining Limited and Mt Thorley Operations Pty Limited | 2 June 2014



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Warkworth Continuation 2014 and Mount Thorley Operations 2014

Final

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Date 2 June 2014

Date 2 June 2014

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Table of Contents

Chapter 1	Introduction	1
1.1	Overview	1
1.2	Mount Thorley Operations EIS	1
1.2.1	Background	1
1.2.2	Proposal description	2
1.3	Warkworth Continuation 2014	3
1.3.1	Background	3
1.3.2	Proposal description	3
1.4	Road and rail transport implications for the proposal	4
Chapter 2	Existing road traffic operations	7
2.1	Site location	7
2.2	Road network	7
2.2.1	Description of roads	7
2.2.2	Site access intersections	9
2.2.3	Major road intersections	9
2.3	Traffic volumes	19
2.3.1	Daily traffic volumes	19
2.3.2	Peak hourly traffic volumes	21
2.3.3	Proportions of heavy vehicles in traffic	22
2.4	Intersections	22
2.5	Mine traffic generation	24
2.5.1	Car and other light vehicle traffic	24
2.5.2	Truck traffic	25
2.5.3	Construction traffic	26
2.6	Car parking	26
2.7	Public transport	26
2.8	Pedestrians and cycling	26
2.9	Road safety	27
2.10	Coal transport operations	27
Chapter 3	Road traffic impact assessment	29
3.1	External traffic movements	29
3.1.1	Traffic impacts on road networks	29
3.1.2	Traffic impact at intersections	30
3.2	Impacts of the Wallaby Scrub Road traffic detour	33
3.2.1	Traffic impacts to the road network	36
3.2.2	Traffic detour impacts at intersections	37
3.2.3	Increased travel times and distances for detoured traffic	38

Table of Contents *(Cont'd)*

3.3	Road safety	38
3.4	Car parking	39
3.5	Public transport access	39
3.6	Pedestrian and cyclist access	39
3.7	Cumulative impacts	39
3.7.1	Traffic impacts to the road network	39
3.7.2	Traffic impacts at intersections	40
Chapter 4	Coal transport impact assessment	41
4.1	Introduction	41
4.2	Hunter Valley rail transport capacity	41
4.3	Rail transport of product coal	42
4.4	Assessment of rail transport	42
4.4.1	Capacity of the rail line	42
4.4.2	Assessment of rail safety	44
Chapter 5	Mitigation and management measures	45
5.1	Road transport mitigation measures	45
5.2	Rail transport mitigation measures	45
Chapter 6	Summary and conclusion	47
References		49

Appendices

A	Tube traffic count surveys
B	Intersection traffic surveys
C	SIDRA intersection analysis results
D	Origin Destination traffic surveys
E	Rural Fire Service response - Wallaby Scrub Road

Tables

2.1	Summary of base daily traffic volumes from surveys on the regional road network	19
2.2	Summary of peak hourly traffic at Golden Highway and Mitchell Line Road	21

Tables

2.3	Summary of peak hourly traffic at Broke Road and MTO CPP access	21
2.4	Summary of peak hourly traffic at Putty Road and Warkworth Mine access	22
2.5	Intersection level of service standards	23
2.6	Peak hour SIDRA performance at key intersections (including current mine traffic)	23
2.7	Locations and current shift working arrangements of the project workforce	24
2.8	Summary of current maximum hourly and daily workforce car traffic movements	25
3.1	Proportional impact of the mine generated traffic on external roads	30
3.2	Summary of year 2017 peak hour performance at intersections	32
3.3	Comparison of Wallaby Scrub Road 2010 and 2014 OD traffic survey results	35
3.4	Proportional impact of the Wallaby Scrub Road traffic on alternative routes	36

Figures

1.1	Regional location of the proposal	5
1.2	The proposal	6
2.1	Locations of access to the mine facilities from surrounding roads	8
2.2	Location of intersections	10
2.3	Location of project tube traffic surveys	11
2.4	Access Roads to Warkworth Mine	12
2.5	Access road to MTO CHPP area	13
2.6	Access roads to MTO car park and MTCL	14
2.7	Location of MTCL and other coal loading loops on the Hunter Valley Rail Network	28
3.1	Wallaby Scrub Road closure traffic detour routes	34
4.1	Forecast growth in rail transport volumes and Newcastle port capacity	43
4.2	Forecast growth in transport volumes on sections of the Hunter Valley main line	43

Photographs

2.1	Golden Highway/Mitchell Line Road intersection looking east	15
2.2	Golden Highway/Mitchell Line Road intersection looking west	15
2.3	Golden Highway/Broke Road intersection looking east	16
2.4	Golden Highway/Broke Road intersection looking west	16
2.5	Putty Road/Warkworth Access (Lydes Lane) intersection looking west	17

Photographs

2.6	Putty Road/Warkworth Access (Lydes Lane) intersection looking east	17
2.7	Broke Road/MTO CHPP access intersection looking south	18
2.8	Broke Road/MTO CHPP access intersection looking north	18

1 Introduction

1.1 Overview

EMGA Mitchell McLennan Pty Limited (EMM) was engaged by Coal & Allied Operations Pty Limited (Coal & Allied) to undertake an assessment of traffic and transport impacts due to the Mount Thorley Operations (MTO) 2014 and Warkworth Continuation 2014 mining proposals.

Warkworth Mine and MTO function as an integrated operation and share the use of a number of resources and infrastructure. This includes a joint workforce and management team. This traffic and transport impact assessment has therefore been based on the combined projects (the proposal). This assessment forms part of the environmental impact statement (EIS) for each project.

It is important to note that the employee traffic generated by Warkworth Mine and MTO on external public roads will not change under the proposal as there will be no changes to the combined project workforces. Truck traffic generated will also generally remain at similar levels. All product coal is either transported by rail or conveyor currently from the two mine Coal Handling and Preparation (CHPP) plants. The volumes and methods of product coal transported from the mines will remain as per the current operations.

1.2 Mount Thorley Operations EIS

1.2.1 Background

MTO is an open cut coal mine approximately 10.5 kilometres (km) south-west of Singleton in the Hunter Valley, NSW, and is shown in Figure 1.1. The mine is operated by Coal & Allied on behalf of Mount Thorley Joint Venture (MTJV). The site currently operates under Development Consent No. DA 34/95 (the MTO development consent) issued by the then Minister for Planning on 22 June 1996 under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

Immediately to the north is Warkworth Mine. Since 2004, the two mines have integrated at an operational level and are known as Mount Thorley Warkworth (MTW), with a single management team responsible for all the operations. Equipment, personnel, water, rejects and coal preparation are all shared between the mines. The MTW operations involve an existing operation of approximately 1,300 persons, which includes full-time personnel and a small number of short-term contractors. Ownership of the two mines remains separate.

Mining activities approved under DA 34/95 have mostly been completed with the exception of Loders Pit and Abbey Green North Pit (AGN) with rehabilitation well-progressed on the east of the site. Run-of-mine (ROM) coal from MTO is transported to either the MTO or Warkworth Mine coal preparation plant (CPP) for processing. Extraction of coal from other pits has been completed; overburden emplacement is ongoing. Product coal from the CPPs is transported via conveyor or haul road to the Mount Thorley Coal Loader (MTCL). Coal loaded onto trains at the MTCL is transported to the Port of Newcastle for export.

The proposal at MTO seeks an approval under Part 4, Division 4.1 of the EP&A Act to complete mining and rehabilitation activities within the current limits of approval.

1.2.2 Proposal description

MTO has approval to mine until 22 June 2017 under its development consent. The proposal seeks a 21 year development consent period from the date of any approval. If approval is granted in 2015, operations at MTO are forecast to continue to the end of 2035, an 18 year extension over the current approval. The proposal seeks a continuation of all aspects of MTO as it presently operates and extends or alters them, including:

- mining in Loders Pit and AGN Pit. Mining in Loders Pit is expected to be completed in approximately 2020. Mining in AGN Pit is yet to commence; however, it is anticipated to take approximately two years and be completed before 2022;
- transfer of overburden between MTO and Warkworth Mine to assist in rehabilitation and development of the final landform;
- maintain existing extraction rate of 10 million tonnes per year (Mtpa) of ROM coal;
- maintain and upgrade to the integrated MTW water management system (WMS), including:
 - upgrade to the approved discharge point and rate of discharge into Loders Creek from 100ML/d to 300ML/d via the Hunter River Salinity Trading Scheme (HRSTS);
 - ability to transfer and accept mine water from neighbouring operations (ie Bulga Coal Complex, Wambo Mine, Warkworth Mine and Hunter Valley Operations); and
 - increase in the storage capacity of the southern out-of-pit (SOOP) dam from 1.6 giga litres (GL) to 2.2GL;
- maintain and upgrade to the integrated MTW tailings management:
 - including use of the northern part of Loders Pit as a TSF after completion of mining; and
 - Wall lift to Centre Ramp Tailings Facility to approximately RL150;
- upgrade to the MTO CPP to facilitate an increase in maximum throughput to 18Mtpa with the ability to receive this coal from Warkworth Mine;
- acknowledge all approved interactions with Bulga Coal Complex; and
- continuation of coal transfer between Warkworth Mine and MTO and transportation of coal via the MTCL to Port of Newcastle.

All activities, including coal extraction will be within disturbance areas approved under the existing development consent. The proposal is shown in Figure 1.2.

1.3 Warkworth Continuation 2014

1.3.1 Background

Warkworth Mine is an open cut coal mine approximately 8 km south-west of Singleton in the Hunter Valley, NSW, and is shown in Figure 1.1. The mine is operated by Coal & Allied on behalf of Warkworth Mining Limited (WML). The site currently operates under Development Consent No. DA 300-9-2002-i (the Warkworth Mine development consent) issued by the then Minister for Planning in May 2003 under Part 4 of the EP&A Act. The site also operates under two separate Commonwealth approvals (*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)): EPBC 2002/629 and EPBC 2009/5081.

Warkworth Mine has been in operation since 1981 and the originally approved operation has been modified several times. Immediately to the south of Warkworth Mine is MTO. As noted in Section 1.2.1, the two mines have integrated at an operational level; however, ownership remains separate.

Warkworth Mine currently operates three integrated open cut mining areas, namely North, West and South pits with West and North pits being the focus of production. ROM coal from Warkworth Mine is transported to either the Warkworth or Mount Thorley CPP for processing. Product coal from the CPPs is transported via conveyor to either the MTCL or to the Redbank Power Station. Coal loaded onto trains at the MTCL is transported to the Port of Newcastle for export.

The proposal at Warkworth Mine seeks an approval under Part 4, Division 4.1 of the EP&A Act to extend mining beyond the current limits.

1.3.2 Proposal description

Warkworth Mine has approval to operate until 19 May 2021 under its development consent. The proposal seeks a 21 year development consent period from the date of any approval. If approval is granted in late 2014, operations at Warkworth Mine are forecast to continue to 2035, a 14 year extension over the current approval. The proposal seeks a continuation of all aspects of Warkworth Mine as it presently operates together with:

- an extension of the approved mining footprint by approximately 698ha to the west of current operations (referred to herein as the proposed 2014 extension area);
- the ability to transfer overburden to MTO to complete MTO's final landform;
- the closure of Wallaby Scrub Road;
- an option to develop an underpass beneath Putty Road for the third bridge crossing yet to be constructed (while retaining the current approval for an overpass);
- minor changes to the design of the Northern out-of-pit (NOOP) dam; and
- the continued use of secondary access gates to the mine site and offsets for activities such as drilling, offset management, equipment shutdown pad access amongst other things.

The proposal is shown in Figure 1.2.

1.4 Road and rail transport implications for the proposal

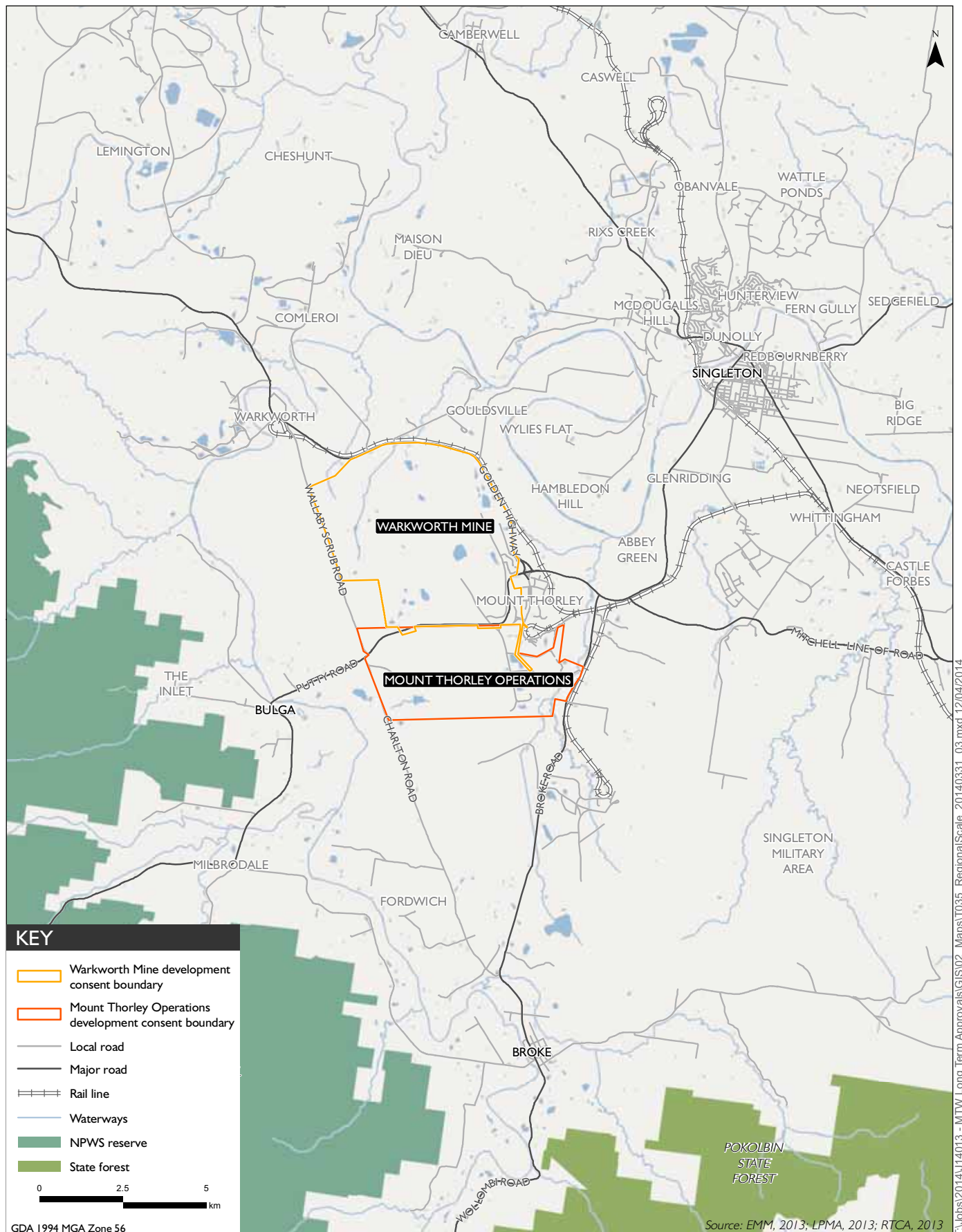
This report assesses the future transport network impacts of the proposal, in accordance with the project Department of Planning and Environment Secretary's requirements for the EIS.

The capacity and performance of the relevant road and rail transport networks are assessed including the effects of the closure of Wallaby Scrub Road, with reference to the most recent road and intersection capacity standards in the *Guide to Road Design* (Austroads 2010) and the Hunter Valley rail network capacity review (ARTC 2013).

Background information reviewed included the previous traffic impact assessments (TIA) and road safety investigations undertaken by Parsons Brinkerhoff in 2010 for the Warkworth Mine Extension Project, and the Bulga Optimisation Project TIA (ARC Traffic + Transport with Transport and Urban Planning 2013). Relevant current information from these documents regarding the road network, intersection operations and traffic safety implications were used to inform this assessment.

The structure of the report is based on the *Guide to Traffic Generating Development* (RTA 2002), which is the standard RMS template for the preparation of traffic impact studies for major projects.

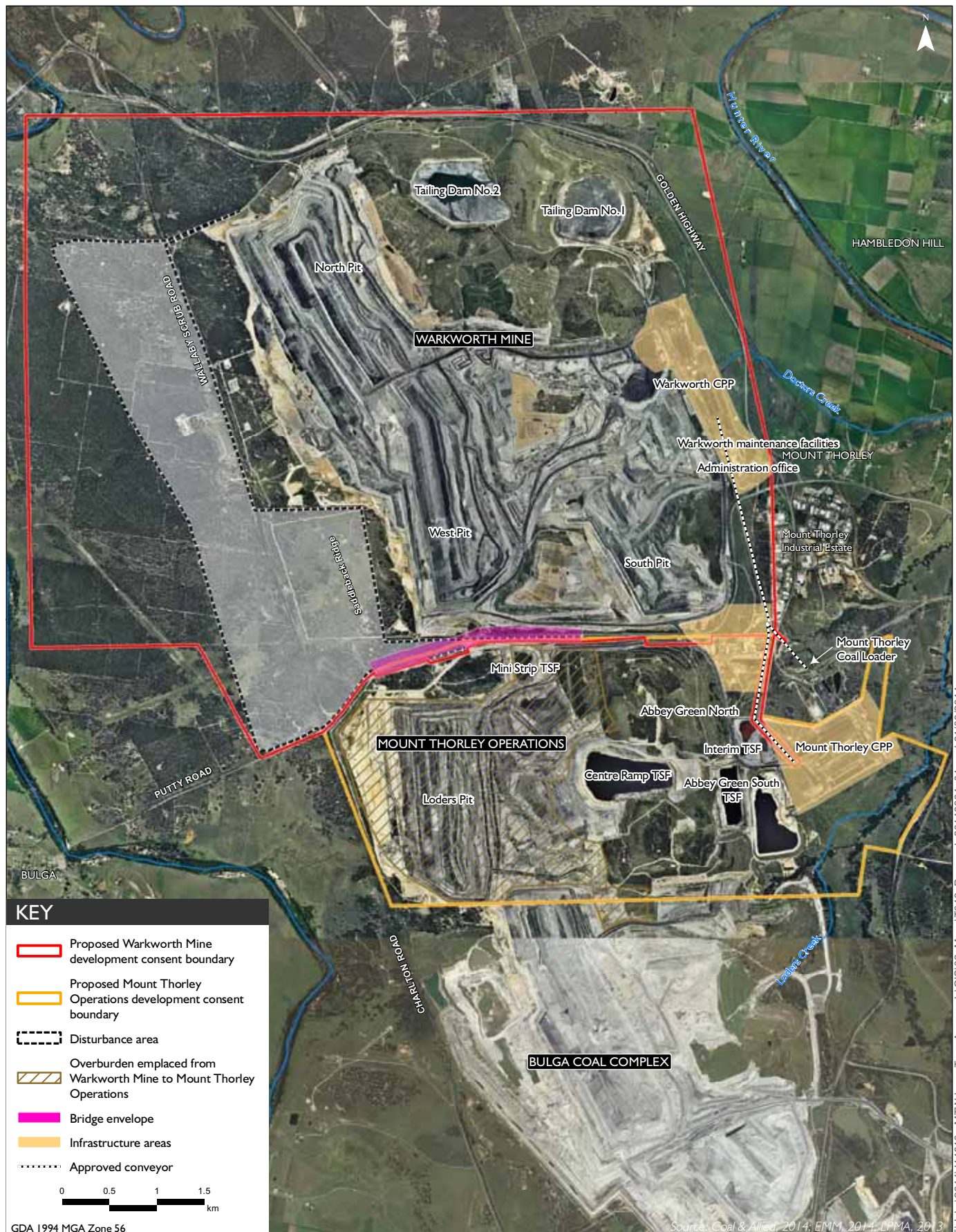
To enable a thorough and detailed assessment, this TIA includes analysis of the current base year traffic conditions in 2014, traffic in the first full year of project operation (2017) following the closure of Wallaby Scrub Road and a cumulative traffic assessment (also in the year 2017) including the closure of Wallaby Scrub Road and forecast mine construction employment at the nearby Bulga Optimisation Project.



Regional location of the proposal

Mount Thorley Warkworth - Continuation of Mining Operations
Traffic Impact Assessment

Figure I.1



2 Existing road traffic operations

2.1 Site location

The MTW mining operations are on the southern (MTO) and northern (Warkworth) sides of Putty Road, west of Mount Thorley Industrial Estate, and east of the village of Bulga. The locality of the mining operations and the surrounding roads is illustrated in Figure 2.1.

2.2 Road network

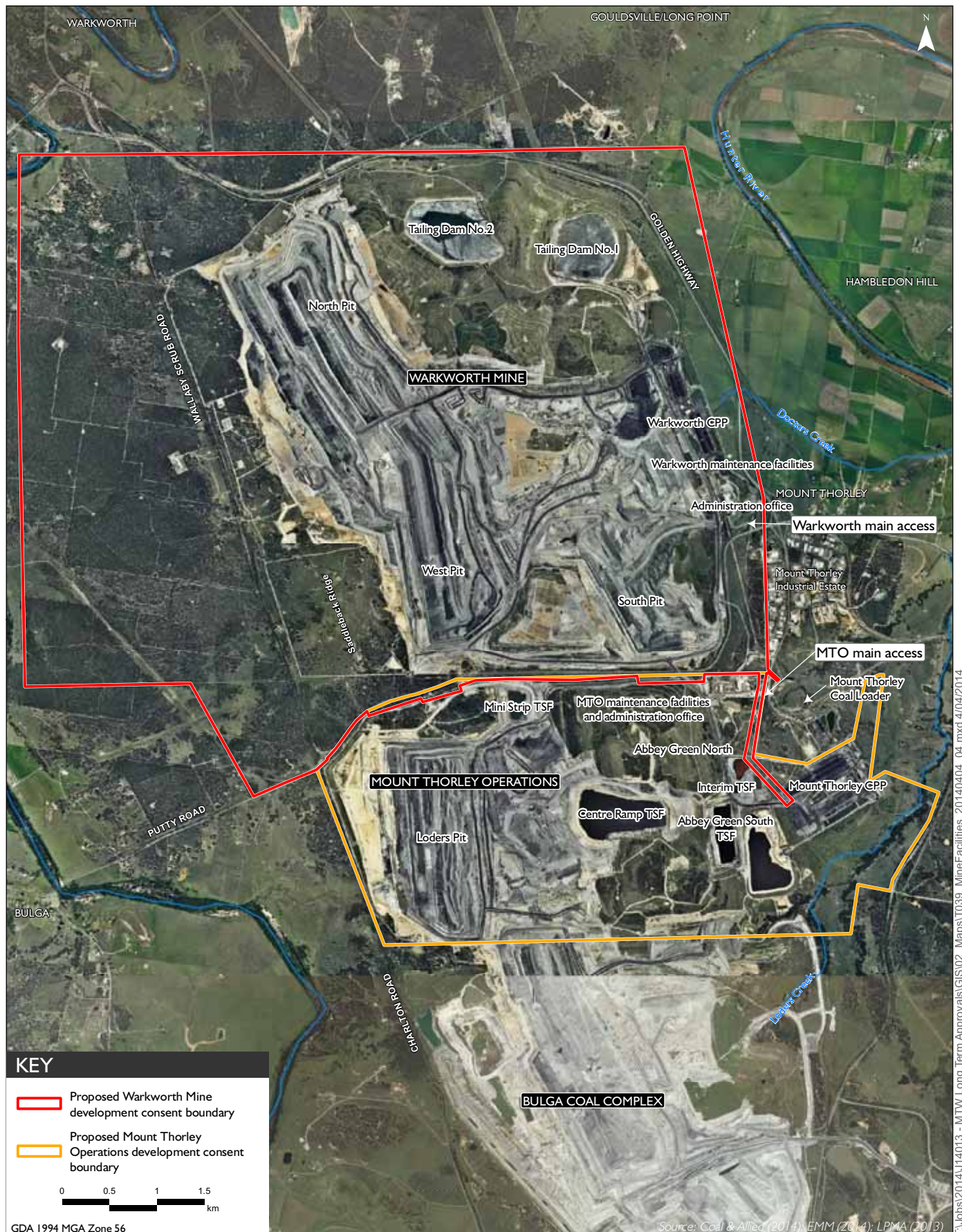
2.2.1 Description of roads

The primary access route for most of the MTW project-related traffic in the Mount Thorley area, is the Golden Highway east of Mount Thorley. Approximately 80 percent of the current and proposed MTW traffic movements will be travelling in this direction, either to or from Singleton, or Maitland and the other Hunter Valley townships further to the east.

A site inspection and photographic survey of the existing mine access intersections, internal car parking areas and the surrounding local road network, including the Golden Highway, Putty Road and other routes was undertaken by EMM on 20 March 2014. The existing traffic lanes widths and configuration/traffic controls at all the major intersections on the surrounding road network were observed and existing road pavement surface conditions noted.

The regional and local transport routes in the vicinity of the project area are depicted in Figure 1.1 and Figure 2.1 and described below.

- Golden Highway – A national road freight route linking the Hunter Region with the central inland regions of NSW. The route is generally a two-lane two-way road with a posted speed limit of 100 km/hr, except where horizontal and vertical alignment requires this to be reduced to 80 km/hr. The roadway is generally constructed to a ‘major rural highway’ design standard, with marked centre and edge lines and sealed shoulders which typically have a minimum width of 1 m or 2 m in many locations.
- Putty Road – Generally an undivided 100 km/hr sealed road which runs between the townships of Singleton in the Hunter Valley and Windsor on the northern outskirts of Sydney. In the vicinity of Mount Thorley, Putty Road shares a section of the route of the Golden Highway, between the intersections with Mitchell Line of Road and Mt Thorley Interchange. To the west Putty Road passes through the village of Bulga, where there is a 60 km/hr speed limit, and continues through generally hilly and mountainous terrain for the remainder of the route towards Windsor.
- Broke Road – An important local road which connects the Golden Highway to the village/settlement of Broke and continues towards the townships of Cessnock and Wollombi via either Broke-Cessnock Road or Wollombi Road. The road also provides the main vehicular access to mining operations at Bulga Coal Mining Complex, where access intersections are a further 3 - 5 km south of the Mount Thorley CPP access intersection. Broke Road is generally a two-lane two-way road with a posted speed limit of 100 km/hr.



Locations of access to the mine facilities from surrounding roads

Mount Thorley Warkworth - Continuation of Mining Operations
Traffic Impact Assessment

Figure 2.1

- Charlton and Wallaby Scrub Roads are both two lane rural roads which link the Golden Highway near Wambo with Broke Road approximately 3 km north of Broke village. The route crosses Putty Road approximately 3 km east of Bulga village. These roads generally have 100 km/hr speed limits and variable road pavement width and conditions, such that the edge and centre lines are not typically marked.
- Mount Thorley Road is an industrial road which provides access to the Mount Thorley Industrial Estate and connects to the Golden Highway and Putty Road as the fourth leg of the Mount Thorley Interchange intersection. The road pavement is generally constructed to a wide 'industrial road' standard. The road has a relatively straight and level alignment and speed limit of 60 km/hr at the northern end and also in the vicinity of MTO and the MTCL access at the southern end.

2.2.2 Site access intersections

The main vehicular access routes to the mine facilities are via three intersections:

- from Putty Road, at Lydes Lane, approximately 200 m west of the Mount Thorley Interchange (west side).
- from Broke Road, approximately 2 km south of the Golden Highway.
- from Mount Thorley Road, at the southern end, near the location of the MTCL rail loop.

The majority (80 percent) of the existing MTW workforce resides in the east and travel via the Golden Highway and Putty Road or Mitchell Line of Road routes which connect to Singleton and other Hunter Valley townships. The remainder of the current MTW workforce generally travels from the west via Putty Road, the north via the Golden Highway, and the south via Broke Road with proportions of approximately 7 percent, 8 percent and 5 percent, respectively.

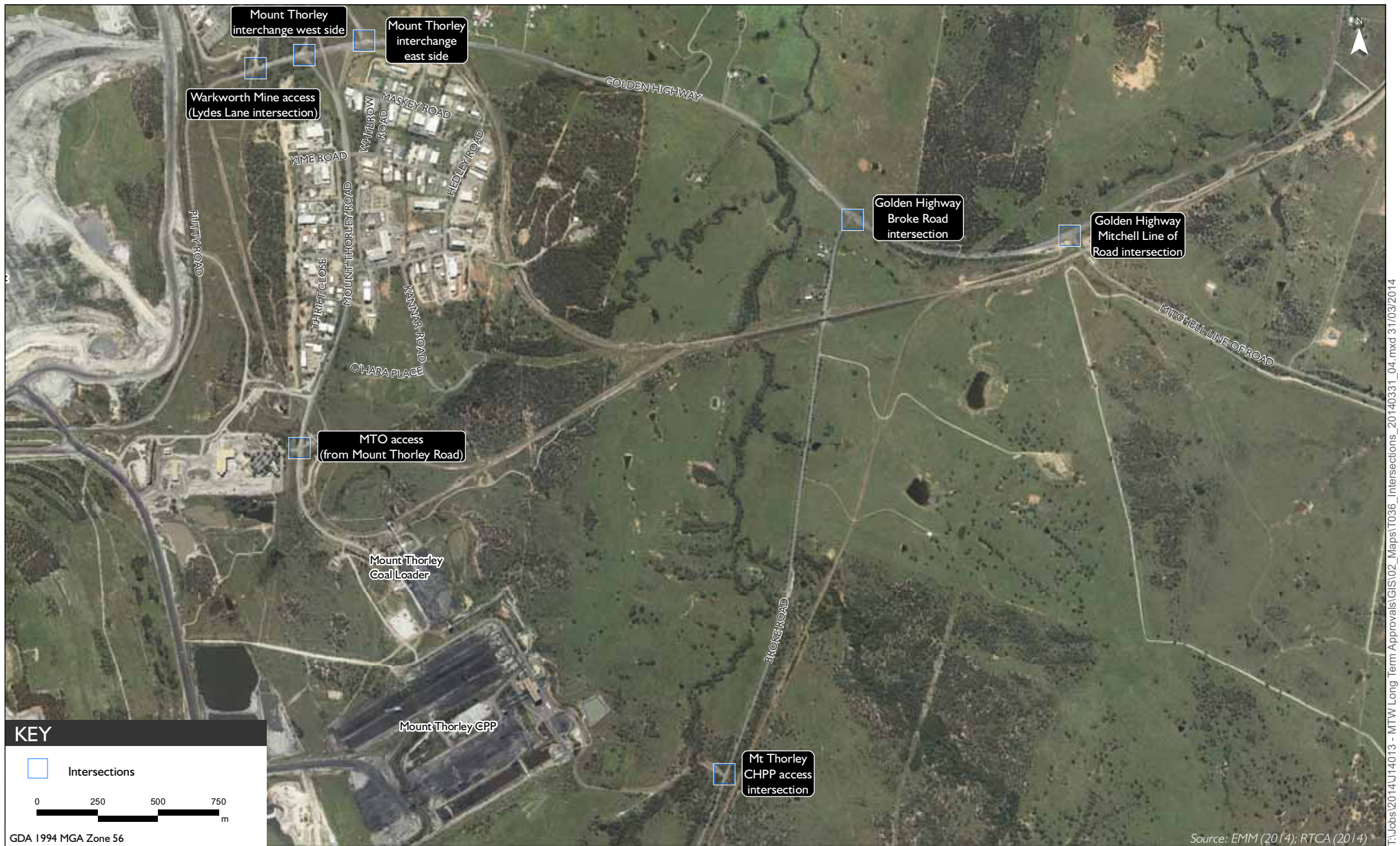
Morning and afternoon peak hour intersection traffic surveys were undertaken between 6.00 to 9.00 am and 3.00 to 6.00 pm on Tuesday 4 March 2014 at the locations shown in Figure 2.2, which include the two mine access intersections from Putty Road and Broke Road which provide the main vehicular access routes and parking for mining employees currently. Daily traffic volume surveys were also undertaken at two locations on the Golden Highway and on Wallaby Scrub Road as shown in Figure 2.3.

Photographs 2.1 to 2.8 illustrate the existing road network at the major road and mine access intersections. The internal car parking areas and truck movement areas are served by roads connecting to these intersections and the Mount Thorley Road intersection (not shown).

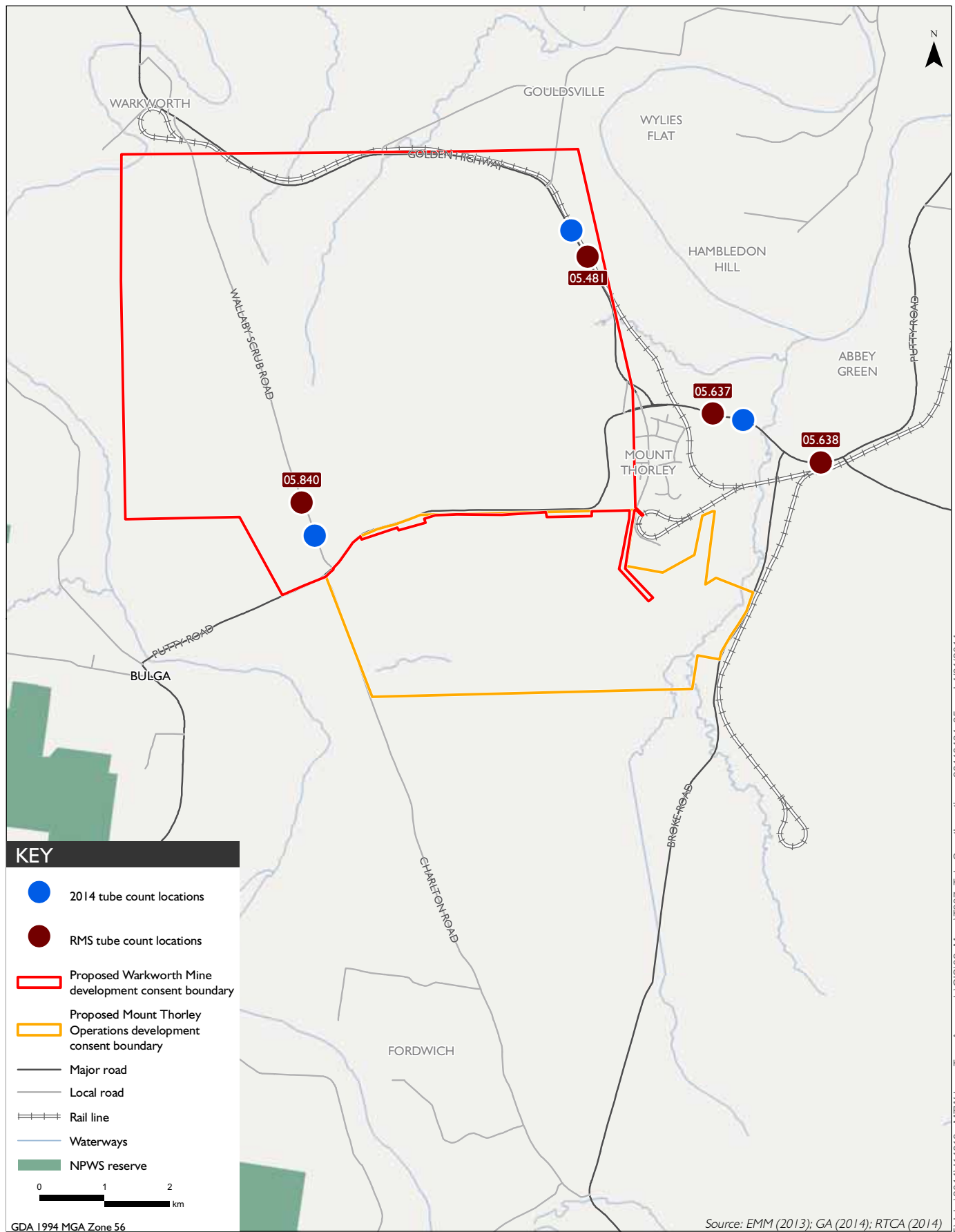
2.2.3 Major road intersections

There are four major road intersections potentially affected by traffic generated under the proposal:

- Golden Highway/Mitchell Line Road;
- Golden Highway Mount Thorley Interchange intersection (west side);
- Golden Highway Mount Thorley Interchange Intersection (east side); and
- Golden Highway/Broke Road.



Location of intersections
 Mount Thorley Warkworth - Continuation of Mining Operations
 Traffic Impact Assessment
 Figure 2.2









T:\lbs\2014\14013 - MTW Long Term Approvals\GIS02_Maps\T045_CoalLoaderLoop_20140328_02.mxd 31/03/2014



Photograph 2.1 **Golden Highway/Mitchell Line Road intersection looking east**



Photograph 2.2 **Golden Highway/Mitchell Line Road intersection looking west**



Photograph 2.3 Golden Highway/Broke Road intersection looking east



Photograph 2.4 Golden Highway/Broke Road intersection looking west



Photograph 2.5 Putty Road/Warkworth Access (Lydes Lane) intersection looking west



Photograph 2.6 Putty Road/Warkworth Access (Lydes Lane) intersection looking east



Photograph 2.7 **Broke Road/MTO CHPP access intersection looking south**



Photograph 2.8 **Broke Road/MTO CHPP access intersection looking north**

Since 2010, three locality intersections have been upgraded by the RMS, addressing key issues identified by previous traffic studies (Parsons Brinkerhof, 2010).

- At the Golden Highway/Broke Road intersection (Figure 2.2 and Photographs 2.3 and 2.4), a 'seagull' type intersection has been established to provide a dedicated right hand turning lane into Broke Road and a merging lane for traffic turning right from Broke Road.
- At the Mount Thorley interchange west side intersection (Figure 2.2), dedicated turning lanes have been established westbound on Putty Road for through and right turning traffic.
- At the Mount Thorley interchange east side intersection (Figure 2.2), a dedicated through traffic lane has been established eastbound on Putty Road to improve merging with the traffic from the Golden Highway.

At the Golden Highway/Broke Road and Golden Highway/Mitchell Line Road intersections, which are east of Mount Thorley and are constructed to a high design standard, but not grade separated, there are potential future traffic capacity impacts from the proposal which require detailed assessment.

2.3 Traffic volumes

2.3.1 Daily traffic volumes

Daily traffic volume surveys were undertaken for this study between Tuesday 4 March and Tuesday 11 March 2014 at the locations shown in Figure 2.3. The survey results are in Appendix A. The historic Roads and Traffic Authority (RTA), now Roads and Maritime Services (RMS), daily traffic volumes surveyed between the years 1980 and 2004 are also summarised in Appendix A.

The historic growth in the RMS daily traffic volumes from 1984 to 2004 including other recent surveys which were undertaken in 2009 and 2011 for the Warkworth Extension 2010 Project (PB, 2010) and the Bulga Optimisation Project TIA (ARC 2013) and the future base year traffic growth projections for the Golden Highway and other traffic routes for the years 2014 and 2017, are summarised in Table 2.1.

Table 2.1 Summary of base daily traffic volumes from surveys on the regional road network

RTA- RMS location ref	Route and nearest cross street	Year 1984	Year 1998	Year 2001	Year 2002	Year 2004	Year 2009	Year 2011	Year 2014	Percent annual traffic growth from surveys	Future trend volume in Year 2017 ¹
05.481	Golden Highway (north of Putty Road at Mount Thorley)	4,200	6,256	7,059	-	5,572	-	-	3,314	-	3,512 ²
05.637	Golden Highway (between Broke Road and Mount Thorley)	5,180	-	-	-	-	-	-	8,346	+1.2%	8,847

Table 2.1 Summary of base daily traffic volumes from surveys on the regional road network

RTA-RMS location ref	Route and nearest cross street	Year 1984	Year 1998	Year 2001	Year 2002	Year 2004	Year 2009	Year 2011	Year 2014	Percent annual traffic growth from surveys	Future trend volume in Year 2017 ¹
05.638	Golden Highway (between Broke Road and Mitchell Line of Road)	5,160	7,164	7,966	-	8,143	-	9,355	9,860 ³	+1.7%	10,452
05.840	Wallaby Scrub Road (between Golden Highway and Putty Road)	-	-	-	660	-	777	-	875	+2.0%	928

Note:

1. The traffic growth projections for the current base years 2014 and 2017 are calculated using linear traffic growth projections, including for the period 2014 to 2017, a growth rate of +2 percent annually (the highest rate observed from the traffic surveys in previous years).
2. The +2 percent per annum future traffic growth projection is still assumed to apply to this route despite negative actual growth in recent years (since 2001).
3. The year 2014 daily traffic volume between Broke Road and Mitchell Line of Road has been estimated from comparison of the Golden Highway peak hourly traffic flows east and west of the Broke Road intersection.

Sources: RMS, PB (2010), ARC (2013) and EMM (2014).

Although there has been a gap in the regular sequence of the RTA/RMS traffic surveys between 2004 and the more recent 2009, 2011 and 2014 daily traffic surveys, these surveys can determine the historic traffic growth rates for these roads which are calculated as an annual growth rate projection from the current year 2014 and are also shown in Table 2.1.

The daily traffic volumes on the Golden Highway route north of Putty Road (RTA-RMS location 05.481) have declined in recent years after reaching a peak of over 7,000 vehicles in 2001. Consequently no historic traffic growth rate is calculated for this location in Table 2.1.

The historic traffic growth rates for the three survey locations which are shown in Table 2.1, show a range of traffic growth rates between +1.2 percent and +2.0 percent annually. The higher end of this range of traffic growth rate (+2.0 percent annually) has been used for projecting forward the current base year 2014 daily traffic volumes to 2017 at all the locations shown in Table 2.1. Also, in Chapter 3 of this TIA, the future Year 2017 intersection peak hourly traffic assessments for the Golden Highway and other roads have used this future traffic growth rate, which provides a conservative assumption for the proposal's traffic impact analysis.

The Hunter Expressway opened on 22 March 2014. Over time, the Expressway will influence regional traffic patterns. These effects cannot be quantified at this time. However, the expressway will potentially provide a faster, more direct and safer route linking the M1 Motorway with the Upper Hunter, which will be available to some drivers previously using the Wallaby Scrub Road and Charlton Road route, prior to this date.

2.3.2 Peak hourly traffic volumes

Peak hour intersection traffic counts were undertaken on Tuesday 4 March 2014 at three intersections:

- the Golden Highway/Mitchell Line of Road intersection;
- the Warkworth mine access intersections with Putty Road (Lydes Lane); and
- the MTO mine access intersection with Broke Road.

The locations of these intersections are shown on Figure 2.2. The detailed traffic count results are included in Appendix B.

The peak hourly traffic volumes on the local road network and the proportions of heavy vehicles in traffic which were surveyed by these intersection traffic counts are summarised in Tables 2.2 – 2.4.

The morning and afternoon traffic peak hours at intersections in the vicinity of Mount Thorley occur relatively early (at 6.15 am – 7.15 am and 3.30 pm – 4.30 pm, typically) and are influenced by the shift changes at a number of locality mining operations including MTW, HVO, Wambo and Bulga and the locality industrial employment at Mount Thorley industrial area.

Table 2.2 Summary of peak hourly traffic at Golden Highway and Mitchell Line Road

Road	Direction	Morning peak hour (6.15 am -7.15 am)			Afternoon peak hour (3.30 pm - 4.30 pm)		
		All traffic	Heavy vehicles	Percent heavy*	All traffic	Heavy vehicles	Percent heavy*
Mitchell Line of Road (south of Golden Highway)	N'bound	537	28	5	73	14	8
	S'bound	172	10		338	20	
Golden Highway (west of Mitchell Line Road)	E'bound	328	17	5	704	31	7
	W'bound	944	42		212	32	
Golden Highway (east of Mitchell Line Road)	E'bound	172	7	4	384	11	5
	W'bound	423	14		157	18	

Note: * % Heavy vehicle traffic is the average proportion based on the traffic flow in both directions.

Table 2.3 Summary of peak hourly traffic at Broke Road and MTO CPP access

Road	Direction	Morning peak hour (6.15 am -7.15 am)			Afternoon peak hour (3.15 pm - 4.15 pm)		
		All traffic	Heavy vehicles	Percent heavy*	All traffic	Heavy vehicles	Percent heavy*
Mount Thorley CPP access (west of Broke Road)	E'bound	2	0	0	22	0	0
	W'bound	12	0		0	0	
Broke Road (south of CPP access Road)	N'bound	123	5	4	140	5	5
	S'bound	246	11		100	6	
Broke Road (north of CPP access Road)	N'bound	123	5	4	159	5	4
	S'bound	256	11		97	6	

Note: * percent heavy vehicle traffic is the average proportion based on the traffic flow in both directions.

Table 2.4 Summary of peak hourly traffic at Putty Road and Warkworth Mine access

Road	Direction	Morning peak hour (6.15 am -7.15 am)			Afternoon peak hour (3.30 pm - 4.30 pm)		
		All traffic	Heavy vehicles	Percent heavy*	All traffic	Heavy vehicles	Percent heavy*
Warkworth Mine access (north of Putty Road)	N'bound	101	4	2	8	0	4
	S'bound	111	0		73	3	
Putty Road (west of Warkworth Mine access)	E'bound	38	2	4	31	1	8
	W'bound	12	0		48	5	
Putty Road (east of Warkworth Mine access)	E'bound	139	1	2	102	4	6
	W'bound	103	3		54	5	

Note: * percent heavy vehicle traffic is the average proportion based on the traffic flow in both directions.

2.3.3 Proportions of heavy vehicles in traffic

At the Golden Highway and Mitchell Line Road intersection the proportions of heavy vehicles in traffic during the morning and afternoon peak hourly periods are 4 - 5 percent and 5 – 8 percent, respectively.

At the Mount Thorley CPP access road/Broke Road intersection, the proportions of heavy vehicles on Broke Road are generally 4 - 5% during both the morning and afternoon peak hourly traffic periods.

At the Warkworth Mine access road/Putty Road intersection the proportions of heavy vehicles in traffic during the two peak hourly traffic periods are 2 - 4 percent and 4 - 8 percent, respectively.

2.4 Intersections

The performance of a road network is generally reflected in the performance of key intersections. The Signalised (and Unsignalised) Intersection Design Research Aid (SIDRA) traffic analysis program was used to assess the existing and future traffic capacity at the two mine access intersections and two major road intersections which require detailed traffic assessment for the proposal (ie the Warkworth Mine access (Lydes Lane)/ Putty Road intersection, Mount Thorley CHPP access road/Broke Road, Golden Highway/Broke Road and Golden Highway/Mitchell Line Road).

The peak hour traffic performance of intersections is quantified in terms of 'level of service' and 'degree of saturation'. Level of service is an index of the operation of traffic at an intersection and is based on the average delay per vehicle. The current RMS intersection operation standards for level of service are summarised in Table 2.5. Degree of saturation provides an overall measure of the capability of the intersection to accommodate the traffic levels. A degree of saturation of 1.0 indicates that an intersection is operating at capacity. A satisfactory degree of saturation is considered to be 0.90 or lower at traffic signal controlled intersections and 0.80 or lower at other intersections.

The SIDRA analysis results for the morning and afternoon peak hour base traffic situation for the year 2014, for the four intersections which require assessment under the proposal are summarised in Table 2.6.

Table 2.5 Intersection level of service standards

Level of service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Priority intersection ('Stop' and 'Give Way')
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: Guide to Traffic Generating Development (RTA 2002).

Table 2.6 Peak hour SIDRA performance at key intersections (including current mine traffic)

Intersection	Peak Hour Period	Degree of Saturation	Average Delay (seconds/vehicle)	Level of Service
Golden Highway/Mitchell Line of Road/ Putty Road	Morning peak hour (6.15 am - 7.15 am)	0.700	20.6	B
	Afternoon peak hour (3.30 pm - 4.30 pm)	0.270	19.0	B
Golden Highway/Broke Road*	Morning peak hour (6.15 am - 7.15 am)	0.386	31.6	C
	Afternoon peak hour (3.30 pm - 4.30 pm)	0.369	16.5	B
Broke Road/MTO CPP Access	Morning peak hour (6.15 am - 7.15 am)	0.138	12.5	A
	Afternoon peak hour (3.15 pm - 4.15 pm)	0.074	12.5	A
Putty Road/Warkworth Mine access	Morning peak hour (6.15 am - 7.15 am)	0.093	12.9	A
	Afternoon peak hour (3.30 pm - 4.30 pm)	0.063	13.0	A

Note * The current peak hour intersection traffic volumes have been determined from volumes at the two adjoining intersections.

The detailed intersection analysis results from the SIDRA analysis, including the existing intersection lane configurations are included in Appendix C.

Three of the four assessed intersections are currently operating at very good conditions (level of service either A or B), with minimal traffic delays. The highest degrees of saturation occur at the Golden Highway/Mitchell Line of Road intersection (0.700) and are associated with the potentially limiting future capacity for the westbound left turn movement from Mitchell Line of Road during the morning peak hour.

This traffic has to merge with a similarly high traffic flow which is travelling from the Singleton direction towards Mount Thorley as a result of the numerous mining and industrial employment locations in the area, including mining projects at Bulga, Wambo, Mount Arthur and further north.

The Golden Highway/Broke Road intersection is currently operating with acceptable traffic delays which are level of service C. The right turn traffic delays are higher than at the Golden Highway/Mitchell Line of Road intersection (over 30 seconds per vehicle) although the maximum intersection degree of saturation is lower.

The RMS intersection operation standards, Table 2.5, indicate that with level of service C intersection operations, an accident study should be undertaken. However as significant intersection upgrading works have only relatively recently been completed by RMS at this intersection (since 2010) a further accident study is not required at the current time.

2.5 Mine traffic generation

2.5.1 Car and other light vehicle traffic

The current maximum mining workforce at MTW is 1,300 persons of whom approximately 25 percent are office/business employees, 65 percent are day or night shift operations workforce and 10 percent are contractors.

The majority of the workforce is currently based at Warkworth Mine where 80 percent of the combined mining workforce facilities and car parking activity is located. The current MTW based workforce numbers are greatest during the daytime when day shift and office/business staff are present. The typical weekday on - site workforce and contractor numbers (FTE) at both sites are summarised in Table 2.7.

Table 2.7 Locations and current shift working arrangements of the project workforce

Location	Day/night shift operations ¹ (7.00 am to 7.00 pm and 7.00 pm to 7.00 am)	Office and business (7.00 am to 3-6.00 pm)	Contractors (various times)	Total employed workforce
Mount Thorley	169 (approximately 85/day)	65	26	260
Warkworth	676 (approximately 338/day)	260	104	1,040
Total	845 (approximately 423/day)	325	130	1,300

Notes: 1. Approximately half of the shift operations workforce would be on-site, split over two shifts (day and night), in any 24 hour period.

The combined maximum number of employees and contractors who will be travelling to and from work at MTW in any given 24 hour period will be 878 persons (comprised of 423 day/night shift operations staff, 325 office/business staff and 130 contractors). The maximum potential daily car traffic movements which would be generated by this workforce would be a maximum of 1,756 car movements. These traffic movements will generally be travelling either inbound to or outbound from MTW employment locations at different times of the day, as summarised in Table 2.8.

Table 2.8 Summary of current maximum hourly and daily workforce car traffic movements

Time period	Operations in	Office in	Contractors in	Operations out	Office out	Contractors out
5 am - 6 am	-	-	-	-	-	-
6 am - 7 am	212	-	10	-	-	5
7 am - 8 am	-	325	20	211	-	5
8 am - 9 am	-	-	10	-	-	10
9 am - 10 am	-	-	10	-	-	10
10 am - 11 am	-	-	10	-	-	10
11 am - 12 pm	-	-	5	-	-	10
12 pm - 1 pm	-	-	5	-	-	5
1 pm - 2 pm	-	-	5	-	-	5
2 pm - 3 pm	-	-	5	-	-	10
3 pm - 4 pm	-	-	10	-	130	20
4 pm - 5 pm	-	-	10	-	130	10
5 pm - 6 pm	-	-	10	-	65	10
6 pm - 7 pm	211	-	10	-	-	10
7 pm - 8 pm	-	-	5	212	-	5
8 pm - 9 pm	-	-	5	-	-	5
9 pm - 10 am	-	-	-	-	-	-
Total	423	325	130	423	325	130

Although the actual daily site employee car movements would generally be lower than the numbers listed in Table 2.8, due to employee car sharing, site visitors would potentially increase traffic movements, such that the overall total daily and hourly site car traffic movements will still be similar to the numbers listed in Table 2.8.

2.5.2 Truck traffic

i Public roads

The external road transport of mining supplies and other consumables for the mine operations and maintenance activities, usually generates approximately 40 truck and other service vehicle deliveries each weekday (80 movements), mainly via delivery routes using main roads between the mines and either Singleton, Maitland or Newcastle.

ii Private roads

Extensive internal coal haulage is undertaken using the internal private roads within and between the two mines which transport the run of mine coal to CPP facilities and also transfer overburden material within and between Warkworth Mine and MTO.

Two private road crossings of Putty Road already exist for these movements and a third is proposed to be constructed under the proposal.

2.5.3 Construction traffic

Future construction activities at MTW will effectively be part of the continuation of normal mining operations along with ongoing maintenance activities.

These activities include mining equipment upgrades, modifications to existing surface infrastructure and the construction of an underpass or a bridge (already approved) over Putty Road.

Traffic associated with these upgrades, including contractor vehicles and truck traffic, are considered part of MTW's normal operational traffic movements, similar to those which are occurring currently.

2.6 Car parking

The onsite car parking areas are generally located adjacent to the main administration buildings approximately 150 m from Putty Road (for Warkworth Mine) and 200 m from Mount Thorley Road (for MTO). During the peak car parking period (during morning shift changeover) approximately 240 cars and 80 cars are parked in the main Warkworth Mine and MTO car parks, respectively. These car parks, which are shown on Figures 2.4 – 2.6 have proven to be adequate to meet current peak parking demand.

Other smaller car parking areas are located within MTW for mine employees and contractors who are specifically based at certain infrastructure (eg at the Warkworth and MTO CPPs).

2.7 Public transport

The locality of MTW is remote from regular public transport services. The nearest railway station is Singleton approximately 8 km from MTW.

There are no local public bus services, other than school buses, operating along Putty Road in the locality of Mount Thorley.

Coach services between Newcastle and Dubbo operate via the Golden Highway through this area. However these services are not generally concurrent with the mine shift workforce start and finish times.

Existing public transport services in the locality are considered unlikely to be a suitable commuting option for most MTW employees.

2.8 Pedestrians and cycling

The travel distances between MTW and the nearest residential areas make walking or cycling generally difficult options for commuter travel. Although this type of travel is generally rare in the locality, a small number of MTW employees do occasionally commute by cycling.

2.9 Road safety

Intersection traffic safety and sight distances were observed by EMM during the 20 March 2014 site visit. The Intersection traffic safety and sight distances are considered good at all the intersections potentially affected by the proposal.

The high design standard of the Golden Highway in the locality of Mount Thorley (with marked centre lines and sealed shoulders on all sections) provides a comparatively higher standard of travel safety for traffic using this route in comparison to other roads in the area (eg Wallaby Scrub Road, Charlton Road, Broke Road and Putty Road).

2.10 Coal transport operations

The product coal transport operations for the proposal utilise rail transport for export via the Port of Newcastle using the Mount Thorley (Whittingham) branch line. The location of the Whittingham branch line in relation to the overall Hunter Valley rail network used for coal transport is shown in Figure 2.7.

On the Whittingham branch line there are three coal loading loops which serve the mines at Bulga, MTW, United and Wambo. At MTO there are two coal loading points (MTCL 1 and MTCL 2) which serve the Warkworth CPP and Mount Thorley CPP conveyor loading systems. An additional coal loop on the Whittingham branch line at the Hunter Valley Operations South mine has also been approved but is not yet constructed.

The capacity of the Whittingham branch line (which is single track) is adequate for the current usage (ARTC, 2013). The primary future constraint to this rail line capacity is generally the availability of coal train paths at Whittingham junction where the branch line meets with the Hunter Valley main line, south of Singleton. The railway junction capacity has been improved by the Minimbah Bank Third Rail Project in 2010. The proposed future ARTC coal transport operations for the Whittingham branch line are discussed further in Chapter 4.

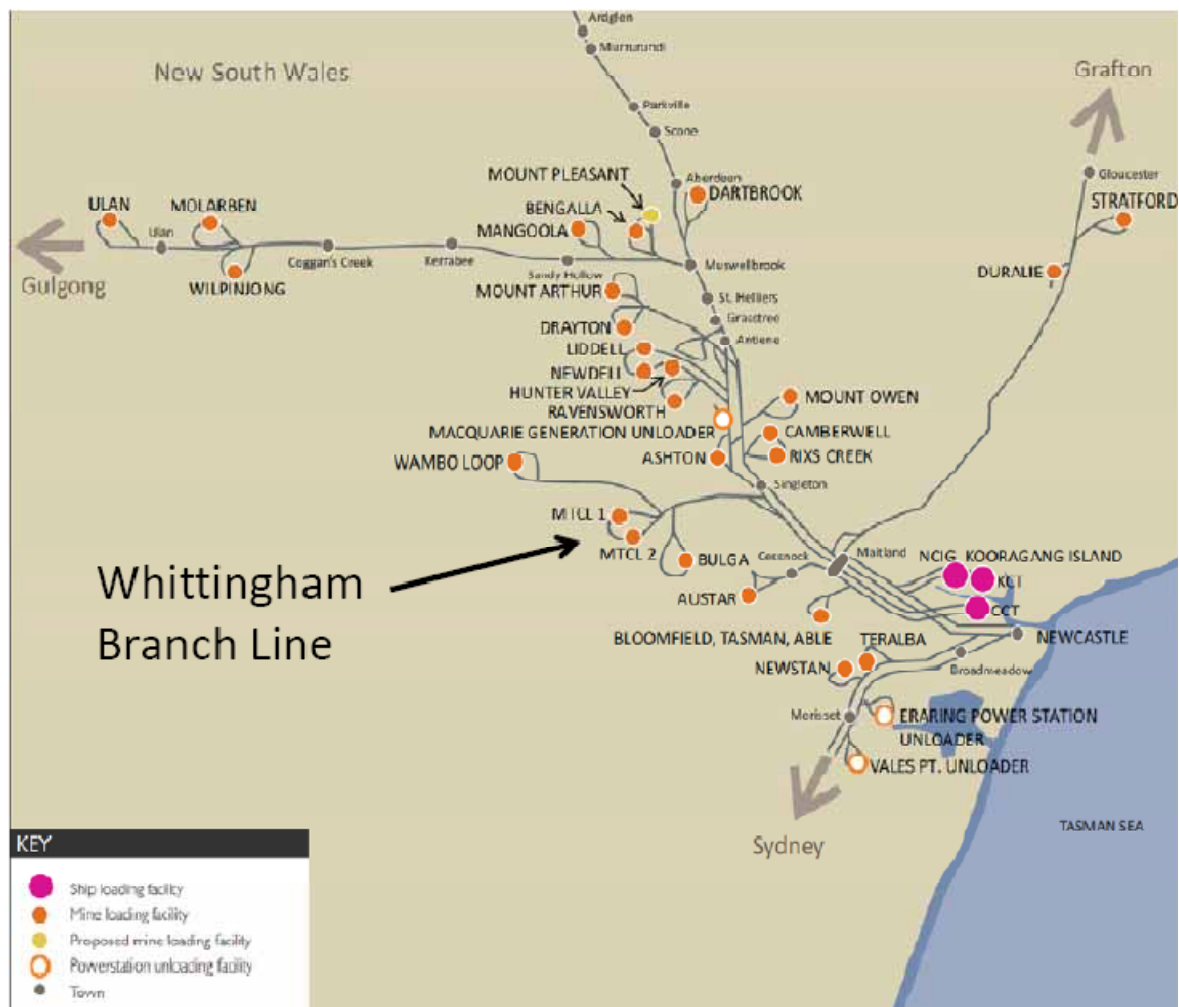


Figure 2.7 Location of MTCL and other coal loading loops on the Hunter Valley Rail Network

3 Road traffic impact assessment

3.1 External traffic movements

Workforce traffic movements for the MTW project on the public road network will not change under the proposal. The current MTW workforce of approximately 1,300 persons, is indicative of future employment levels throughout the proposal period. With the substantial proportion of the workforce employed on a rotating shift basis, the typical maximum number of persons travelling to and from MTW each weekday will remain at approximately 878. The corresponding maximum hourly and daily traffic movements for this workforce over a typical weekday are summarised in Table 2.8.

Approximately 80 daily truck movements are currently generated on public roads by MTW operations (40 truck deliveries each day for maintenance and other activities). This will also not change under the proposal.

Up to 1,756 vehicle movements daily for workforce and site visitor traffic, with up to 80 vehicle movements daily of heavy vehicle traffic, will continue to be generated by MTW operations in future years. This traffic (1,836 daily vehicle movements in total) will be distributed over the surrounding road network in the following general proportions.

- 42 percent total daily vehicle movements to and from the east via Singleton (771 vpd).
- 38 percent total daily vehicle movements to and from the east via other routes (698 vpd).
- 8 percent total daily vehicle movements to and from the west via Putty Road (147 vpd).
- 7 percent total daily vehicle movements to and from the north via Golden Highway (128 vpd).
- 5 percent total daily vehicle movements to and from the south via Broke Road (92 vpd).

3.1.1 Traffic impacts on road networks

The road and intersection traffic surveys for this assessment were undertaken shortly before the Hunter expressway was opened on 22 March 2014. Over time, the expressway will be likely to generate changes to regional traffic patterns. These cannot be quantified currently. However the expressway will provide a faster and safer route for the longer distance traffic travelling between the M1 Motorway and some Upper Hunter locations which will be available to drivers currently using the Wallaby Scrub Road and Charlton Road routes.

The current road network traffic impacts of the proposal are quantified in Table 3.1 in terms of the typical percentage contribution of the MTW generated daily traffic volumes towards the current total daily vehicle traffic movements in early March 2014, at locations on the external roads which correspond to the historic RTA/RMS traffic survey locations shown Figure 2.3 and other locality roads.

The MTW generated daily and hourly car traffic volumes, which are summarised in Table 2.8, will not generally change with the proposal. However other traffic volumes on the surrounding roads will generally change in future years due to either continuing background traffic growth or other changes to the road network such as the closure of Wallaby Scrub Road.

On most major roads in the locality, including sections of the Golden Highway and Putty Road routes, the current MTW daily traffic movements which are shown in Table 3.1 represent between 11 – 22 percent of the total daily traffic movements in March 2014.

On other roads, such as Broke Road and the Golden Highway route north of Mount Thorley, MTW has a lesser contribution to the existing traffic flows, representing only 3 – 4 percent of the total daily traffic movements in March 2014.

Table 3.1 Proportional impact of the mine generated traffic on external roads

RTA-RMS location ref	Road location	Current daily traffic volume (year 2014)	Daily traffic movements generated by MTW	Proportion of current daily traffic volume generated by MTW
05.481	Golden Highway (north of Putty Road at Mount Thorley)	3,314	128	3.8 percent
05.637	Golden Highway (between Broke Road and Mount Thorley)	8,346	1,561	18.7 percent
05.638	Golden Highway (between Broke Road and Mitchell Line of Road)	9,860 (2014 estimate)*	1,469	14.9 percent
N/A	Mitchell Line of Road (south of the Golden Highway and Putty Road)	5,958 (2014 estimate)*	698	11.7 percent
N/A	Broke Road (south of the Mount Thorley CHPP access road intersection)	3,240 (2014 estimate)*	92	2.8 percent
N/A	Putty Road (west of the Warkworth Mine access towards Bulga Village)	686 (2014 estimate)*	147	21.4 percent

Notes: *The actual daily traffic volumes in 2014 were surveyed at the two locations shown on the Golden Highway and on Wallaby Scrub Road. The daily traffic volumes for the other routes were determined from comparisons of the peak hourly intersection traffic volumes using these roads and the Golden Highway at the two surveyed locations.

The effects of the proposal's heavy vehicle traffic movements on the roads shown in Table 3.1 are not currently significant as the MTW generated heavy vehicle traffic movements (which are approximately 80 vehicle movements daily) currently represent between 4 and 5 percent of the total MTW generated daily traffic. These proportions of heavy vehicle traffic are similar to the proportions of heavy vehicles in other traffic which is currently using these roads. There is correspondingly, no disproportionate heavy vehicle generated traffic usage from the MTW activity on surrounding roads. The major roads in the area (eg the Golden Highway) have generally been constructed to carry large volumes of heavy vehicle traffic, so no adverse future heavy vehicle related traffic impacts are anticipated for the MTW related truck traffic using these roads.

3.1.2 Traffic impact at intersections

Detailed traffic impact assessment was undertaken for the intersections potentially affected by the MTW project traffic, which are primarily the two mine access intersections on major roads and two intersections along the Golden Highway route east of Mount Thorley.

The Golden Highway/ Broke Road intersection was previously identified as an intersection likely to require upgrading in the Warkworth Extension 2010 traffic impact assessment (Parsons Brinkerhof 2010). This intersection has been upgraded since 2010 by the construction of the 'seagull type' acceleration lane, which is shown in Photographs 2.3 – 2.4. This improvement has substantially improved the peak hour intersection traffic delays (previously level of service F, now level of service C) and has removed the significant traffic capacity constraint for the major road network in the area which previously existed at this location.

At the two Mount Thorley interchange intersections on the eastern and western sides, dedicated through and right hand turning traffic lanes have also recently been provided for both eastbound and westbound traffic on the Putty Road route to improve the merging and queuing traffic capacity at these intersections.

At the Golden Highway/Mitchell Line Road intersection which is further to the east towards Singleton, the recent traffic impact assessment for the Bulga Optimisation Project (ARC 2013) has identified the intersection as potentially requiring upgrading as a combined result of mining traffic growth and general locality traffic growth on the Golden Highway route through the area. Future potential project traffic impacts (including cumulative traffic impacts) have therefore been considered at this intersection in this assessment.

Three base year and future year traffic scenarios have been defined and evaluated for this traffic impact assessment including the current base year (2014), traffic in the first full year of project operation (2017) following the closure of Wallaby Scrub Road and a cumulative traffic assessment (also in the year 2017) which includes the closure of Wallaby Scrub Road and forecast mine employment at the nearby Bulga Optimisation Project.

These future year traffic impact assessments have also considered the likely additional locality background traffic growth from other sources during the assessment period. However, the effects of the Hunter Expressway, which opened on 22 March 2014, cannot be quantified at this time.

The predicted future background traffic growth which has been included up to the year 2017 in the SIDRA intersection assessments has been +2 percent per annum. This rate corresponds to the higher end of the range of recent recorded traffic growth rates on the major road network shown in Table 2.1. The future (year 2017) peak hour traffic operations at four intersections have been analysed using the SIDRA intersection model for the following future traffic scenarios.

- Scenario 1 – Year 2017 traffic situation including base network traffic growth on the external road network at +2 percent annually.
- Scenario 2 – Year 2017 traffic situation including base network traffic growth on the external road network at +2 percent annually and the detoured traffic from the proposed closure of Wallaby Scrub Road at relevant intersections.
- Scenario 3 – Year 2017 traffic situation including base network traffic growth on the external road network at +2 percent annually at relevant intersections, the detoured traffic from the proposed closure of Wallaby Scrub Road and the additional year 2017 construction traffic movements from a workforce of 25 persons at the Bulga Optimisation Project (eg this traffic does not affect the Warkworth Mine access intersection from Putty Road).

The year 2017 SIDRA intersection analysis results are included in detail in Appendix C and summarised in comparison to the current year 2014 intersection analysis results in Table 3.2.

Table 3.2 Summary of year 2017 peak hour performance at intersections

Intersection	Peak hour period	SIDRA parameter	Base year (2014)	Future traffic scenario 1	Future traffic scenario 2	Future traffic scenario 3
Golden Highway/ Mitchell Line of Road/ Putty Road)	Morning peak hour (6.15 am - 7.15 am)	Dos	0.700	0.766	0.766	0.781
		Delay	20.6	22.5	22.5	23.1
		Los	B	B	B	B
	Afternoon peak hour (3.30 pm - 4.30 pm)	Dos	0.270	0.289	0.289	0.296
		Delay	19.0	19.5	19.5	19.7
		Los	B	B	B	B
Golden Highway/Broke Road (Paynes Crossing Road)	Morning peak hour (6.15 am - 7.15 am)	Dos	0.386	0.409	0.409	0.409
		Delay	31.6	34.1	34.6	34.9
		Los	C	C	C	C
	Afternoon peak hour (3.30 pm - 4.30 pm)	Dos	0.369	0.397	0.412	0.448
		Delay	16.5	17.1	18.2	18.5
		Los	B	B	B	B
Broke Road/Mount Thorley CHPP Access	Morning peak hour (6.15 am - 7.15 am)	Dos	0.138	0.145	0.150	0.156
		Delay	12.5	13.4	13.6	13.6
		Los	A	A	A	A
	Afternoon peak hour (3.15 pm - 4.15 pm)	Dos	0.074	0.078	0.086	0.093
		Delay	12.5	13.2	13.3	13.3
		Los	A	A	A	A
Putty Road/Warkworth Mine Access	Morning peak hour (6.15 am - 7.15 am)	Dos	0.093	0.093	0.095	0.095
		Delay	12.9	12.9	12.9	12.9
		Los	A	A	A	A
	Afternoon peak hour (3.30 pm - 4.30 pm)	Dos	0.063	0.063	0.063	0.063
		Delay	13.0	13.0	13.0	13.0
		Los	A	A	A	A

Notes: Dos = degree of saturation

Delay = average delay (seconds per vehicle)

Los = level of service

The results in Table 3.2 show the four intersections are currently operating at either very good or acceptable levels of service during both the morning and afternoon peak hours, with the base year (2014) traffic flows.

At the Broke Road/ MTO CHPP access intersection there will be no change with the future (year 2017) intersection operations in terms of the intersection level of service or any other parameter. The peak hour intersection traffic delays at this intersection will increase marginally from 12.5 seconds per vehicle currently (level of service A) to up to 13.6 seconds per vehicle under the future traffic scenarios considered.

At the Putty Road/ Warkworth mine access intersection there will be no change to the future (year 2017) intersection operations in terms of the intersection level of service or any other parameter. The peak hour intersection traffic delays at this intersection will remain at 12.9 to 13.0 seconds per vehicle (level of service A) under all the future traffic scenarios considered.

At the Golden Highway/Mitchell Line of Road intersection, the level of service and the future intersection traffic delays are also not generally affected under the future traffic scenarios considered. In the highest delayed morning peak period traffic scenarios, the average intersection traffic delays will increase from 20.6 seconds per vehicle (level of service B) to 22-23 seconds per vehicles (also level of service B). This is a relatively minor increase in delay. However, the relatively high degree of saturation for the left turn movements from Mitchell Line Road at the intersection will increase to 0.781 in the most delayed future traffic scenario. This degree of saturation is indicative of a developing traffic capacity constraint at this location, but still within acceptable standards, by the year 2017.

At the Golden Highway/Broke Road intersection, the level of service and the future intersection traffic delays are not generally affected under the future traffic scenarios considered. In the highest delayed am peak period traffic scenarios, the average intersection traffic delays will increase from 31.6 seconds per vehicle (level of service C) to 34-35 seconds per vehicle (also level of service C). This is a relatively minor increase in delay. The degree of saturation for the right turn movements at the intersection from Broke Road will remain generally below 0.45 in the most delayed future traffic scenario in Table 3.2, which is indicative of continuing spare traffic capacity at this intersection to accommodate additional future traffic growth in the longer term beyond 2017.

3.2 Impacts of the Wallaby Scrub Road traffic detour

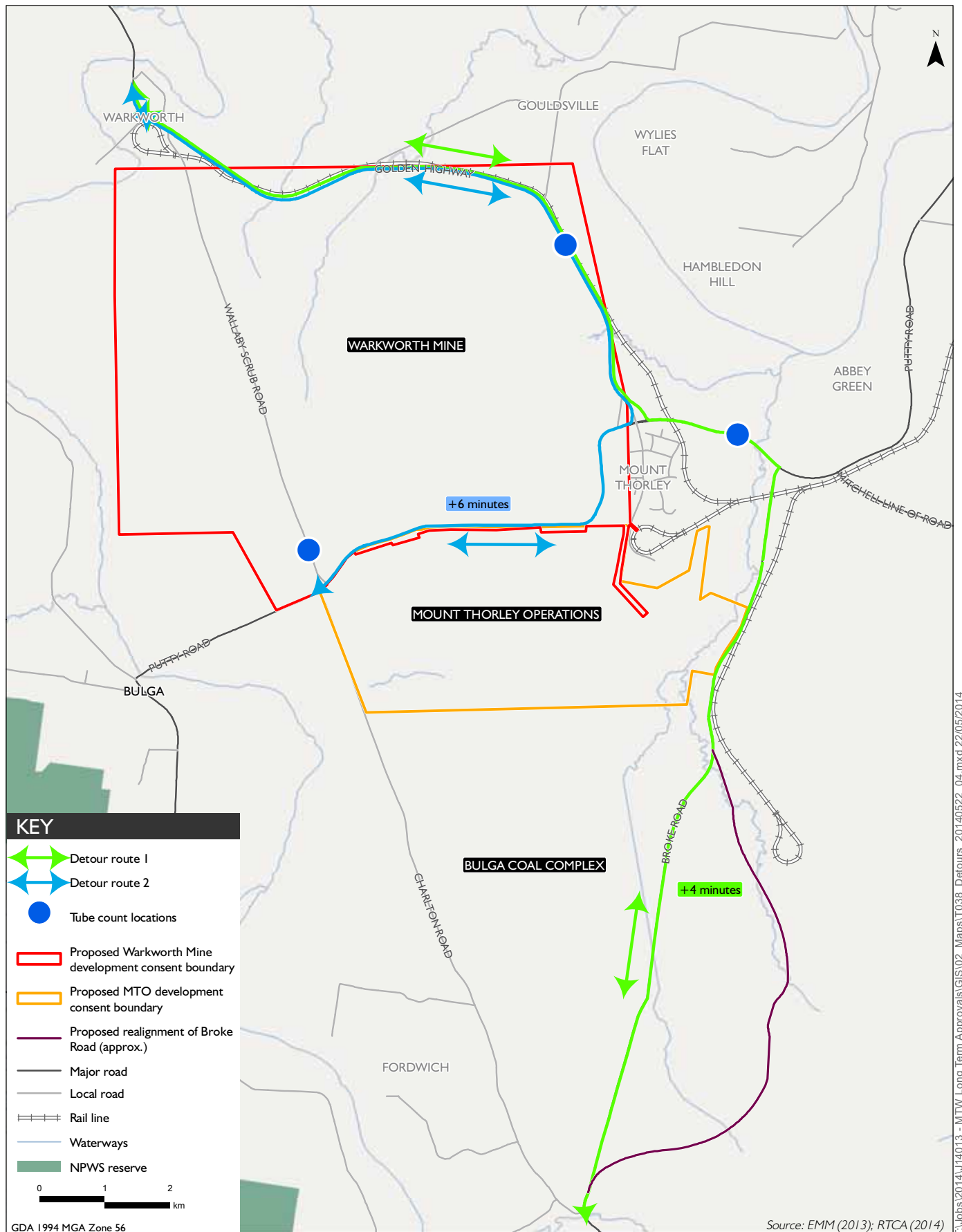
Wallaby Scrub Road is a local road approximately 7 km in length. The proposed closure would divert most traffic to use alternative routes via either the Golden Highway and Putty Road or the Golden Highway and Broke Road, which are shown on Figure 3.1. A replacement fire trail route will be provided to maintain rural fire service emergency access to areas on the western side of the future mine footprint area, between Jerrys Plains, Bulga and Broke. Other emergency vehicles (police and ambulance services) would not generally be affected by the closure as their vehicles are based in Singleton and would not generally travel via Wallaby Scrub Road to access other areas.

The existing traffic movements, which are primarily from the Charlton Road direction, travelling to and from the south, were identified in previous traffic assessments (Parsons Brinkerhof, 2010) as approximately 557 vehicle movements during a 12 hour period and 777 vehicle movements daily, by means of an origin-destination (OD) traffic survey and a tube traffic count. These traffic surveys were repeated for this traffic impact assessment. The latest 2014 traffic surveys returned similar results to the 2010 survey, with 584 vehicle movements recorded during a 12 hour period and 875 vehicle movements daily.

As mentioned previously, the traffic surveys for this assessment were undertaken shortly before the Hunter expressway was opened on 22 March 2014. The expressway provides a faster and safer route for traffic travelling between the M1 Motorway and some Upper Hunter locations. This route will now be available to through traffic which has previously used routes such as Wallaby Scrub Road and Charlton Road, through the Warkworth area.

The March 2014 OD traffic survey included a 24 hour tube traffic counts on Wallaby Scrub Road and at two locations on the Golden Highway to confirm the existing daily traffic volumes on these routes. The locations of these tube traffic count surveys are also shown on Figure 3.1.

The most recent 2014 OD traffic survey results are included in Appendix D. A detailed comparison of the traffic distribution results from the 2014 traffic survey, compared to the previous OD traffic survey (Parsons Brinkerhof 2010) is presented in Table 3.3.



Wallaby Scrub Road closure traffic detour routes
 Mount Thorley Warkworth - Continuation of Mining Operations
 Traffic Impact Assessment

Figure 3.1

As some of the traffic survey locations were different for the two surveys, the results are not directly comparable at all locations. The 2014 survey also determined the proportion of traffic at the northern end of Wallaby Scrub Road, which had an origin or destination along Wallaby Scrub Road and did not travel through to the southern end of Wallaby Scrub Road.

The 2014 survey also determined traffic which had an origin or destination along Charlton Road and did not travel through to the southern end of Charlton Road. However, the 2010 survey looked in more detail at the proportions of traffic which was travelling to and from the west via Bulga Road and how much of this traffic was travelling either to or from Bulga village or from other origins and destinations, south of Bulga. The most recent (2014) survey results generally confirmed the key findings of the earlier OD survey from 2010, which were that:

- The total surveyed traffic volume using Wallaby Scrub Road is less than 1,000 vehicle movements daily.
- The general traffic proportions using Wallaby Scrub Road were approximately 60 – 70 percent coming from Charlton Road (at the south end) and approximately 20 – 25 percent coming from the Putty Road (west) directions.

Table 3.3 Comparison of Wallaby Scrub Road 2010 and 2014 OD traffic survey results

Direction	Route	2010 Survey traffic (vehicles)	2010 Survey traffic (percent)	2014 Survey traffic (vehicles)	2014 Survey traffic (percent)
Southbound	To Charlton Road	223	76.6	168	63.2
	To Wallaby Scrub Road (local)	0	0	36	13.5
	To Putty Road (east)	14	4.8	8 ¹	3.0 ¹
	To Putty Road (Bulga)	16	5.5	54 ²	20.3 ²
	To Putty Road (south of Bulga)	38	13.1		
	Total Vehicles	291	100.0	266	100.0
Northbound	From Charlton Road	202	75.9	215	67.6
	From Wallaby Scrub Road (local)	0	0	5	1.6
	From Putty Road (east)	0	0	17 ¹	5.3 ¹
	To Putty Road (Bulga)	29	10.9	81 ²	25.5 ²
	To Putty Road (south of Bulga)	35	13.2		
	Total Vehicles	266	100.0	318	100.0
Combined To/from	Charlton Road	425	76.3	383	65.6
	Wallaby Scrub Road (local)	0	0	41	7.0
	Putty Road (east)	14	2.5	25 ¹	4.3 ¹
	Putty Road (Bulga)	45	8.1	135 ²	23.1 ²
	Putty Road (south of Bulga)	73	13.1		
	Total Vehicles	557	100.0	584	100.0

Notes: 1. Also Includes traffic travelling on Charlton Road which does not continue to the southern end.

2. Includes traffic travelling from Bulga village and from other locations further to the south.

3.2.1 Traffic impacts to the road network

The daily traffic capacity for a two lane rural highway such as the Golden Highway is determined by the traffic capacity for two way flow which is approximately 2,500 vehicles per hour for level terrain, 2,000 vehicles per hour for rolling terrain and 1,400 vehicles per hour for mountainous terrain (RTA, 2002) for routes carrying 5 percent heavy vehicles during the peak traffic hours. The mid range hourly traffic capacity figure of 2,000 vehicles would be applicable to the Golden Highway in this locality as it traverses generally rolling terrain. As the peak hourly traffic is approximately 10 percent of daily traffic using the Golden Highway in the locality of Mount Thorley, the daily traffic capacity of the route is 20,000 vehicles approximately.

For Putty Road and Broke Road, which have a lower design standard than the Golden Highway and lower sealed shoulder widths, the daily traffic capacity is approximately 10 percent lower, at 18,000 vehicles.

The daily traffic increases which will be occurring on the alternative traffic detour routes following the closure of Wallaby Scrub Road are summarised in Table 3.4. Although the current traffic volume of Wallaby Scrub Road is low in comparison to the capacity of the detour routes, there will be proportional daily traffic increases of up to 20 – 30 percent on some of the detour roads.

These increases will however be small in comparison to the actual capacity of the affected roads, which will continue to have considerable spare capacity (in comparison to the daily capacity limits of approximately 18,000 to 20,000 vehicle movements currently) to accommodate the detoured traffic and future improvements will not generally be required to the road widths or the other design standards of these roads.

The potential impacts of the Wallaby Scrub Road traffic detour will affect approximately 93% of the daily traffic movements currently using the route (approximately 863 projected daily vehicle movements) in 2017. However, the affected traffic volume could potentially reduce due to the future effect of the Hunter Expressway route opening, which has yet to be determined.

Table 3.4 Proportional impact of the Wallaby Scrub Road traffic on alternative routes

RTA count reference	Road location	Projected daily traffic volume (year 2017) ¹	Route daily traffic capacity (vehicles)	Daily traffic detoured by Wallaby Scrub Road Closure	Detoured traffic proportion compared to 2017 base daily traffic movements	Detoured traffic proportion compared to route daily traffic capacity
05.481	Golden Highway (north of Putty Road at Mount Thorley)	3,512	20,000	863	24.6 percent	4.3 percent
05.637	Golden Highway (between Broke Road and Mount Thorley)	8,847	20,000	609	6.9 percent	3.0 percent
N/A	Broke Road (south of the Mount Thorley CPP access road intersection)	3,434	18,000	609	17.7 percent	3.4 percent

Table 3.4 Proportional impact of the Wallaby Scrub Road traffic on alternative routes

RTA count reference	Road location	Projected daily traffic volume (year 2017) ¹	Route daily traffic capacity (vehicles)	Daily traffic detoured by Wallaby Scrub Road Closure	Detoured traffic proportion compared to 2017 base daily traffic movements	Detoured traffic proportion compared to route daily traffic capacity
N/A	Putty Road (west of the Warkworth Mine access at Mount Thorley)	727	18,000	254	34.9 percent	1.4 percent

*Notes: *The actual daily traffic volumes in 2014 were surveyed at the two locations shown on the Golden Highway. The 2014 daily traffic volumes for Broke Road and Putty Road were determined by comparison of the peak hourly intersection traffic counts on these roads with the surveyed peak hourly and daily volumes using the Golden Highway. A uniform annual traffic growth factor of 2 percent was applied to all routes.*

3.2.2 Traffic detour impacts at intersections

The potential impacts of the Wallaby Scrub Road closure, will affect approximately 77 to 80 peak hourly vehicle movements from the year 2017 onwards, which is conservatively estimated to increase at approximately +2 percent annually in future years, assuming no reduction from traffic using the Hunter Expressway.

The intersection capacity and delay impacts of the detoured traffic in 2017 have been assessed as shown in future traffic analysis Scenarios 2 and 3 in Table 3.2. The assessment shows there will be minimal traffic delay impacts at intersections on these alternative traffic routes from the Wallaby Scrub Road closure as the relevant intersections have sufficient spare capacity to accommodate this traffic.

Since 2010, three intersections in the area have been upgraded by the RMS, which improves their capacity to accommodate the detoured traffic; namely.

- At the Golden Highway/Broke Road intersection a ‘seagull’ type intersection has been established to provide a dedicated right hand turning lane into Broke Road and a merging lane for traffic turning right from Broke Road.
- At the Mount Thorley interchange west side intersection, dedicated turning lanes have been established westbound on Putty Road for through and right turning traffic.
- At the Mount Thorley interchange east side intersection, a dedicated through traffic lane has been established eastbound on Putty Road to improve merging with the traffic from the Golden Highway.

Following the recent road improvement works (seagull type intersection) which have been implemented by RMS at the Golden Highway/ Broke Road intersection, the peak hour traffic delays and level of service at this intersection have substantially improved (previously level of service F, now level of service C). No further capacity improvements to this intersection or any other intersections on the major road networks in the Mount Thorley area will be required as a result of the generally minimal intersection traffic impacts of the proposal, including the traffic detours from the closure of Wallaby Scrub Road.

At four other intersections, which have not been assessed in detail, at the northern and southern ends respectively of Wallaby Scrub Road and Charlton Road, at the Golden Highway, Putty Road and Broke Road, the detoured traffic will in the future be travelling straight through rather than turning at these intersections. This will generally reduce the turning traffic conflicts and therefore improve the traffic safety and traffic delays at these intersections.

On the Golden Highway section of the traffic detour route, to the north of Putty Road, the existing intersections which provide access to the locality of Gouldsville will have approximately 25% increased daily traffic usage following the Wallaby Scrub Road closure. The existing design standard of these intersections should be reviewed to ensure compliance with the most recent (Austroads 2010) *Road Design Guide* requirements for rural intersections. This review should be incorporated into the road closure plan required for Wallaby Scrub Road, which will be prepared in consultation with RMS and other organisations.

3.2.3 Increased travel times and distances for detoured traffic

The potential impacts of the Wallaby Scrub Road closure will affect approximately 863 vehicle movements daily from the year 2017 onwards, increasing at approximately +2 percent annually in each future year, which is conservatively estimated assuming no reduction from traffic using the Hunter Expressway.

These vehicle movements will be subject to increased travel distances of approximately 8.8 km and 6.2 km per trip, with additional travel times of 6 and 4 minutes per journey respectively and increased fuel usage, for the Putty Road and Charlton Road originating traffic. The alternative traffic routes for each detour are shown in Figure 3.1.

For the Charlton Road originating traffic, it is also likely that with the Bulga Optimisation Project (which is proposed but not yet approved) an additional traffic detour of approximately 3 additional kilometres and 2 minutes per trip will also be implemented to Broke Road which would generally increase the overall travel detour distances and travel times for this traffic to similar levels as for the Putty Road traffic, ie to approximately 9 kilometres and 6 minutes per trip in total.

The current local property access functions for traffic using Wallaby Scrub Road have also been reviewed in this assessment. All the properties affected on Wallaby Scrub Road, to the south of the railway bridge, are owned by MTW. Emergency vehicle access will be maintained by the construction of an emergency access road between Putty Road and the Golden Highway, prior to the closure of Wallaby Scrub Road. The road would be developed in consultation with the Rural Fire Service (RFS) and constructed to access standards prescribed in *Planning for Bush Fire Protection* (Rural Fire Service 2006).

The economic impact of closing Wallaby Scrub Road is discussed and assessed in more detail in the Economic Impact Assessment for the proposal (BA Economics 2014). The economic assessment includes road user costs, operator costs and non- user costs.

3.3 Road safety

The potential impacts of the Wallaby Scrub Road closure have also been assessed in terms of road safety. Detoured traffic will be subject to increased travel distances as detailed in Section 3.2.3.

Generally there will be safer travelling conditions for detoured traffic (and lower accident rates per kilometre travelled) when travelling via the Golden Highway, due to the improved intersection sight distances and higher road construction standards which are present along this route. These improved traffic safety conditions should generally compensate for the greater travel distances which are likely to be travelled by the detoured traffic while travelling through the MTW area in the future.

A road closure implementation plan for Wallaby Scrub Road, will be prepared in conjunction with relevant stakeholders in the local community including RMS, emergency services Singleton Council and the community.

The road closure implementation plan will include strategies to minimise any potential local traffic access and road safety impacts of the closure, including a review of intersection traffic safety at the existing minor road intersections on the Golden Highway at Gouldsville, where the existing design standard of intersections should be reviewed to ensure compliance with the most recent (Austroads 2010) *Road Design Guide* requirements for rural intersections.

3.4 Car parking

There are no proposed changes to the MTW car parking areas. The capacity of the existing car parking areas is adequate for the current, and therefore future, workforce and visitor car parking requirements.

3.5 Public transport access

There are no conveniently accessible local bus routes within the area. There is unlikely to be any additional demand on public transport services in the area from the proposal. The nearest train station at Singleton is also not likely to be affected by the proposal.

3.6 Pedestrian and cyclist access

Given the current patterns of predominantly industrial development in the Mount Thorley area, and distance from residential areas, the local and major roads will continue to have only minimal pedestrian and cyclist usage. Improvements to these roads, such as shoulder widening, or the provision of separate pedestrian footpaths and/or cycleways would not generally be warranted as a result of the proposal.

3.7 Cumulative impacts

3.7.1 Traffic impacts to the road network

The potential cumulative traffic impacts from the proposal and the construction work phases for the Bulga Coal Complex (Bulga Optimisation Project) have also been considered for 2017 which is the first year in which cumulative traffic impacts will potentially occur. Although the proposed construction stage workforce for the Bulga Optimisation Project will be up to 300 persons during the early years of construction in 2014 and 2015 (ARC 2013), this workforce will be greatly reduced (to approximately 25 persons) by the year 2017, such that minimal cumulative traffic impacts are anticipated from the two proposals in that and subsequent years. MTW's workforce and other traffic related contributions to cumulative road traffic impacts (with other mining projects) will remain unchanged under the proposal.

There will potentially be a cumulative traffic detour impact for the MTW project with the Bulga Optimisation Project (which is proposed but not yet approved). For the Charlton Road originating traffic, which will be diverted from the Wallaby Scrub Road route, an additional traffic detour of approximately 3 additional kilometres and 2 minutes per trip would also potentially occur along the Broke Road route, which would further increase the overall travel detour distances and travel times for this traffic to similar levels as for the Putty Road originating traffic, ie to approximately 9 kilometres and 6 minutes per trip in total.

3.7.2 Traffic impacts at intersections

In terms of future intersection operations, there will also be minimal impacts from the cumulative traffic impacts of the proposal in combination with the Bulga Optimisation Project, including the effects of the Wallaby Scrub Road closure. The relevant intersection traffic impacts have been considered in the traffic analysis in Table 3.2, and show these intersections will have sufficient spare capacity to accommodate the predicted cumulative traffic increases, with minimal intersection capacity or delay impacts.

The recent RMS intersection improvement works at the Golden Highway/ Broke Road intersection, which were completed during 2011/12, have substantially improved the peak hour traffic delays and level of service at this intersection (previously level of service F, now level of service C) such that this intersection no longer represents a capacity constraint to the major road network in the locality of Mount Thorley.

4 Coal transport impact assessment

4.1 Introduction

The existing Mount Thorley Coal Loader (MTCL) is shown on Figure 2.6 and the schematic plan of the Hunter Valley rail network in Figure 2.7 shows the Whittingham branch line, rail loops and train loading facilities. These facilities will continue to be used for transport of the export coal produced by MTW. MTCL is a separate facility with a separate development consent and is not subject to this proposal.

The MTCL loop is accessed from the Main Northern Railway at Whittingham (near Singleton). Empty trains exit the Main Northern Railway line at Whittingham junction and travel along the Whittingham branch line to the MTCL spur line, in preparation for loading. On completion of loading, trains return along the Whittingham branch to Whittingham junction and proceed to the coal terminals in Newcastle for ship loading. In addition to MTW, other users of the Whittingham branch include Bulga Coal Complex and Wambo Mine.

The future capacity of the Whittingham branch line must accommodate the combined coal transport demand from the MTCL coal loaders and other mines such as Bulga, Wambo and HVO South potentially, which also use the line. The branch line has single track capacity and its capacity is also potentially constrained by the combined operations and the availability of coal train paths at the junction with the Main Northern Railway line at Whittingham.

4.2 Hunter Valley rail transport capacity

Over 150 million tonnes of coal was exported from the Port of Newcastle in 2013 (calendar year), with current expectations of additional growth in throughput across 2014. Installed coal terminal capacity in Newcastle currently exceeds 200 million tonnes; however, the timing of when industry output in the Hunter Valley might align with or exceed coal terminal capacity in Newcastle is uncertain.

The Australian Rail Track Corporation (ARTC) commenced a 60-year lease of the Hunter Valley coal rail network in 2004. ARTC has published several long-term corridor capacity strategies for the Hunter Valley coal network, where the *2013—2022 Hunter Valley Corridor Capacity Strategy* (ARTC 2013) is the seventh version.

This document outlines ARTC's expectations for customer track access over the short, medium and long-term, and the associated rail investment and operating performance requirements to deliver contracted and prospective volume commitments. Excerpts from the 2013-2022 strategy outline ARTC's view on the expected increase in export coal volumes:

... contracted export coal volumes are... increasing to around 204 mtpa in 2018 and 206 mtpa in 2019. Forward contract volumes are in part conditional on ARTC projects and HVCCC Coal Chain Capacity assessment.

On this basis, it is possible that annual railed coal volumes for export could increase by a further 56 million tonnes by 2019, an almost 40 percent increase on 2013 throughput and a compound annual growth rate (CAGR) of 5.4 percent. The ARTC corridor capacity strategy is based on a combination of contracted volumes (volumes for which contractual arrangements for the transport of coal are already in place) and prospective volumes (volumes from projects which have not progressed to the level at which 'binding' coal transport contracts have been committed to).

The current relationship between contracted volumes, prospective volumes as determined by the Rail Capacity Group of ARTC, and terminal capacity at the Port of Newcastle is shown in Figure 4.1. Further details of the projected contractual and prospective volumes of coal to be transported over each section on the Hunter Valley main line between Newcastle and Muswellbrook are also shown in Figure 4.2.

4.3 Rail transport of product coal

There are no changes proposed by MTW to the MTCL rail loop or spur line as part of the modification. MTCL is a separate facility to MTW and operates to its own development consent.

For the transport of product coal by rail, Coal & Allied (C&A) entered into a rolling 10 year agreement with ARTC in 2012 for track access to provide for the ability to haul coal from MTW to the coal terminals in Newcastle. This agreement was established after the ARTC *Hunter Valley Coal Network Access Undertaking* was approved by the ACCC in June 2011.

A fundamental part of the agreement is the take-or-pay capacity commitment, which provides contracted track access to transport specific monthly and annual coal volumes from MTW for the full 10 year period. All agreements with ARTC are limited to 10 years and RTCA will extend the agreement with ARTC if and when required to accommodate continuing use of the rail network.

ARTC plans and manages network capacity enhancement projects to cater for the track access volumes it has contracted across its customer base and prospective volumes where applicable. The C&A agreement with ARTC for MTW track access is included in ARTC's long-term contractual commitments, and as such, the MTW volumes are considered confirmed for the 10 year period on the basis that ARTC has the available capacity to deliver MTW's contract. The MTW volumes, therefore, are not expected to have any adverse impact on the capacity of the coal rail network because the capacity has been planned and committed for some time.

4.4 Assessment of rail transport

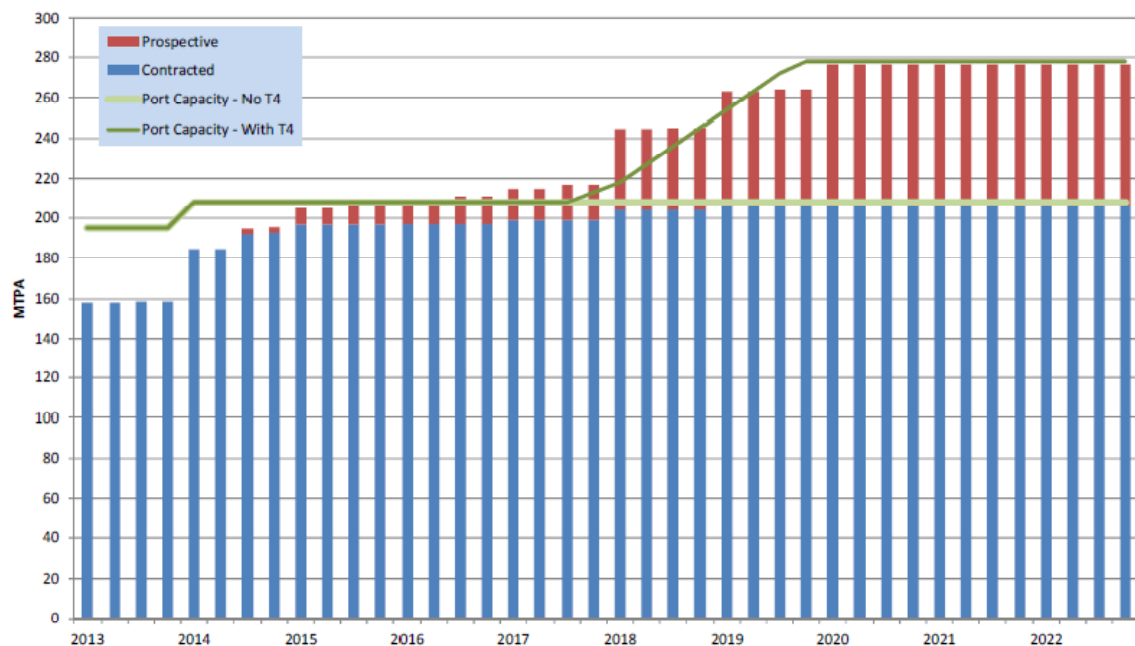
4.4.1 Capacity of the rail line

The daily train movements for MTW coal transport will be consistent with those loaded previously at MTCL and are not anticipated to increase above levels seen historically. As there is no projected increase in annual train movements, the MTW coal transport operations are not expected to cause any increase in delays to other users of the Whittingham branch line.

From the current ARTC strategy, the current contracted and prospective coal transport tonnages for the sections of the Hunter Valley lines shown in Figure 4.2, show there is a planned increase in the total processed export coal transported from existing and proposed mining operations using the Whittingham Branch (eg including the approved HVO South coal loading facility) between the years 2013 and 2022 (the end year of the current ARTC Strategy) from 25 Mt to 40 Mt per annum.

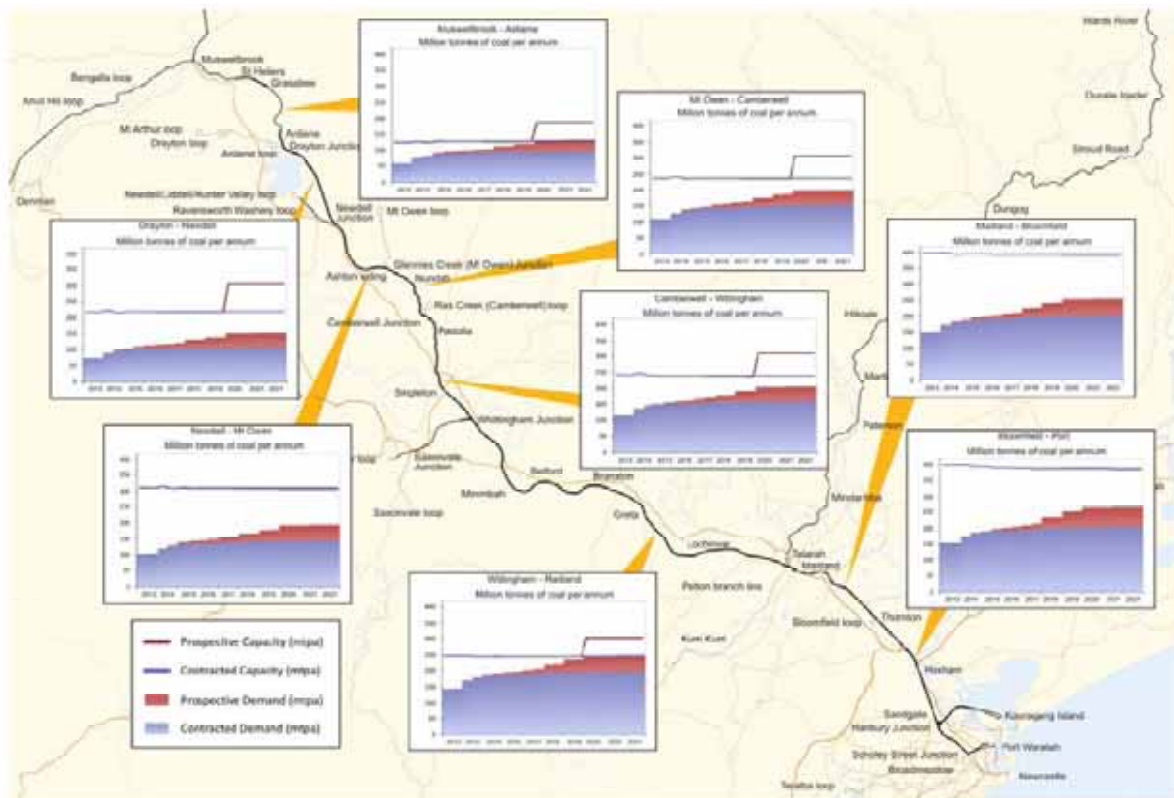
Capacity is incorporated in the ARTC strategy which can accommodate the increased coal transport demand from coal loading facilities using the Whittingham Branch line, notwithstanding that the coal transported from MTW is not anticipated to form part of this demand increase.

The branch line operates with a typical average trainload tonnage of 8,400 tonnes and has potentially 350 days operation per year. The annual average daily number of loaded trains using the Whittingham Branch (from MTW and other mines) will increase from approximately 8.5 in 2013 (to transport approximately 25 Mt of coal) to approximately 13.6 in 2022 (to transport approximately 40 Mt of coal).



Note: Data Source (ARTC, 2013)

Figure 4.1 Forecast growth in rail transport volumes and Newcastle port capacity



Note: Data Source (ARTC, 2013)

Figure 4.2 Forecast growth in transport volumes on sections of the Hunter Valley main line

While 40 Mtpa is within the current operating capacity of a single track branch line, which can generally accommodate approximately one train movement hourly in each direction, it is believed that the limiting factor for the branch line capacity is the number of available train paths at the junction with the main line at Whittingham. This capacity will ultimately determine the capacity of the Whittingham branch line to accommodate the projected daily train loads in the years beyond the currently defined ARTC strategy, which continues until 2022.

4.4.2 Assessment of rail safety

i Level crossings

The ARTC network expansion plans include significant expenditure to construct facilities that separate road vehicles from the high volume public level crossings to eliminate interaction. Notable crossings already completed include Range Road (Singleton), Golden Highway (adjacent to New England Highway intersection) and Hermitage Road (Belford). As there will not be an increase in daily train movements beyond those seen historically for MTW, the number of MTW train interactions with users of existing public and private level crossings will not change.

ii Rail safety

MTW train movements will continue to transport coal in a manner consistent with historical operations. Coal will be loaded onto trains provided by approved rail haulage companies who are licensed and approved to operate on the ARTC network. These companies must comply with the requirements of the Independent Transport Safety Regulator whose principal objective is to facilitate the safe operation of railways in NSW. Therefore MTW is not expected to cause an impact on rail safety.

5 Mitigation and management measures

The following project impact mitigation and related monitoring and management measures have been identified to address the identified road and rail transport related aspects of the project.

The primary road transport impact identified for the proposal is the increased travel time and distance costs for the traffic which is currently using Wallaby Scrub Road when the road is closed and the detour is implemented.

MTW propose to prepare a road closure implementation plan for Wallaby Scrub Road, in conjunction with relevant stakeholders in the local community, emergency services, RMS and Singleton Council, which will include strategies to minimise any potential local traffic access and road safety impacts of the closure.

5.1 Road transport mitigation measures

Emergency vehicle access to areas west of Wallaby Scrub Road will be maintained by the construction of an appropriate emergency access road/fire trail between Putty Road and the Golden Highway, prior to the closure of Wallaby Scrub Road. The fire trail route would be constructed in accordance with the NSW Rural Fire Service access standards in *NSW Bushfire Coordinating Committee policy No 2/2007* (Rural Fire Service 2007). Other emergency vehicles (police and ambulance services) would not generally be affected by the closure as their vehicles are based in Singleton and would not generally travel via Wallaby Scrub Road to access other areas.

Some local residents, e.g. in Bulga village and its surrounding areas will experience increased travel times and distances from traffic diversions as a result of the road closure. However the majority of the traffic using the route is regionally based and travels from areas beyond the southern end of Charlton Road. These traffic volumes are anticipated to reduce in the future following the opening of the Hunter Expressway, which should cause some of the affected traffic to use other routes, regardless of whether Wallaby Scrub Road is closed or not.

The recent RMS intersection improvement works at the Golden Highway/ Broke Road intersection and the two Mount Thorley interchange intersections, on the east and west sides, have substantially improved the peak hour traffic delays and level of service at these intersections. No further intersection improvement works to these or other intersections on the major road network are specifically required as a result of the predicted road traffic impacts of the proposal.

However, on the Golden Highway section of the Wallaby Scrub Road traffic detour route, to the north of Putty Road, the existing intersections which provide access to the locality of Gouldsville should be reviewed to ensure compliance with the most recent (Austroads 2010) *Road Design Guide* requirements for rural intersections. This review should be incorporated into the road closure plan required for Wallaby Scrub Road, which will be prepared in consultation with RMS and other organisations.

5.2 Rail transport mitigation measures

No specific rail transport impact mitigation measures are required for the proposal.

6 Summary and conclusion

The contents of this TIA report are based on the Department of Planning and Environment Secretary's requirements, the list of traffic impact assessment requirements published in the RTA/RMS Guide to traffic impact assessment and the most recent ARTC 2013 - 2022 ten year strategy for coal transport on the Hunter Valley rail network.

This TIA identifies that the proposal is currently generating significant daily traffic movements for both car and truck traffic on the Golden Highway and other major roads in the locality of Mount Thorley. The road network currently has spare capacity (including at all the major intersection) and these intersections are currently operating at good or reasonable peak hour levels of service. Based on historic traffic growth patterns at annual growth rates of up to +2 percent, the future background traffic increases for the locality roads, by the year 2017, have also been calculated to determine the future base year traffic situation against which the impact of the proposed closure of Wallaby Scrub Road and the cumulative impact of the MTW traffic with the Bulga Optimisation Project traffic have been assessed.

Employee traffic generated by Warkworth Mine and MTO on external public roads will not generally increase. Truck traffic movements on the external road network would also generally remain at similar levels. The future road and intersection traffic operations in the locality will not generally change due to these factors.

As there is no projected increase in annual production tonnages or train movements, the proposal is not expected to cause any rail transport impacts.

The proposal would also result in minimal traffic impacts to the wider road network and intersections related to the closure of Wallaby Scrub Road. The traffic surveys for this traffic impact assessment included an Origin-Destination traffic survey during a 12 hour period on Tuesday 4 March 2014, which identified the current volumes and proportions of all traffic entering or leaving the area via the northern end of Wallaby Scrub Road. These were:

- The total surveyed traffic volume using Wallaby Scrub Road is less than 1,000 vehicle movements daily.
- The general traffic proportions using Wallaby Scrub Road were approximately 60 – 70 percent coming from Charlton Road (at the south end) and approximately 20 – 25 percent coming from the Putty Road (west) directions.

However, the Hunter Expressway route which opened on 22 March 2014 now provides a faster, safer and more direct travel route for regional traffic movements between the M1 Motorway and the Upper Hunter. This route option is now available to through traffic from the Charlton Road direction which had previously been travelling via Wallaby Scrub Road.

Traffic detoured by the Wallaby Scrub Road closure will be subject to some increases in travel distances and journey times. However, given the improved road construction standard and travelling conditions on the Golden Highway, the closure of Wallaby Scrub Road should not result in an increase in the travel safety risk for the detoured traffic.

MTW propose to prepare a road closure implementation plan, in conjunction with relevant stakeholders in the local community, emergency services, RMS and Singleton Council, to develop strategies to minimise local traffic related impacts of the closure.

Emergency vehicle access to areas west of Wallaby Scrub Road is proposed to be maintained through the development, in conjunction with RFS, of an emergency access/fire trail route between Putty Road and the Golden Highway, close to the western limit of the proposed mining footprint (see Appendix E). The fire trail route would be constructed in accordance with the NSW Rural Fire Service access standards in *NSW Bushfire Coordinating Committee policy No 2/2007* (Rural Fire Service 2007). Other emergency vehicles (police and ambulance services) would not generally be affected by the closure as their vehicles are based in Singleton and would not generally travel via Wallaby Scrub Road to access other areas.

The potential cumulative traffic impacts of the MTW proposal, with the construction work phases for the Bulga Optimisation Project have also been considered in the year 2017. This is the first year in which these cumulative traffic impacts could occur. The proposed construction stage workforce for the Bulga Optimisation Project will be higher in the earlier years of construction, but will have reduced to approximately 25 persons by the year 2017, such that minimal cumulative traffic impacts will occur from the two proposals in that and subsequent years.

There will potentially be a cumulative traffic detour impact from the MTW project with the Bulga Optimisation Project (which is proposed but not yet approved), where the Charlton Road originating traffic diverted from the Wallaby Scrub Road route, will be subject to an additional traffic detour of approximately 3 additional kilometres and 2 minutes per trip along the Broke Road route, as a result of the traffic detours which would occur to that route with the Bulga Optimisation Project.

References

ARC Traffic + Transport with Transport and Urban Planning, 2013 Traffic Impact Assessment for the Bulga Mine Optimisation Project

ARTC 2013, 2013-2022 Hunter Valley Corridor Capacity Strategy, June 2013

Austroads 2010, Guide to Road Design

Parsons Brinkerhoff 2010, Traffic Impact Assessment for the Warkworth Mine Extension project

Roads and Traffic Authority 2002, *Guide to Traffic Generating Developments*.

Rural Fire Service 2007, NSW Bushfire Coordinating Committee policy No 2/2007.

Appendix A

Tube traffic count surveys

Job No	N1299	
Client	EMM	
Road	Golden Hwy - Between Thornley and Wallaby Scrub	Average Weekday 3,314
Location	Singleton	7 Day Average 2,978
Site No.	3	
Start Date	4-Mar-14	
Description	Volume Summary	
Direction	Combined	

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar		
AM Peak	268	234	234	232	247	175	194		
PM Peak	292	238	275	266	324	164	250		
0:00	13	22	20	25	24	15	12	21	19
1:00	9	6	14	9	6	12	8	9	9
2:00	6	6	6	11	7	6	7	7	7
3:00	16	8	17	17	15	15	8	15	14
4:00	47	29	32	36	27	17	9	34	28
5:00	182	157	177	180	183	85	75	176	148
6:00	268	234	234	232	219	81	64	237	190
7:00	230	204	190	179	166	95	66	194	161
8:00	183	161	166	202	172	102	76	177	152
9:00	230	168	158	187	230	120	124	195	174
10:00	200	185	193	187	247	175	120	202	187
11:00	199	179	220	195	239	135	194	206	194
12:00	225	168	199	195	237	164	185	205	196
13:00	292	183	198	222	289	125	231	237	220
14:00	238	188	183	218	324	145	250	230	221
15:00	279	238	257	253	294	104	223	264	235
16:00	257	238	275	266	297	107	194	267	233
17:00	213	231	227	236	274	126	189	236	214
18:00	162	154	142	185	225	127	171	174	167
19:00	82	76	75	103	139	41	91	95	87
20:00	36	49	44	54	63	14	51	49	44
21:00	43	22	36	36	34	20	36	34	32
22:00	27	29	27	32	28	17	17	29	25
23:00	26	22	25	17	19	17	13	22	20
Total	3463	2957	3115	3277	3758	1865	2414	3314	2978

7-19	2708	2297	2408	2525	2994	1525	2023	2586	2354
6-22	3137	2678	2797	2950	3449	1681	2265	3002	2708
6-24	3190	2729	2849	2999	3496	1715	2295	3053	2753
0-24	3463	2957	3115	3277	3758	1865	2414	3314	2978

Job No	N1299	
Client	EMM	
Road	Golden Hwy - Between Thornley and Wallaby Scrub	Average Weekday 1,620
Location	Singleton	7 Day Average 1,461
Site No.	3	
Start Date	4-Mar-14	
Description	Volume Summary	
Direction	EB	

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar		
AM Peak	100	99	106	97	126	92	86		
PM Peak	157	147	164	169	208	86	137		
0:00	5	17	18	20	19	9	6	16	13
1:00	8	4	9	7	4	1	2	6	5
2:00	1	2	1	7	5	3	2	3	3
3:00	0	2	5	6	7	11	2	4	5
4:00	8	10	7	9	7	2	3	8	7
5:00	34	25	31	28	30	22	22	30	27
6:00	90	86	96	74	82	44	35	86	72
7:00	82	92	69	58	65	48	40	73	65
8:00	80	72	79	86	82	49	31	80	68
9:00	91	67	74	97	109	70	39	88	78
10:00	88	73	89	77	126	92	49	91	85
11:00	100	99	106	97	123	68	86	105	97
12:00	114	81	105	95	133	86	98	106	102
13:00	119	85	95	126	163	64	119	118	110
14:00	117	117	96	131	208	70	137	134	125
15:00	157	147	157	162	192	50	113	163	140
16:00	140	144	164	169	193	45	103	162	137
17:00	106	118	118	140	130	57	98	122	110
18:00	87	93	83	109	124	79	92	99	95
19:00	38	41	39	60	97	24	61	55	51
20:00	24	26	29	38	39	4	29	31	27
21:00	11	11	23	24	18	7	22	17	17
22:00	8	10	7	15	13	6	12	11	10
23:00	18	15	14	8	11	6	9	13	12
Total	1526	1437	1514	1643	1980	917	1210	1620	1461

7-19	1281	1188	1235	1347	1648	778	1005	1340	1212
6-22	1444	1352	1422	1543	1884	857	1152	1529	1379
6-24	1470	1377	1443	1566	1908	869	1173	1553	1401
0-24	1526	1437	1514	1643	1980	917	1210	1620	1461

Job No	N1299	
Client	EMM	
Road	Golden Hwy - Between Thornley and Wallaby Scrub	Average Weekday 1,694
Location	Singleton	7 Day Average 1,517
Site No.	3	
Start Date	4-Mar-14	
Description	Volume Summary	
Direction	WB	

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar		
AM Peak	178	148	146	158	153	83	108		
PM Peak	173	113	111	100	144	78	113		
0:00	8	5	2	5	5	6	6	5	5
1:00	1	2	5	2	2	11	6	2	4
2:00	5	4	5	4	2	3	5	4	4
3:00	16	6	12	11	8	4	6	11	9
4:00	39	19	25	27	20	15	6	26	22
5:00	148	132	146	152	153	63	53	146	121
6:00	178	148	138	158	137	37	29	152	118
7:00	148	112	121	121	101	47	26	121	97
8:00	103	89	87	116	90	53	45	97	83
9:00	139	101	84	90	121	50	85	107	96
10:00	112	112	104	110	121	83	71	112	102
11:00	99	80	114	98	116	67	108	101	97
12:00	111	87	94	100	104	78	87	99	94
13:00	173	98	103	96	126	61	112	119	110
14:00	121	71	87	87	116	75	113	96	96
15:00	122	91	100	91	102	54	110	101	96
16:00	117	94	111	97	104	62	91	105	97
17:00	107	113	109	96	144	69	91	114	104
18:00	75	61	59	76	101	48	79	74	71
19:00	44	35	36	43	42	17	30	40	35
20:00	12	23	15	16	24	10	22	18	17
21:00	32	11	13	12	16	13	14	17	16
22:00	19	19	20	17	15	11	5	18	15
23:00	8	7	11	9	8	11	4	9	8
Total	1937	1520	1601	1634	1778	948	1204	1694	1517

7-19	1427	1109	1173	1178	1346	747	1018	1247	1143
6-22	1693	1326	1375	1407	1565	824	1113	1473	1329
6-24	1720	1352	1406	1433	1588	846	1122	1500	1352
0-24	1937	1520	1601	1634	1778	948	1204	1694	1517

Job No	N1299	
Client	EMM	
Road	Golden Hwy - Between Broke Rd & Mt Thornley	Average Weekday 9,849
Location	Singleton	7 Day Average 8,346
Site No.	2	
Start Date	4-Mar-14	
Description	Volume Summary	
Direction	Combined	

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar		
AM Peak	1165	1083	1148	1214	1048	372	322		
PM Peak	905	819	915	859	904	411	454		
0:00	22	44	46	61	68	58	25	48	46
1:00	16	24	31	13	20	28	22	21	22
2:00	28	22	36	37	31	24	19	31	28
3:00	34	34	48	64	51	61	23	46	45
4:00	149	123	115	138	145	69	30	134	110
5:00	657	701	691	723	711	269	209	697	566
6:00	1165	1083	1148	1214	1048	372	322	1132	907
7:00	745	720	643	646	605	298	229	672	555
8:00	477	449	461	521	467	191	123	475	384
9:00	476	393	417	475	508	250	212	454	390
10:00	419	412	465	441	560	315	204	459	402
11:00	479	429	502	417	565	266	281	478	420
12:00	442	429	497	529	540	290	309	487	434
13:00	560	443	440	531	663	248	326	527	459
14:00	610	525	552	594	732	243	383	603	520
15:00	905	819	704	859	904	209	320	838	674
16:00	771	761	915	766	727	203	299	788	635
17:00	702	726	717	715	676	316	390	707	606
18:00	595	585	600	605	560	411	454	589	544
19:00	285	291	286	341	353	200	255	311	287
20:00	124	143	103	122	155	62	82	129	113
21:00	74	58	90	86	80	41	75	78	72
22:00	85	73	98	96	81	45	49	87	75
23:00	43	62	65	66	54	32	35	58	51
Total	9863	9349	9670	10060	10304	4501	4676	9849	8346

7-19	7181	6691	6913	7099	7507	3240	3530	7078	6023
6-22	8829	8266	8540	8862	9143	3915	4264	8728	7403
6-24	8957	8401	8703	9024	9278	3992	4348	8873	7529
0-24	9863	9349	9670	10060	10304	4501	4676	9849	8346

Job No	N1299	
Client	EMM	
Road	Golden Hwy - Between Broke Rd & Mt Thornley	Average Weekday 4,649
Location	Singleton	7 Day Average 3,951
Site No.	2	
Start Date	4-Mar-14	
Description	Volume Summary	
Direction	EB	

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar		
AM Peak	294	294	265	256	275	187	172		
PM Peak	628	599	689	650	623	240	246		
0:00	10	36	39	48	42	28	14	35	31
1:00	11	13	16	7	14	10	8	12	11
2:00	6	11	11	11	13	6	3	10	9
3:00	11	17	21	26	25	25	6	20	19
4:00	14	21	19	27	31	15	5	22	19
5:00	53	70	77	75	63	37	31	68	58
6:00	207	237	265	256	230	151	137	239	212
7:00	294	294	229	204	221	187	172	248	229
8:00	176	184	188	183	158	90	49	178	147
9:00	199	186	195	226	247	126	83	211	180
10:00	195	182	176	175	264	165	87	198	178
11:00	232	216	222	204	275	140	113	230	200
12:00	205	210	264	251	298	162	164	246	222
13:00	257	198	202	249	390	109	162	259	224
14:00	300	319	309	361	483	117	178	354	295
15:00	628	599	478	650	623	114	169	596	466
16:00	523	560	689	560	481	96	141	563	436
17:00	390	421	427	420	325	106	155	397	321
18:00	314	352	373	366	313	240	246	344	315
19:00	203	213	196	245	280	159	202	227	214
20:00	55	70	61	66	83	33	47	67	59
21:00	31	28	48	46	36	17	36	38	35
22:00	44	38	58	43	41	17	24	45	38
23:00	38	54	45	47	32	15	14	43	35
Total	4396	4529	4608	4746	4968	2165	2246	4649	3951

7-19	3713	3721	3752	3849	4078	1652	1719	3823	3212
6-22	4209	4269	4322	4462	4707	2012	2141	4394	3732
6-24	4291	4361	4425	4552	4780	2044	2179	4482	3805
0-24	4396	4529	4608	4746	4968	2165	2246	4649	3951

Job No	N1299	
Client	EMM	
Road	Golden Hwy - Between Broke Rd & Mt Thornley	Average Weekday 5,200
Location	Singleton	7 Day Average 4,395
Site No.	2	
Start Date	4-Mar-14	
Description	Volume Summary	
Direction	WB	

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar		
AM Peak	958	846	883	958	818	232	185		
PM Peak	312	305	290	295	351	210	235		
0:00	12	8	7	13	26	30	11	13	15
1:00	5	11	15	6	6	18	14	9	11
2:00	22	11	25	26	18	18	16	20	19
3:00	23	17	27	38	26	36	17	26	26
4:00	135	102	96	111	114	54	25	112	91
5:00	604	631	614	648	648	232	178	629	508
6:00	958	846	883	958	818	221	185	893	696
7:00	451	426	414	442	384	111	57	423	326
8:00	301	265	273	338	309	101	74	297	237
9:00	277	207	222	249	261	124	129	243	210
10:00	224	230	289	266	296	150	117	261	225
11:00	247	213	280	213	290	126	168	249	220
12:00	237	219	233	278	242	128	145	242	212
13:00	303	245	238	282	273	139	164	268	235
14:00	310	206	243	233	249	126	205	248	225
15:00	277	220	226	209	281	95	151	243	208
16:00	248	201	226	206	246	107	158	225	199
17:00	312	305	290	295	351	210	235	311	285
18:00	281	233	227	239	247	171	208	245	229
19:00	82	78	90	96	73	41	53	84	73
20:00	69	73	42	56	72	29	35	62	54
21:00	43	30	42	40	44	24	39	40	37
22:00	41	35	40	53	40	28	25	42	37
23:00	5	8	20	19	22	17	21	15	16
Total	5467	4820	5062	5314	5336	2336	2430	5200	4395

7-19	3468	2970	3161	3250	3429	1588	1811	3256	2811
6-22	4620	3997	4218	4400	4436	1903	2123	4334	3671
6-24	4666	4040	4278	4472	4498	1948	2169	4391	3724
0-24	5467	4820	5062	5314	5336	2336	2430	5200	4395

Job No	N1299	
Client	EMM	
Road	Wallaby Scrub Rd - North of Putty Rd	Average Weekday 921
Location	Singleton	7 Day Average 875
Site No.	1	
Start Date	4-Mar-14	
Description	Volume Summary	
Direction	Combined	

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar		
AM Peak	88	89	68	96	74	52	60		
PM Peak	104	81	82	91	115	54	110		
0:00	3	8	9	10	10	5	5	8	7
1:00	2	0	1	1	5	1	3	2	2
2:00	0	1	0	2	4	1	1	1	1
3:00	4	1	4	5	2	2	1	3	3
4:00	17	9	8	8	10	4	6	10	9
5:00	58	64	49	48	59	28	21	56	47
6:00	88	89	68	96	74	36	32	83	69
7:00	68	54	50	48	50	41	34	54	49
8:00	39	45	40	44	48	30	21	43	38
9:00	44	32	39	39	42	52	28	39	39
10:00	54	28	35	48	50	34	43	43	42
11:00	52	24	43	47	57	45	60	45	47
12:00	57	41	33	43	67	54	63	48	51
13:00	48	40	41	38	68	49	74	47	51
14:00	77	53	54	45	87	47	110	63	68
15:00	104	81	82	91	115	40	86	95	86
16:00	71	58	72	87	105	40	71	79	72
17:00	63	49	63	70	99	40	79	69	66
18:00	50	54	54	63	82	41	61	61	58
19:00	39	33	24	36	58	30	47	38	38
20:00	7	8	16	17	28	5	29	15	16
21:00	6	2	1	9	16	5	9	7	7
22:00	8	10	10	11	10	0	2	10	7
23:00	2	5	3	2	1	7	1	3	3
Total	961	789	799	908	1147	637	887	921	875

7-19	727	559	606	663	870	513	730	685	667
6-22	867	691	715	821	1046	589	847	828	797
6-24	877	706	728	834	1057	596	850	840	807
0-24	961	789	799	908	1147	637	887	921	875

Job No	N1299	
Client	EMM	
Road	Wallaby Scrub Rd - North of Putty Rd	Average Weekday 439
Location	Singleton	7 Day Average 417
Site No.	1	
Start Date	4-Mar-14	
Description	Volume Summary	
Direction	NB	

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar		
AM Peak	72	77	57	80	63	27	26		
PM Peak	35	23	30	27	39	28	45		
0:00	2	0	0	3	0	5	4	1	2
1:00	1	0	1	1	4	1	0	1	1
2:00	0	1	0	0	3	0	0	1	1
3:00	3	1	4	4	1	1	1	3	2
4:00	14	8	7	7	10	3	5	9	8
5:00	53	58	46	43	54	24	21	51	43
6:00	72	77	57	80	63	21	19	70	56
7:00	39	31	31	21	24	13	8	29	24
8:00	22	30	24	21	21	16	11	24	21
9:00	28	17	22	20	20	27	14	21	21
10:00	25	14	13	22	22	19	26	19	20
11:00	21	14	17	12	22	23	22	17	19
12:00	34	23	19	13	26	26	28	23	24
13:00	27	21	22	20	22	28	24	22	23
14:00	28	18	16	9	22	15	45	19	22
15:00	35	13	16	20	26	19	34	22	23
16:00	24	19	20	24	33	18	34	24	25
17:00	30	19	30	27	39	24	43	29	30
18:00	24	10	17	25	38	26	35	23	25
19:00	11	6	11	12	17	4	13	11	11
20:00	4	3	9	9	15	2	10	8	7
21:00	3	2	1	6	8	1	4	4	4
22:00	5	8	7	7	7	0	0	7	5
23:00	0	2	0	0	0	6	1	0	1
Total	505	395	390	406	497	322	402	439	417

7-19	337	229	247	234	315	254	324	272	277
6-22	427	317	325	341	418	282	370	366	354
6-24	432	327	332	348	425	288	371	373	360
0-24	505	395	390	406	497	322	402	439	417

Job No	N1299	
Client	EMM	
Road	Wallaby Scrub Rd - North of Putty Rd	Average Weekday 482
Location	Singleton	7 Day Average 459
Site No.	1	
Start Date	4-Mar-14	
Description	Volume Summary	
Direction	SB	

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	10-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar		
AM Peak	31	23	26	35	35	28	38		
PM Peak	69	68	66	71	89	32	65		
0:00	1	8	9	7	10	0	1	7	5
1:00	1	0	0	0	1	0	3	0	1
2:00	0	0	0	2	1	1	1	1	1
3:00	1	0	0	1	1	1	0	1	1
4:00	3	1	1	1	0	1	1	1	1
5:00	5	6	3	5	5	4	0	5	4
6:00	16	12	11	16	11	15	13	13	13
7:00	29	23	19	27	26	28	26	25	25
8:00	17	15	16	23	27	14	10	20	17
9:00	16	15	17	19	22	25	14	18	18
10:00	29	14	22	26	28	15	17	24	22
11:00	31	10	26	35	35	22	38	27	28
12:00	23	18	14	30	41	28	35	25	27
13:00	21	19	19	18	46	21	50	25	28
14:00	49	35	38	36	65	32	65	45	46
15:00	69	68	66	71	89	21	52	73	62
16:00	47	39	52	63	72	22	37	55	47
17:00	33	30	33	43	60	16	36	40	36
18:00	26	44	37	38	44	15	26	38	33
19:00	28	27	13	24	41	26	34	27	28
20:00	3	5	7	8	13	3	19	7	8
21:00	3	0	0	3	8	4	5	3	3
22:00	3	2	3	4	3	0	2	3	2
23:00	2	3	3	2	1	1	0	2	2
Total	456	394	409	502	650	315	485	482	459

7-19	390	330	359	429	555	259	406	413	390
6-22	440	374	390	480	628	307	477	462	442
6-24	445	379	396	486	632	308	479	468	446
0-24	456	394	409	502	650	315	485	482	459

STATE HIGHWAY NO.23 - CHARLESTOWN-SANDGATE HIGHWAY

LAKE MACQUARIE LGA

STATION	LOCATION	MAP	Km	1980 AADT	1982 AADT	1984 AADT	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1995 AADT	1998 AADT	2001 AADT	2004 AADT
05.304	H'BOROUGH-N OF WARNERS BAY RD,MR325	F	0.0	--	--	--	--	--	--	--	--	--	--	29923

NEWCASTLE LGA

STATION	LOCATION	MAP	Km	1980 AADT	1982 AADT	1984 AADT	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1995 AADT	1998 AADT	2001 AADT	2004 AADT
05.308	KOTARA-0.5KM N OF MYALL RD	B	2.4	17470	21170	23630	23624	--	--	--	--	--	--	38866
05.309	KOTARA-N OF CARNLEY AV	B	3.1	--	17650	19620	19580	19790	--	18833	25993	25489	22013	33279
05.310	CARDIFF HEIGHTS-N OF CARDIFF RD,223	B	3.6	--	24290	25490	25822	25086	--	23993	29774	29515	28014	36859
V05.204	NEW LAMBTON HEIGHTS-N OF RIDGEWAY RD	B	4.1	24850*	26936*	29007*	30359*	30594*	30996V	33737V	35149V	35596V	36907V	-- ³
05.312	NEW LAMBTON HTS-N OF MR223,RUSSELL R	B	0.1	15620	16690	18020	19102	--	--	--	--	--	--	--
05.314	LAMBTON-N OF MR188,HOVE ST	B	1.0	20270	21260	22820	22679	23219	--	25284	22398	29247	28695	33571
05.951	SHORTLAND-SH23 OFF/R NB+SANDGTE ON-S	B	7.6	--	--	--	--	--	--	--	14525	15945	16153	16966
05.321	SANDGATE-S OF SH10,PACIFIC HWY	40	9.4	17990	19540	21310	21424	--	--	--	--	--	--	27062

STATE HIGHWAY NO.27 - GOLDEN HIGHWAY

SINGLETON LGA

STATION	LOCATION	MAP	Km	1980 AADT	1982 AADT	1984 AADT	1986 AADT	1988 AADT	1990 AADT	1992 AADT	1995 AADT	1998 AADT	2001 AADT	2004 AADT
05.841	WHITTINGHAM-W OF SH9,NEW ENGLAND HWY	38	0.0	--	--	2560	--	1682	--	2286	3337	3333	3724	3637
05.638	EAST OF MR181B,BROKE RD	38	0.0	3910	--	5160	--	4759	--	4800	6447	7164	7966	8143
05.637	MT THORLEY-E OF MR503,MILBRODALE RD	38	180.3	3160	--	5180	--	--	--	--	--	--	--	--
05.481	MT THORLEY-N OF MR503,THE PUTTY RD	38	0.1	3120	--	4200	--	4757	--	4508	7997	6256	7059	5572
05.482	WARKWORTH-AT WOLLOMBI BROOK BR	38	11.8	3610	--	3430	--	--	--	--	--	--	--	--

³ 05204s has many problems through out 2004

Appendix B

Intersection traffic surveys



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : EMGA
 Job No/Name : 5030 MT. THORLEY Mine Access
 Day/Date : Tuesday 4th March 2014

PEDS	WEST	SOUTH	EAST	
Time Per	Golden Hwy	Mitchell Line	Putty Rd	TOT
0600 - 0615				0
0615 - 0630		NOT		0
0630 - 0645		REQUIRED		0
0645 - 0700				0
0700 - 0715				0
0715 - 0730				0
0730 - 0745				0
0745 - 0800				0
0800 - 0815				0
0815 - 0830				0
0830 - 0845				0
0845 - 0900				0
Per End	0	0	0	0

PEDS	WEST	SOUTH	EAST	
Peak Per	Golden Hwy	Mitchell Line	Putty Rd	TOT
0600 - 0700	0	0	0	0
0615 - 0715	0	0	0	0
0630 - 0730	0	0	0	0
0645 - 0745	0	0	0	0
0700 - 0800	0	0	0	0
0715 - 0815	0	0	0	0
0730 - 0830	0	0	0	0
0745 - 0845	0	0	0	0
0800 - 0900	0	0	0	0
PEAK HR	0	0	0	0

Lights	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Time Per	I	R	L	R	L	I	TOT
0600 - 0615	26	10	123	1	4	88	252
0615 - 0630	29	16	171	0	4	103	323
0630 - 0645	35	30	146	1	1	114	327
0645 - 0700	39	31	83	1	1	117	272
0700 - 0715	53	78	100	7	1	68	307
0715 - 0730	42	44	56	4	1	58	205
0730 - 0745	30	29	37	2	4	62	164
0745 - 0800	31	23	44	1	2	51	152
0800 - 0815	39	18	29	1	2	52	141
0815 - 0830	42	19	36	0	2	50	149
0830 - 0845	33	13	23	2	2	24	97
0845 - 0900	46	19	34	2	3	37	141
Per End	445	330	882	22	27	824	2530

Heavies	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Time Per	I	R	L	R	L	I	TOT
0600 - 0615	2	2	3	0	4	4	15
0615 - 0630	2	2	8	0	0	4	16
0630 - 0645	2	3	5	0	0	2	12
0645 - 0700	2	4	8	0	0	1	15
0700 - 0715	1	1	7	0	0	7	16
0715 - 0730	1	4	2	0	0	4	11
0730 - 0745	1	1	2	0	1	1	6
0745 - 0800	1	4	8	0	0	4	17
0800 - 0815	4	5	3	0	0	3	15
0815 - 0830	7	8	4	0	1	6	26
0830 - 0845	2	2	5	0	0	1	10
0845 - 0900	2	5	5	0	0	4	16
Per End	27	41	60	0	6	41	175

Combined	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Time Per	I	R	L	R	L	I	TOT
0600 - 0615	28	12	126	1	8	92	267
0615 - 0630	31	18	179	0	4	107	339
0630 - 0645	37	33	151	1	1	116	339
0645 - 0700	41	35	91	1	1	118	287
0700 - 0715	54	79	107	7	1	75	323
0715 - 0730	43	48	58	4	1	62	216
0730 - 0745	31	30	39	2	5	63	170
0745 - 0800	32	27	52	1	2	55	169
0800 - 0815	43	23	32	1	2	55	156
0815 - 0830	49	27	40	0	3	56	175
0830 - 0845	35	15	28	2	2	25	107
0845 - 0900	48	24	39	2	3	41	157
Per End	472	371	942	22	33	865	2705

Lights	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Peak Per	I	R	L	R	L	I	TOT
0600 - 0700	129	87	523	3	10	422	1174
0615 - 0715	156	155	500	9	7	402	1229
0630 - 0730	169	183	385	13	4	357	1111
0645 - 0745	164	182	276	14	7	305	948
0700 - 0800	156	174	237	14	8	239	828
0715 - 0815	142	114	166	8	9	223	662
0730 - 0830	142	89	146	4	10	215	606
0745 - 0845	145	73	132	4	8	177	539
0800 - 0900	160	69	122	5	9	163	528
PEAK HR	156	155	500	9	7	402	1229

Heavies	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Peak Per	I	R	L	R	L	I	TOT
0600 - 0700	8	11	24	0	4	11	58
0615 - 0715	7	10	28	0	0	14	59
0630 - 0730	6	12	22	0	0	14	54
0645 - 0745	5	10	19	0	1	13	48
0700 - 0800	4	10	19	0	1	16	50
0715 - 0815	7	14	15	0	1	12	49
0730 - 0830	13	18	17	0	2	14	64
0745 - 0845	14	19	20	0	1	14	68
0800 - 0900	15	20	17	0	1	14	67
PEAK HR	7	10	28	0	0	14	59

Combined	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Peak Per	I	R	L	R	L	I	TOT
0600 - 0700	137	98	547	3	14	433	1232
0615 - 0715	163	165	528	9	7	416	1288
0630 - 0730	175	195	407	13	4	371	1165
0645 - 0745	169	192	295	14	8	318	996
0700 - 0800	160	184	256	14	9	255	878
0715 - 0815	149	128	181	8	10	235	711
0730 - 0830	155	107	163	4	12	229	670
0745 - 0845	159	92	152	4	9	191	607
0800 - 0900	175	89	139	5	10	177	595
PEAK HR	163	165	528	9	7	416	1288



R.O.A.R. DATA

Reliable, Original & Authentic Results

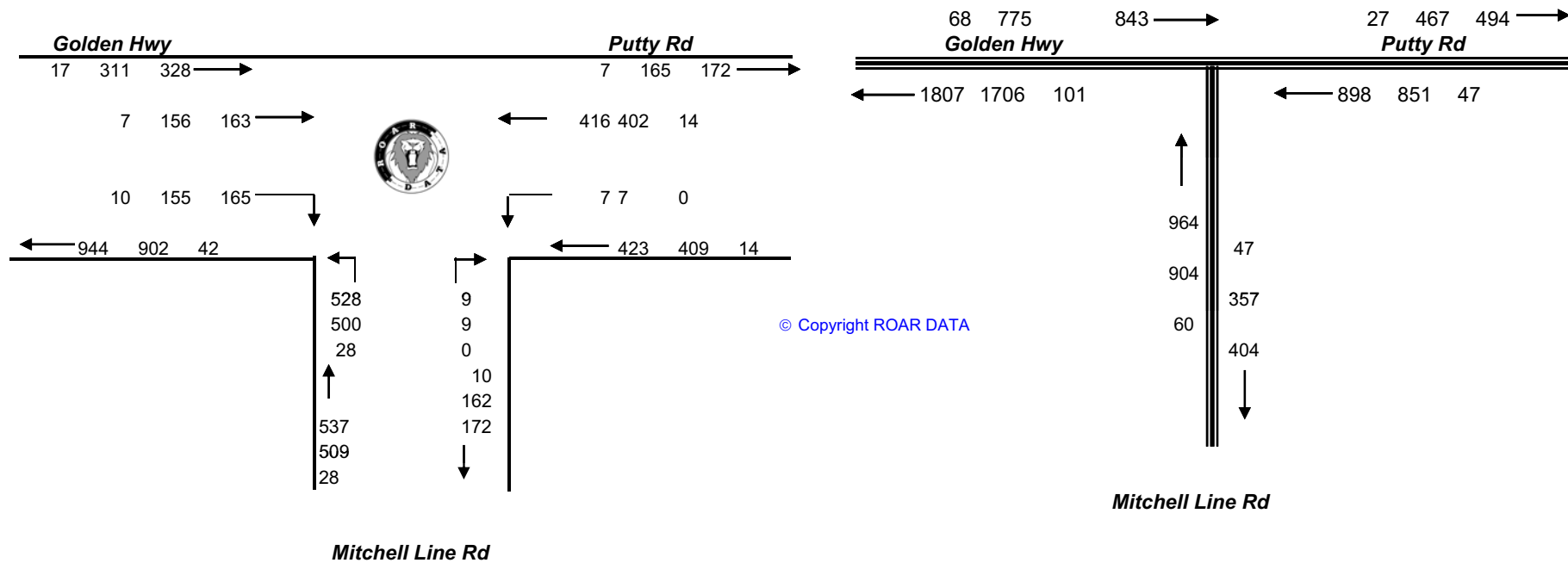
Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMGA
Job No/Name : 5030 MT. THORLEY Mine Access
Day/Date : Tuesday 4th March 2014

AM PEAK
0615 - 0715



**TOTAL VOLUMES
FOR COUNT
PERIOD**





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMGA
Job No/Name : 5030 MT. THORLEY Mine Access
Day/Date : Tuesday 4th March 2014

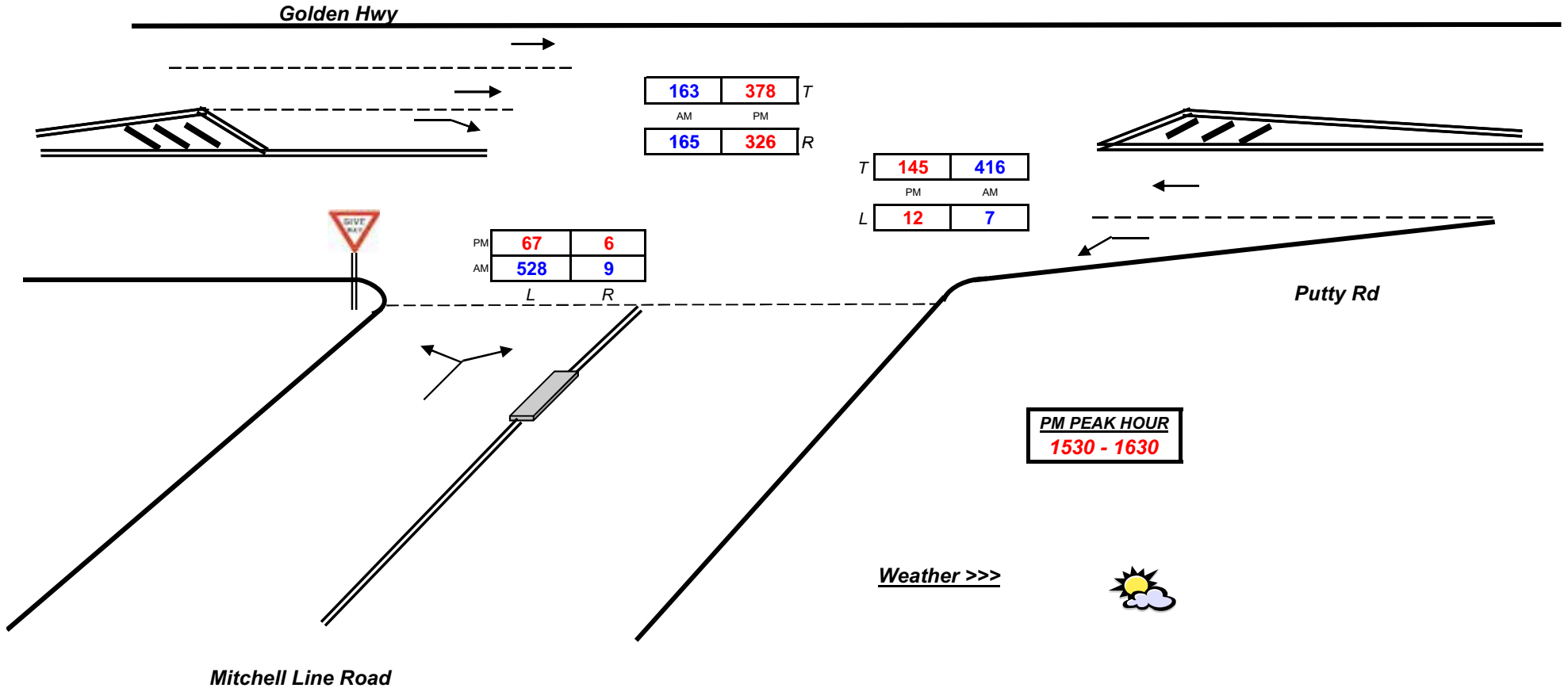
Intersection Details

Obtained via satellite

May be incorrect

AM PEAK HOUR
0615 - 0715

Combined figures only





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : EMGA
 Job No/Name : 5030 MT. THORLEY Mine Access
 Day/Date : Tuesday 4th March 2014

PEDS	WEST	SOUTH	EAST	
Time Per	Golden Hwy	Mitchell Line	Putty Rd	TOT
1500 - 1515				0
1515 - 1530		NOT		0
1530 - 1545		REQUIRED		0
1545 - 1600				0
1600 - 1615				0
1615 - 1630				0
1630 - 1645				0
1645 - 1700				0
1700 - 1715				0
1715 - 1730				0
1730 - 1745				0
1745 - 1800				0
Per End	0	0	0	0

PEDS	WEST	SOUTH	EAST	
Peak Per	Golden Hwy	Mitchell Line	Putty Rd	TOT
1500 - 1600	0	0	0	0
1515 - 1615	0	0	0	0
1530 - 1630	0	0	0	0
1545 - 1645	0	0	0	0
1600 - 1700	0	0	0	0
1615 - 1715	0	0	0	0
1630 - 1730	0	0	0	0
1645 - 1745	0	0	0	0
1700 - 1800	0	0	0	0
PEAK HR	0	0	0	0

Lights	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Time Per	I	R	L	R	L	I	TOT
1500 - 1515	74	80	17	8	4	43	226
1515 - 1530	75	73	17	2	3	27	197
1530 - 1545	90	92	10	1	1	30	224
1545 - 1600	89	79	22	1	4	34	229
1600 - 1615	108	71	7	0	4	32	222
1615 - 1630	80	64	14	4	3	31	196
1630 - 1645	87	62	15	1	3	30	198
1645 - 1700	76	67	23	0	6	25	197
1700 - 1715	86	80	27	3	1	38	235
1715 - 1730	60	51	27	3	1	32	174
1730 - 1745	41	34	32	1	2	44	154
1745 - 1800	54	49	49	2	0	45	199
Per End	920	802	260	26	32	411	2451

Heavies	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Time Per	I	R	L	R	L	I	TOT
1500 - 1515	1	5	7	1	0	3	17
1515 - 1530	1	1	5	0	0	1	8
1530 - 1545	4	4	2	0	0	5	15
1545 - 1600	5	4	2	0	0	7	18
1600 - 1615	1	8	5	0	0	2	16
1615 - 1630	1	4	5	0	0	4	14
1630 - 1645	4	2	2	0	0	0	8
1645 - 1700	4	1	2	0	0	0	7
1700 - 1715	2	8	3	0	0	1	14
1715 - 1730	2	3	6	0	0	2	13
1730 - 1745	1	2	4	0	0	2	9
1745 - 1800	1	4	2	0	1	0	8
Per End	27	46	45	1	1	27	147

Combined	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Time Per	I	R	L	R	L	I	TOT
1500 - 1515	75	85	24	9	4	46	243
1515 - 1530	76	74	22	2	3	28	205
1530 - 1545	94	96	12	1	1	35	239
1545 - 1600	94	83	24	1	4	41	247
1600 - 1615	109	79	12	0	4	34	238
1615 - 1630	81	68	19	4	3	35	210
1630 - 1645	91	64	17	1	3	30	206
1645 - 1700	80	68	25	0	6	25	204
1700 - 1715	88	88	30	3	1	39	249
1715 - 1730	62	54	33	3	1	34	187
1730 - 1745	42	36	36	1	2	46	163
1745 - 1800	55	53	51	2	1	45	207
Per End	947	848	305	27	33	438	2598

Lights	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Peak Per	I	R	L	R	L	I	TOT
1500 - 1600	328	324	66	12	12	134	876
1515 - 1615	362	315	56	4	12	123	872
1530 - 1630	367	306	53	6	12	127	871
1545 - 1645	364	276	58	6	14	127	845
1600 - 1700	351	264	59	5	16	118	813
1615 - 1715	329	273	79	8	13	124	826
1630 - 1730	309	260	92	7	11	125	804
1645 - 1745	263	232	109	7	10	139	760
1700 - 1800	241	214	135	9	4	159	762
PEAK HR	367	306	53	6	12	127	871

Heavies	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Peak Per	I	R	L	R	L	I	TOT
1500 - 1600	11	14	16	1	0	16	58
1515 - 1615	11	17	14	0	0	15	57
1530 - 1630	11	20	14	0	0	18	63
1545 - 1645	11	18	14	0	0	13	56
1600 - 1700	10	15	14	0	0	6	45
1615 - 1715	11	15	12	0	0	5	43
1630 - 1730	12	14	13	0	0	3	42
1645 - 1745	9	14	15	0	0	5	43
1700 - 1800	6	17	15	0	1	5	44
PEAK HR	11	20	14	0	0	18	63

Combined	WEST		SOUTH		EAST		
	Golden Hwy		Mitchell Line		Putty Rd		
Peak Per	I	R	L	R	L	I	TOT
1500 - 1600	339	338	82	13	12	150	934
1515 - 1615	373	332	70	4	12	138	929
1530 - 1630	378	326	67	6	12	145	934
1545 - 1645	375	294	72	6	14	140	901
1600 - 1700	361	279	73	5	16	124	858
1615 - 1715	340	288	91	8	13	129	869
1630 - 1730	321	274	105	7	11	128	846
1645 - 1745	272	246	124	7	10	144	803
1700 - 1800	247	231	150	9	5	164	806
PEAK HR	378	326	67	6	12	145	934



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMGA

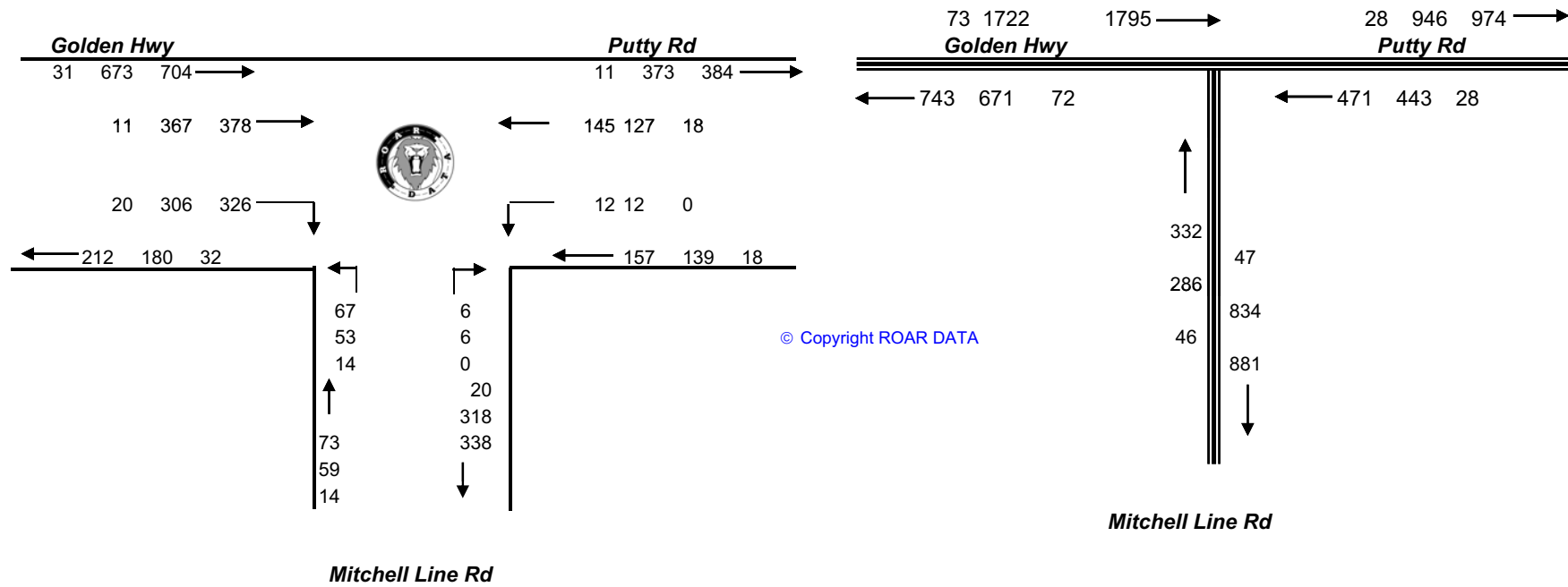
Job No/Name : 5030 MT. THORLEY Mine Access

Day/Date : Tuesday 4th March 2014

PM PEAK
1530 - 1630



TOTAL VOLUMES
FOR COUNT
PERIOD





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : EMGA
 Job No/Name : 5030 MT. THORLEY Mine Access
 Day/Date : Tuesday 4th March 2014

PEDS	NORTH	WEST	SOUTH	
Time Per	Broke Rd	Mt Thorley	Broke Rd	TOT
0600 - 0615				0
0615 - 0630		NOT		0
0630 - 0645		REQUIRED		0
0645 - 0700				0
0700 - 0715				0
0715 - 0730				0
0730 - 0745				0
0745 - 0800				0
0800 - 0815				0
0815 - 0830				0
0830 - 0845				0
0845 - 0900				0
Per End	0	0	0	0

PEDS	NORTH	WEST	SOUTH	
Peak Per	Broke Rd	Mt Thorley	Broke Rd	TOT
0600 - 0700	0	0	0	0
0615 - 0715	0	0	0	0
0630 - 0730	0	0	0	0
0645 - 0745	0	0	0	0
0700 - 0800	0	0	0	0
0715 - 0815	0	0	0	0
0730 - 0830	0	0	0	0
0745 - 0845	0	0	0	0
0800 - 0900	0	0	0	0

PEAK HR	0	0	0	0
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Lights	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Time Per	I	R	L	R	L	I	TOT
0600 - 0615	26	5	0	0	0	20	51
0615 - 0630	57	3	0	0	1	25	86
0630 - 0645	71	4	0	0	0	27	102
0645 - 0700	60	4	1	1	0	29	95
0700 - 0715	46	0	0	0	0	36	82
0715 - 0730	31	3	0	0	0	40	74
0730 - 0745	27	2	0	0	0	24	53
0745 - 0800	20	1	0	0	0	25	46
0800 - 0815	32	2	0	0	0	24	58
0815 - 0830	15	5	0	0	0	21	41
0830 - 0845	16	0	1	0	0	15	32
0845 - 0900	15	0	0	0	0	26	41
Per End	416	29	2	1	1	312	761

Heavies	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Time Per	I	R	L	R	L	I	TOT
0600 - 0615	0	0	0	0	0	1	1
0615 - 0630	3	0	0	0	0	2	5
0630 - 0645	2	0	0	0	0	1	3
0645 - 0700	2	0	0	0	0	1	3
0700 - 0715	4	0	0	0	0	1	5
0715 - 0730	2	0	0	0	0	2	4
0730 - 0745	2	0	0	0	0	1	3
0745 - 0800	1	0	0	0	0	3	4
0800 - 0815	1	0	0	0	0	3	4
0815 - 0830	2	0	0	0	0	1	3
0830 - 0845	2	0	0	0	0	3	5
0845 - 0900	4	0	0	0	0	2	6
Per End	25	0	0	0	0	21	46

Combined	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Time Per	I	R	L	R	L	I	TOT
0600 - 0615	26	5	0	0	0	21	52
0615 - 0630	60	3	0	0	1	27	91
0630 - 0645	73	4	0	0	0	28	105
0645 - 0700	62	4	1	1	0	30	98
0700 - 0715	50	0	0	0	0	37	87
0715 - 0730	33	3	0	0	0	42	78
0730 - 0745	29	2	0	0	0	25	56
0745 - 0800	21	1	0	0	0	28	50
0800 - 0815	33	2	0	0	0	27	62
0815 - 0830	17	5	0	0	0	22	44
0830 - 0845	18	0	1	0	0	18	37
0845 - 0900	19	0	0	0	0	28	47
Per End	441	29	2	1	1	333	807

Lights	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Peak Per	I	R	L	R	L	I	TOT
0600 - 0700	214	16	1	1	1	101	334
0615 - 0715	234	11	1	1	1	117	365
0630 - 0730	208	11	1	1	0	132	353
0645 - 0745	164	9	1	1	0	129	304
0700 - 0800	124	6	0	0	0	125	255
0715 - 0815	110	8	0	0	0	113	231
0730 - 0830	94	10	0	0	0	94	198
0745 - 0845	83	8	1	0	0	85	177
0800 - 0900	78	7	1	0	0	86	172
PEAK HR	234	11	1	1	1	117	365

Heavies	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Peak Per	I	R	L	R	L	I	TOT
0600 - 0700	7	0	0	0	0	5	12
0615 - 0715	11	0	0	0	0	5	16
0630 - 0730	10	0	0	0	0	5	15
0645 - 0745	10	0	0	0	0	5	15
0700 - 0800	9	0	0	0	0	7	16
0715 - 0815	6	0	0	0	0	9	15
0730 - 0830	6	0	0	0	0	8	14
0745 - 0845	6	0	0	0	0	10	16
0800 - 0900	9	0	0	0	0	9	18
PEAK HR	11	0	0	0	0	5	16

Combined	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Peak Per	I	R	L	R	L	I	TOT
0600 - 0700	221	16	1	1	1	106	346
0615 - 0715	245	11	1	1	1	122	381
0630 - 0730	218	11	1	1	0	137	368
0645 - 0745	174	9	1	1	0	134	319
0700 - 0800	133	6	0	0	0	132	271
0715 - 0815	116	8	0	0	0	122	246
0730 - 0830	100	10	0	0	0	102	212
0745 - 0845	89	8	1	0	0	95	193
0800 - 0900	87	7	1	0	0	95	190
PEAK HR	245	11	1	1	1	122	381



R.O.A.R. DATA

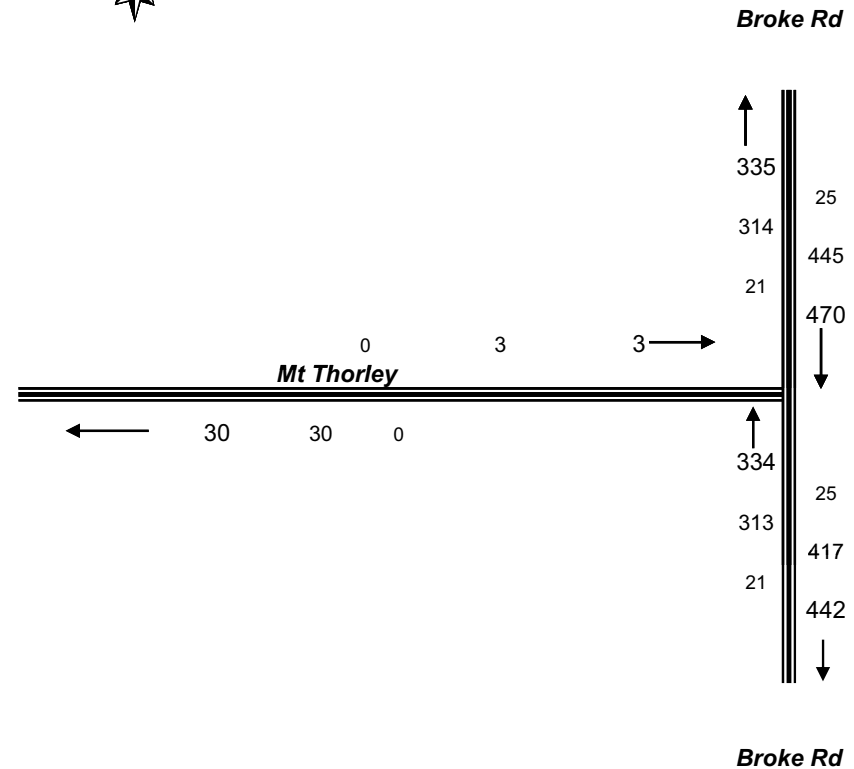
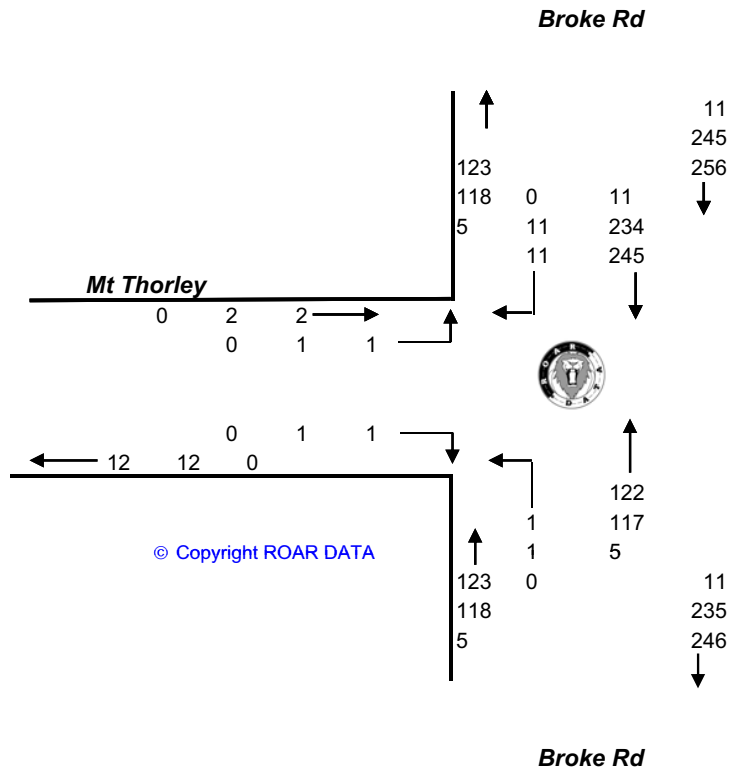
Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMGA
Job No/Name : 5030 MT. THORLEY Mine Access
Day/Date : Tuesday 4th March 2014

AM PEAK
0615 - 0715

**TOTAL VOLUMES
FOR COUNT
PERIOD**





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMGA
Job No/Name : 5030 MT. THORLEY Mine Access
Day/Date : Tuesday 4th March 2014

Intersection Details

Obtained via satellite

May be incorrect

AM PEAK HOUR
0615 - 0715



Mt. Thorley Mine Access

Broke Rd



R		T		
11		245		AM
0		97		PM

1		19		L
1		3		R
	AM		PM	

PM	0	140	
AM	1	122	
	L	T	

PM PEAK HOUR
1515 - 1615

Combined figures only

Weather >>>



Broke Rd



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : EMGA
 Job No/Name : 5030 MT. THORLEY Mine Access
 Day/Date : Tuesday 4th March 2014

PEDS	NORTH	WEST	SOUTH	
Time Per	Broke Rd	Mt Thorley	Broke Rd	TOT
1500 - 1515				0
1515 - 1530		NOT		0
1530 - 1545		REQUIRED		0
1545 - 1600				0
1600 - 1615				0
1615 - 1630				0
1630 - 1645				0
1645 - 1700				0
1700 - 1715				0
1715 - 1730				0
1730 - 1745				0
1745 - 1800				0
Per End	0	0	0	0

PEDS	NORTH	WEST	SOUTH	
Peak Per	Broke Rd	Mt Thorley	Broke Rd	TOT
1500 - 1600	0	0	0	0
1515 - 1615	0	0	0	0
1530 - 1630	0	0	0	0
1545 - 1645	0	0	0	0
1600 - 1700	0	0	0	0
1615 - 1715	0	0	0	0
1630 - 1730	0	0	0	0
1645 - 1745	0	0	0	0
1700 - 1800	0	0	0	0

PEAK HR	0	0	0	0
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Lights	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Time Per	I	R	L	R	L	I	TOT
1500 - 1515	32	0	4	0	0	29	65
1515 - 1530	24	0	3	0	0	33	60
1530 - 1545	26	0	2	0	0	35	63
1545 - 1600	17	0	9	2	0	22	50
1600 - 1615	24	0	5	1	0	45	75
1615 - 1630	23	0	3	0	0	23	49
1630 - 1645	15	0	2	0	0	30	47
1645 - 1700	17	0	1	0	0	32	50
1700 - 1715	25	0	1	0	0	33	59
1715 - 1730	19	0	0	0	0	17	36
1730 - 1745	22	0	0	0	0	22	44
1745 - 1800	11	0	1	0	0	23	35
Per End	255	0	31	3	0	344	633

Heavies	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Time Per	I	R	L	R	L	I	TOT
1500 - 1515	0	0	0	0	0	1	1
1515 - 1530	1	0	0	0	0	1	2
1530 - 1545	2	0	0	0	0	2	4
1545 - 1600	1	0	0	0	0	1	2
1600 - 1615	2	0	0	0	0	1	3
1615 - 1630	2	0	0	0	0	0	2
1630 - 1645	0	0	0	0	0	1	1
1645 - 1700	1	0	0	0	0	2	3
1700 - 1715	0	0	0	0	0	2	2
1715 - 1730	0	0	0	0	0	0	0
1730 - 1745	0	0	0	0	0	1	1
1745 - 1800	0	0	0	0	0	2	2
Per End	9	0	0	0	0	14	23

Combined	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Time Per	I	R	L	R	L	I	TOT
1500 - 1515	32	0	4	0	0	30	66
1515 - 1530	25	0	3	0	0	34	62
1530 - 1545	28	0	2	0	0	37	67
1545 - 1600	18	0	9	2	0	23	52
1600 - 1615	26	0	5	1	0	46	78
1615 - 1630	25	0	3	0	0	23	51
1630 - 1645	15	0	2	0	0	31	48
1645 - 1700	18	0	1	0	0	34	53
1700 - 1715	25	0	1	0	0	35	61
1715 - 1730	19	0	0	0	0	17	36
1730 - 1745	22	0	0	0	0	23	45
1745 - 1800	11	0	1	0	0	25	37
Per End	264	0	31	3	0	358	656

Lights	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Peak Per	I	R	L	R	L	I	TOT
1500 - 1600	99	0	18	2	0	119	238
1515 - 1615	91	0	19	3	0	135	248
1530 - 1630	90	0	19	3	0	125	237
1545 - 1645	79	0	19	3	0	120	221
1600 - 1700	79	0	11	1	0	130	221
1615 - 1715	80	0	7	0	0	118	205
1630 - 1730	76	0	4	0	0	112	192
1645 - 1745	83	0	2	0	0	104	189
1700 - 1800	77	0	2	0	0	95	174
PEAK HR	91	0	19	3	0	135	248

Heavies	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Peak Per	I	R	L	R	L	I	TOT
1500 - 1600	4	0	0	0	0	5	9
1515 - 1615	6	0	0	0	0	5	11
1530 - 1630	7	0	0	0	0	4	11
1545 - 1645	5	0	0	0	0	3	8
1600 - 1700	5	0	0	0	0	4	9
1615 - 1715	3	0	0	0	0	5	8
1630 - 1730	1	0	0	0	0	5	6
1645 - 1745	1	0	0	0	0	5	6
1700 - 1800	0	0	0	0	0	5	5
PEAK HR	6	0	0	0	0	5	11

Combined	NORTH		WEST		SOUTH		
	Broke Rd		Mt Thorley		Broke Rd		
Peak Per	I	R	L	R	L	I	TOT
1500 - 1600	103	0	18	2	0	124	247
1515 - 1615	97	0	19	3	0	140	259
1530 - 1630	97	0	19	3	0	129	248
1545 - 1645	84	0	19	3	0	123	229
1600 - 1700	84	0	11	1	0	134	230
1615 - 1715	83	0	7	0	0	123	213
1630 - 1730	77	0	4	0	0	117	198
1645 - 1745	84	0	2	0	0	109	195
1700 - 1800	77	0	2	0	0	100	179
PEAK HR	97	0	19	3	0	140	259



R.O.A.R. DATA

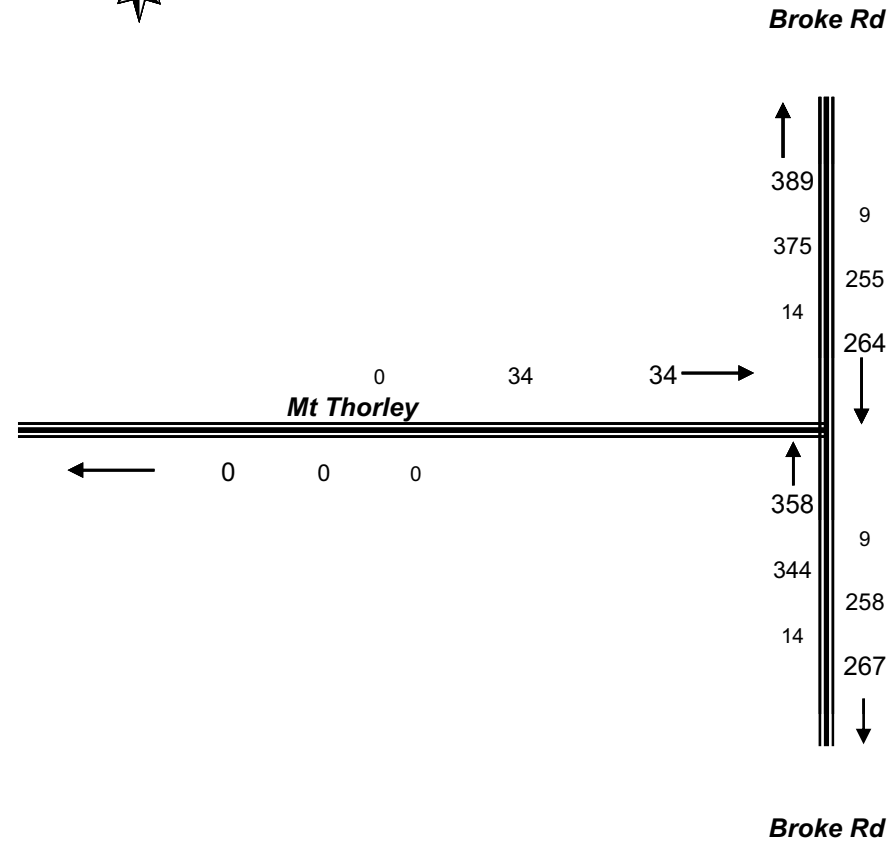
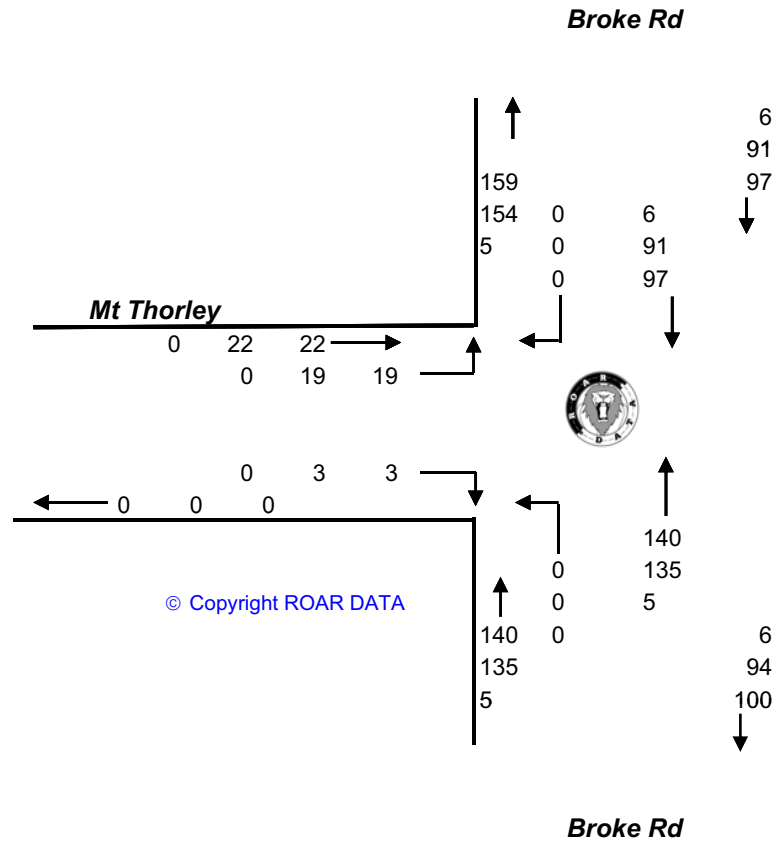
Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : EMGA
Job No/Name : 5030 MT. THORLEY Mine Access
Day/Date : Tuesday 4th March 2014

PM PEAK
1515 - 1615

**TOTAL VOLUMES
FOR COUNT
PERIOD**





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : EMGA
 Job No/Name : 5030 MT. THORLEY Mine Access
 Day/Date : Tuesday 4th March 2014

PEDS	WEST	NORTH	EAST	
Time Per	Putty Rd	Warkworth	Putty Rd	TOT
0600 - 0615				0
0615 - 0630		NOT		0
0630 - 0645		REQUIRED		0
0645 - 0700				0
0700 - 0715				0
0715 - 0730				0
0730 - 0745				0
0745 - 0800				0
0800 - 0815				0
0815 - 0830				0
0830 - 0845				0
0845 - 0900				0
Per End	0	0	0	0

PEDS	WEST	NORTH	EAST	
Peak Per	Putty Rd	Warkworth	Putty Rd	TOT
0600 - 0700	0	0	0	0
0615 - 0715	0	0	0	0
0630 - 0730	0	0	0	0
0645 - 0745	0	0	0	0
0700 - 0800	0	0	0	0
0715 - 0815	0	0	0	0
0730 - 0830	0	0	0	0
0745 - 0845	0	0	0	0
0800 - 0900	0	0	0	0
PEAK HR	0	0	0	0

<u>Lights</u>	WEST		NORTH		EAST		
	<u>Putty Rd</u>		<u>Warkworth</u>		<u>Putty Rd</u>		
Time Per	<u>I</u>	<u>L</u>	<u>R</u>	<u>L</u>	<u>R</u>	<u>I</u>	TOT
0600 - 0615	5	0	0	5	18	2	30
0615 - 0630	1	5	0	14	39	1	60
0630 - 0645	11	0	0	14	19	1	45
0645 - 0700	11	0	1	17	10	4	43
0700 - 0715	7	1	2	63	23	3	99
0715 - 0730	4	1	1	5	13	3	27
0730 - 0745	5	0	0	8	9	5	27
0745 - 0800	9	0	0	5	5	3	22
0800 - 0815	10	1	0	5	6	5	27
0815 - 0830	15	0	1	5	7	8	36
0830 - 0845	11	0	0	2	5	2	20
0845 - 0900	12	0	0	3	3	8	26
Per End	101	8	5	146	157	45	462

Heavies	WEST		NORTH		EAST		TOT
	Putty Rd		Warkworth		Putty Rd		
Time Per	<u>I</u>	<u>L</u>	<u>R</u>	<u>L</u>	<u>R</u>	<u>I</u>	
0600 - 0615	0	0	0	0	0	0	0
0615 - 0630	0	1	0	0	1	0	2
0630 - 0645	0	0	0	0	1	0	1
0645 - 0700	0	0	0	0	1	0	1
0700 - 0715	1	0	0	0	0	0	1
0715 - 0730	0	0	0	0	0	2	2
0730 - 0745	1	0	0	0	0	0	1
0745 - 0800	0	0	0	0	0	0	0
0800 - 0815	0	0	0	0	2	0	2
0815 - 0830	1	0	0	0	1	0	2
0830 - 0845	1	0	0	2	4	0	7
0845 - 0900	1	0	0	2	0	0	3
Per End	5	1	0	4	10	2	22

Combined	WEST		NORTH		EAST		
	Putty Rd		Warkworth		Putty Rd		
Time Per	<u>I</u>	<u>L</u>	<u>R</u>	<u>L</u>	<u>R</u>	<u>I</u>	TOT
0600 - 0615	5	0	0	5	18	2	30
0615 - 0630	1	6	0	14	40	1	62
0630 - 0645	11	0	0	14	20	1	46
0645 - 0700	11	0	1	17	11	4	44
0700 - 0715	8	1	2	63	23	3	100
0715 - 0730	4	1	1	5	13	5	29
0730 - 0745	6	0	0	8	9	5	28
0745 - 0800	9	0	0	5	5	3	22
0800 - 0815	10	1	0	5	8	5	29
0815 - 0830	16	0	1	5	8	8	38
0830 - 0845	12	0	0	4	9	2	27
0845 - 0900	13	0	0	5	3	8	29
Per End	106	9	5	150	167	47	484

<u>Lights</u>	WEST		NORTH		EAST		
	<i>Putty Rd</i>		<i>Warkworth</i>		<i>Putty Rd</i>		
Peak Per	<u>I</u>	<u>L</u>	<u>R</u>	<u>L</u>	<u>R</u>	<u>I</u>	TOT
0600 - 0700	28	5	1	50	86	8	178
0615 - 0715	30	6	3	108	91	9	247
0630 - 0730	33	2	4	99	65	11	214
0645 - 0745	27	2	4	93	55	15	196
0700 - 0800	25	2	3	81	50	14	175
0715 - 0815	28	2	1	23	33	16	103
0730 - 0830	39	1	1	23	27	21	112
0745 - 0845	45	1	1	17	23	18	105
0800 - 0900	48	1	1	15	21	23	109
PEAK HR	30	6	3	108	91	9	247

Heavies	WEST		NORTH		EAST		
	Putty Rd		Warkworth		Putty Rd		
Peak Per	<u>T</u>	<u>L</u>	<u>R</u>	<u>L</u>	<u>R</u>	<u>T</u>	TOT
0600 - 0700	0	1	0	0	3	0	4
0615 - 0715	1	1	0	0	3	0	5
0630 - 0730	1	0	0	0	2	2	5
0645 - 0745	2	0	0	0	1	2	5
0700 - 0800	2	0	0	0	0	2	4
0715 - 0815	1	0	0	0	2	2	5
0730 - 0830	2	0	0	0	3	0	5
0745 - 0845	2	0	0	2	7	0	11
0800 - 0900	3	0	0	4	7	0	14
PEAK HR	1	1	0	0	3	0	5

Combined	WEST		NORTH		EAST		
	Putty Rd		Warkworth		Putty Rd		
Peak Per	<u>T</u>	<u>L</u>	<u>R</u>	<u>L</u>	<u>R</u>	<u>T</u>	TOT
0600 - 0700	28	6	1	50	89	8	182
0615 - 0715	31	7	3	108	94	9	252
0630 - 0730	34	2	4	99	67	13	219
0645 - 0745	29	2	4	93	56	17	201
0700 - 0800	27	2	3	81	50	16	179
0715 - 0815	29	2	1	23	35	18	108
0730 - 0830	41	1	1	23	30	21	117
0745 - 0845	47	1	1	19	30	18	116
0800 - 0900	51	1	1	19	28	23	123
PEAK HR	31	7	3	108	94	9	252



R.O.A.R. DATA

Client : EMGA

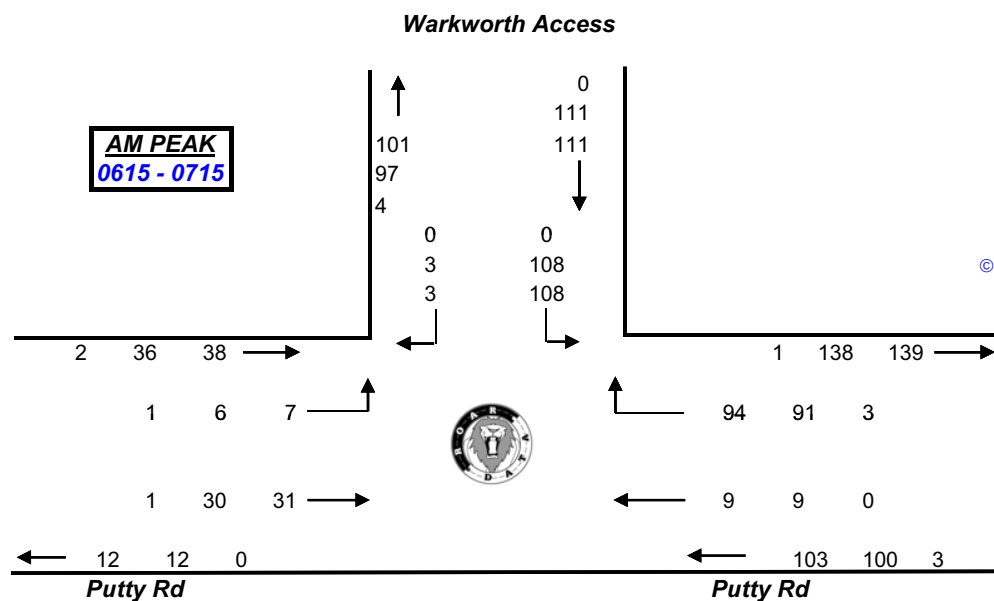


Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Job No/Name : 5030 MT. THORLEY Mine Access
Day/Date : Tuesday 4th March 2014



**TOTAL VOLUMES
FOR COUNT
PERIOD**





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

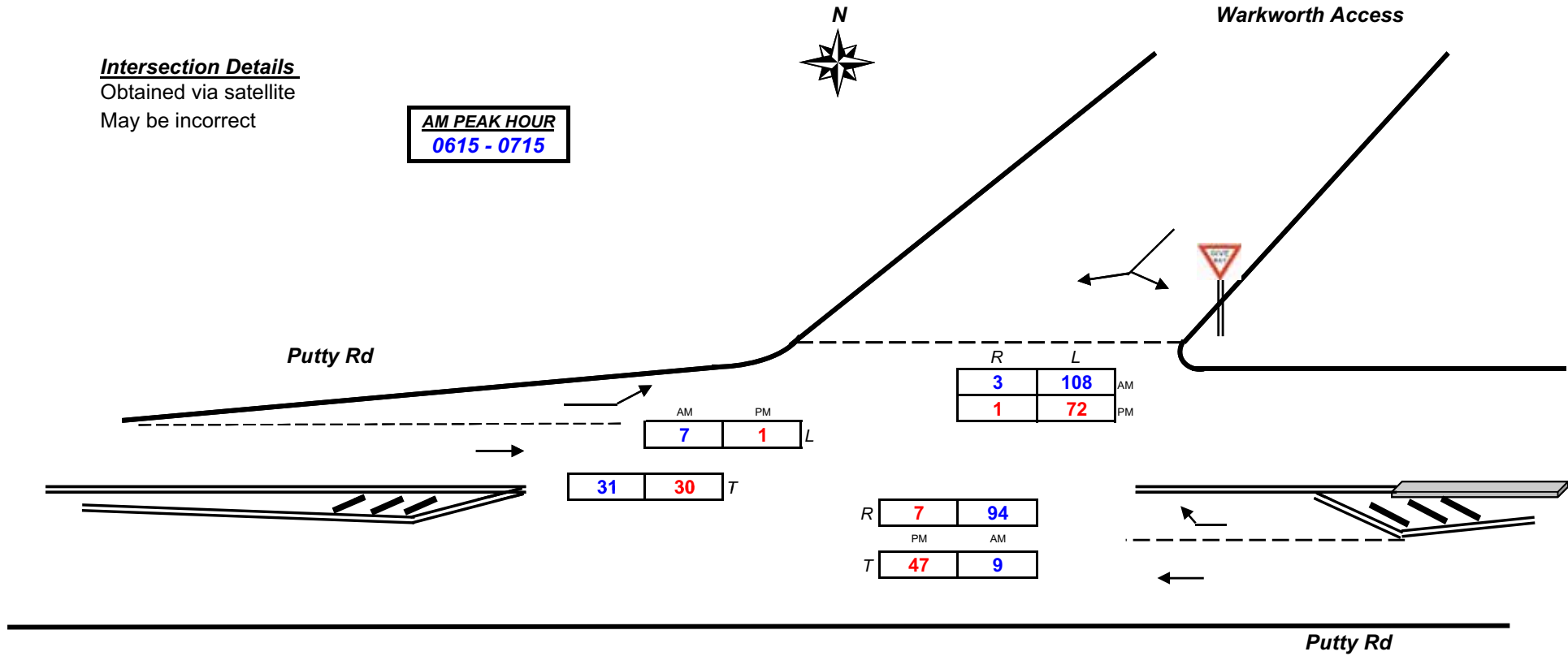
Client : EMGA
Job No/Name : 5030 MT. THORLEY Mine Access
Day/Date : Tuesday 4th March 2014

Intersection Details

Obtained via satellite

May be incorrect

AM PEAK HOUR
0615 - 0715



Combined figures only

PM PEAK HOUR
1530 - 1630

Weather >>>





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : EMGA
 Job No/Name : 5030 MT. THORLEY Mine Access
 Day/Date : Tuesday 4th March 2014

PEDS	WEST	NORTH	EAST	
Time Per	Putty Rd	Warkworth	Putty Rd	TOT
1500 - 1515				0
1515 - 1530		NOT		0
1530 - 1545		REQUIRED		0
1545 - 1600				0
1600 - 1615				0
1615 - 1630				0
1630 - 1645				0
1645 - 1700				0
1700 - 1715				0
1715 - 1730				0
1730 - 1745				0
1745 - 1800				0
Per End	0	0	0	0

PEDS	WEST	NORTH	EAST	
Peak Per	Putty Rd	Warkworth	Putty Rd	TOT
1500 - 1600	0	0	0	0
1515 - 1615	0	0	0	0
1530 - 1630	0	0	0	0
1545 - 1645	0	0	0	0
1600 - 1700	0	0	0	0
1615 - 1715	0	0	0	0
1630 - 1730	0	0	0	0
1645 - 1745	0	0	0	0
1700 - 1800	0	0	0	0

PEAK HR	0	0	0	0
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Lights	WEST	NORTH	EAST	
Time Per	Putty Rd	Warkworth	Putty Rd	TOT
1500 - 1515	7	0	15	32
1515 - 1530	4	1	6	28
1530 - 1545	8	1	25	47
1545 - 1600	10	0	10	25
1600 - 1615	4	0	23	43
1615 - 1630	7	0	11	34
1630 - 1645	6	0	11	28
1645 - 1700	2	0	6	21
1700 - 1715	6	1	11	40
1715 - 1730	7	1	13	37
1730 - 1745	2	0	7	21
1745 - 1800	5	0	17	72
Per End	68	3	144	428

Heavies	WEST	NORTH	EAST	
Time Per	Putty Rd	Warkworth	Putty Rd	TOT
1500 - 1515	3	0	0	4
1515 - 1530	0	0	1	1
1530 - 1545	1	0	2	4
1545 - 1600	0	0	0	1
1600 - 1615	0	0	1	2
1615 - 1630	0	0	0	2
1630 - 1645	1	0	0	1
1645 - 1700	0	0	0	0
1700 - 1715	2	0	0	2
1715 - 1730	1	0	0	1
1730 - 1745	0	0	0	0
1745 - 1800	0	0	2	2
Per End	8	0	3	20

Combined	WEST	NORTH	EAST	
Time Per	Putty Rd	Warkworth	Putty Rd	TOT
1500 - 1515	10	0	15	36
1515 - 1530	4	1	6	29
1530 - 1545	9	1	27	51
1545 - 1600	10	0	10	26
1600 - 1615	4	0	24	45
1615 - 1630	7	0	11	36
1630 - 1645	7	0	11	29
1645 - 1700	2	0	6	21
1700 - 1715	8	1	11	42
1715 - 1730	8	1	13	38
1730 - 1745	2	0	7	21
1745 - 1800	5	0	17	74
Per End	76	3	147	448

Lights	WEST	NORTH	EAST	
Peak Per	Putty Rd	Warkworth	Putty Rd	TOT
1500 - 1600	29	1	56	132
1515 - 1615	26	1	64	143
1530 - 1630	29	1	69	149
1545 - 1645	27	0	55	130
1600 - 1700	19	0	51	126
1615 - 1715	21	1	33	123
1630 - 1730	21	2	30	126
1645 - 1745	17	2	26	119
1700 - 1800	20	2	37	170

Heavies	WEST	NORTH	EAST	
Peak Per	Putty Rd	Warkworth	Putty Rd	TOT
1500 - 1600	4	0	2	10
1515 - 1615	1	0	3	8
1530 - 1630	1	0	3	9
1545 - 1645	1	0	1	6
1600 - 1700	1	0	1	5
1615 - 1715	3	0	0	5
1630 - 1730	4	0	0	4
1645 - 1745	3	0	0	3
1700 - 1800	3	0	0	5

Combined	WEST	NORTH	EAST	
Peak Per	Putty Rd	Warkworth	Putty Rd	TOT
1500 - 1600	33	1	58	142
1515 - 1615	27	1	67	151
1530 - 1630	30	1	72	158
1545 - 1645	28	0	56	136
1600 - 1700	20	0	52	131
1615 - 1715	24	1	33	128
1630 - 1730	25	2	30	130
1645 - 1745	20	2	26	122
1700 - 1800	23	2	37	175

PEAK HR	29	1	1	69	7	42	149
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PEAK HR	1	0	0	3	0	5	9
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PEAK HR	30	1	1	72	7	47	158
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R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

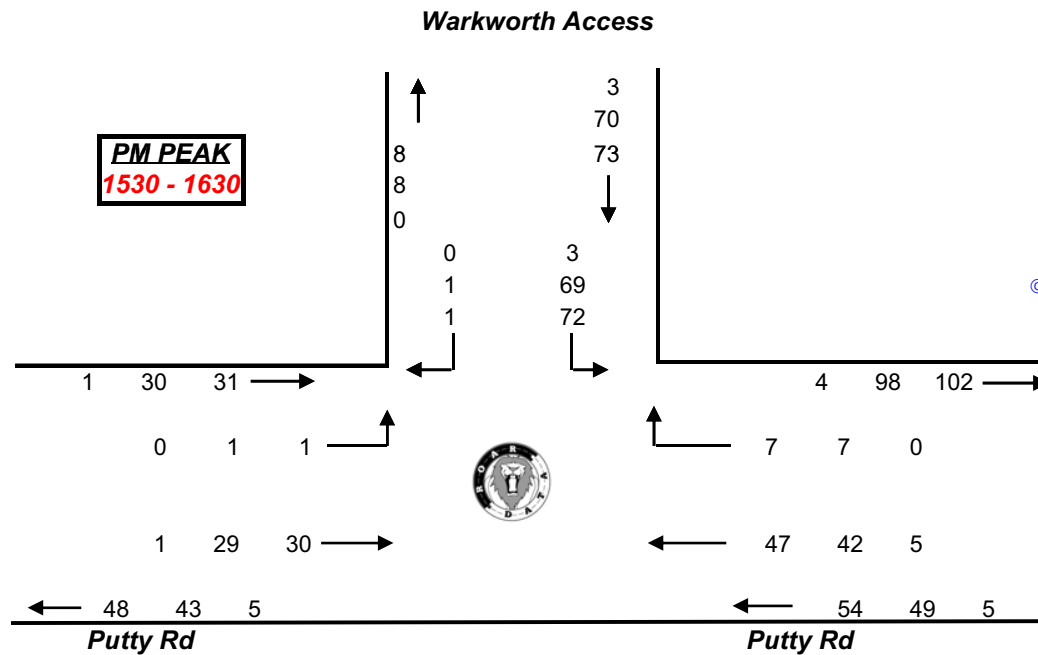
Client : EMGA

Job No/Name : 5030 MT. THORLEY Mine Access

Day/Date : Tuesday 4th March 2014



**TOTAL VOLUMES
FOR COUNT
PERIOD**



Appendix C

SIDRA intersection analysis results



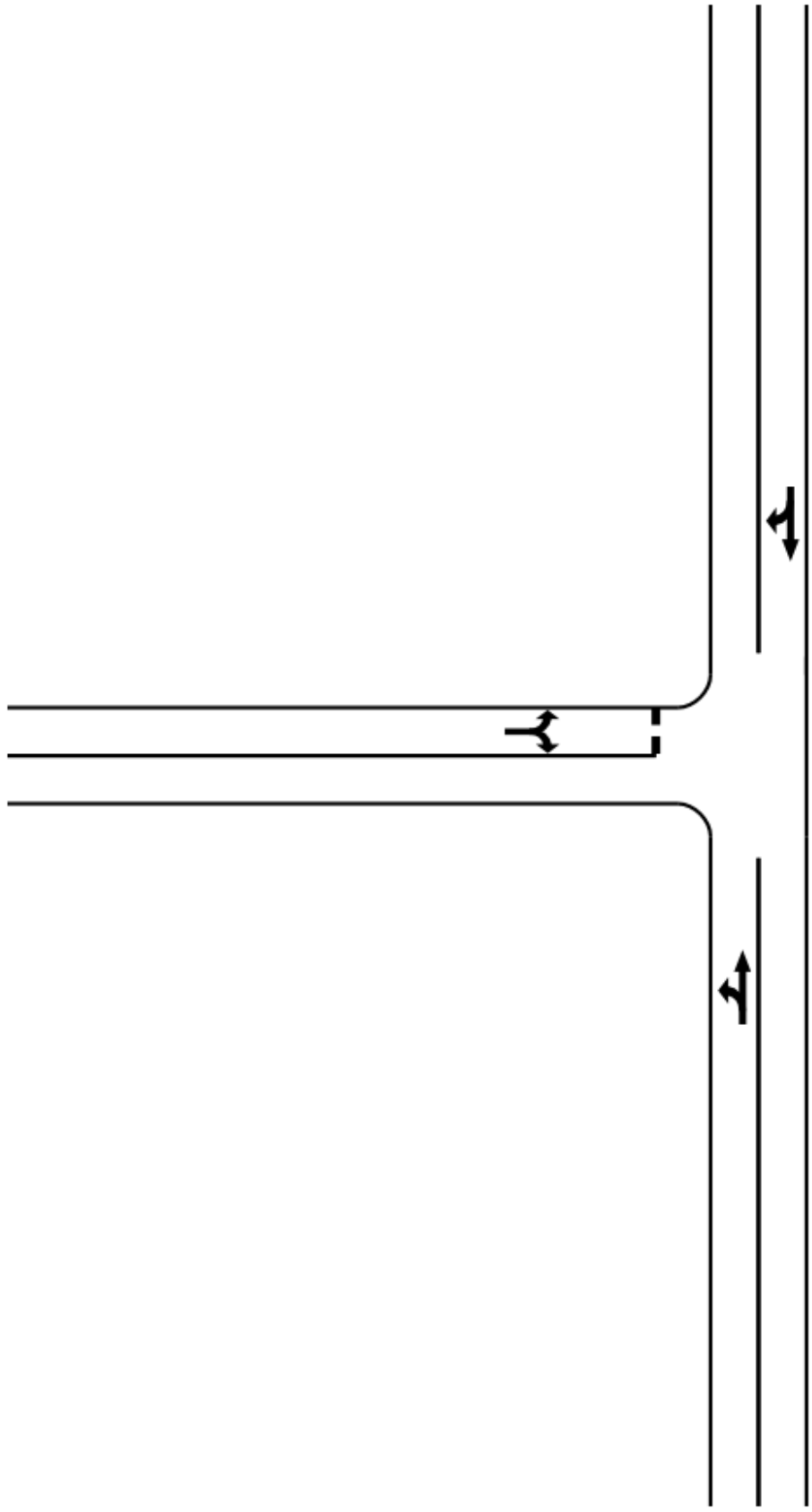
Broke Road



Broke Road



CHPP Access

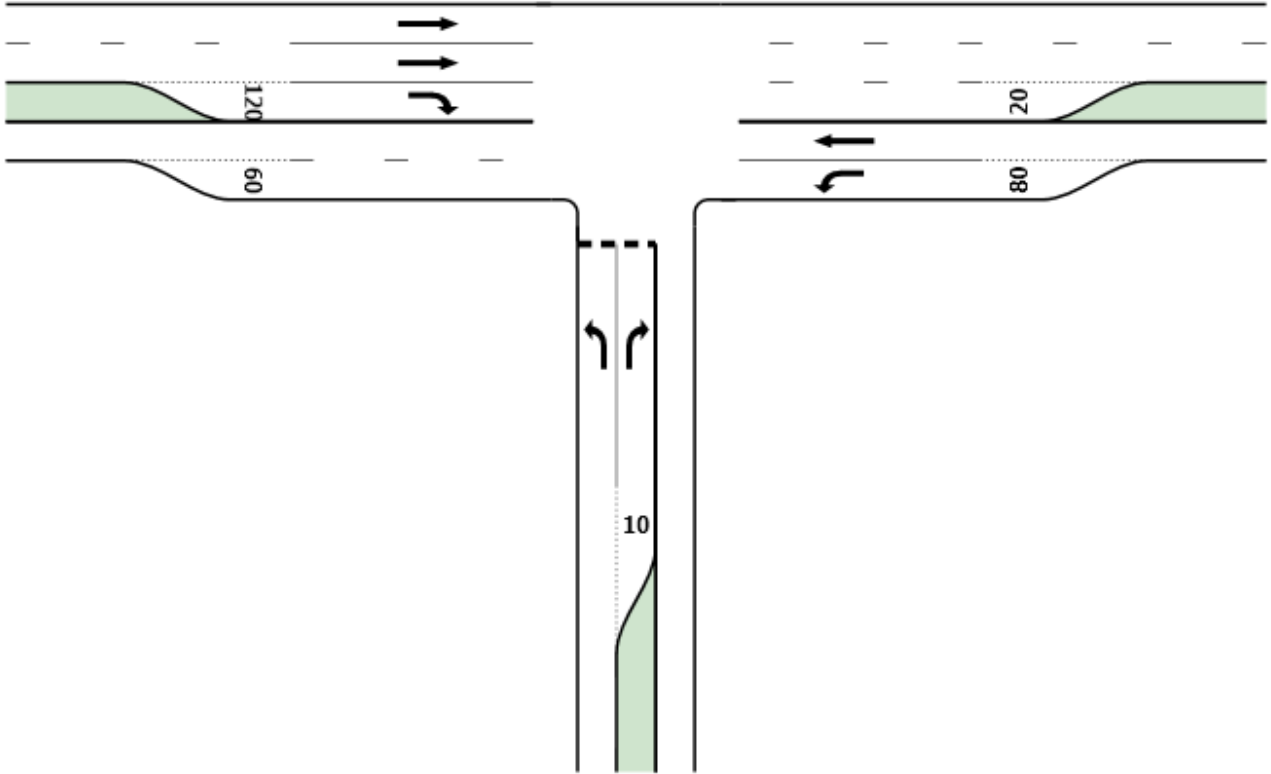




Golden Highway

Putty Road

Mitchell Line Road

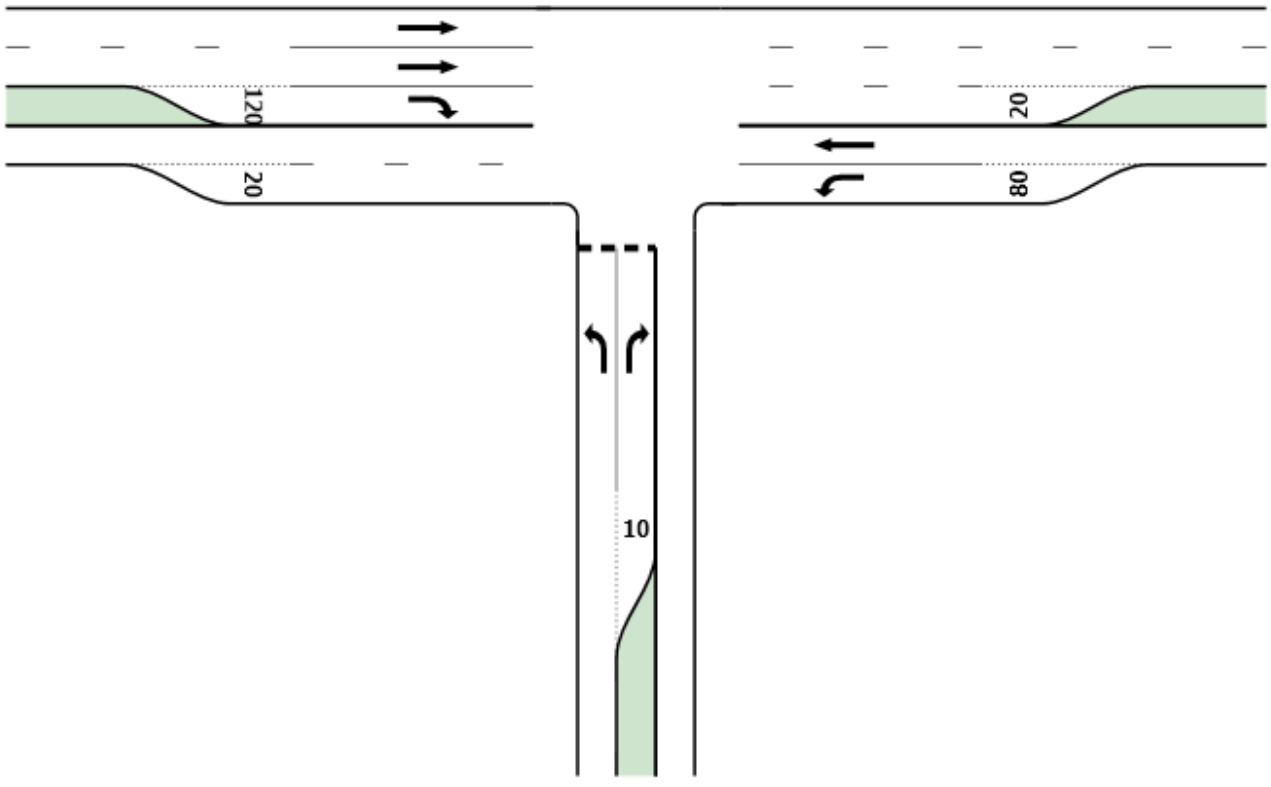




Golden Highway

Golden Highway

Broke Road

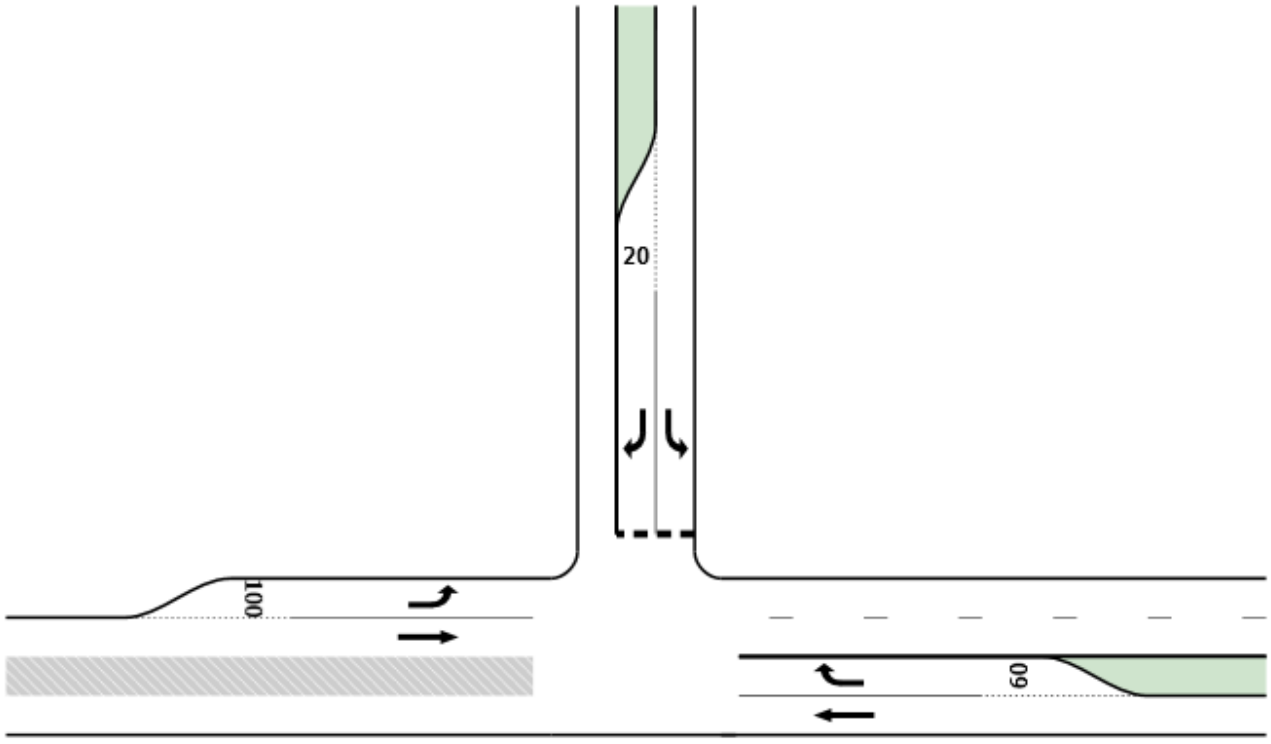




Warkworth Access

Putty Road

Putty Road



MOVEMENT SUMMARY

Site: Golden Hwy Broke Road
Intersection 2014 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	79	5.0	0.186	20.3	LOS B	0.6	4.7	0.69	0.93	58.6
3	R	44	5.0	0.253	31.6	LOS C	0.8	5.7	0.81	0.97	47.4
Approach		123	5.0	0.253	24.3	LOS B	0.8	5.7	0.73	0.94	54.1
East: Golden Highway											
4	L	215	5.0	0.120	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	729	5.0	0.386	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		944	5.0	0.386	3.0	NA	0.0	0.0	0.00	0.17	90.9
West: Golden Highway											
11	T	284	5.0	0.075	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	41	5.0	0.086	19.5	LOS B	0.3	2.2	0.69	0.92	59.6
Approach		325	5.0	0.086	2.5	NA	0.3	2.2	0.09	0.12	92.3
All Vehicles		1392	5.0	0.386	4.7	NA	0.8	5.7	0.09	0.23	86.1

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 12:54:36 PM

SIDRA INTERSECTION 5.1.13.2093

Project: C:\Program Files\SIDRA RESULTS\MTW Intersections\MTW Intersections 2014.sip

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Golden Hwy Broke Road
Intersection 2014 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	29	5.0	0.030	13.9	LOS A	0.1	0.8	0.29	0.70	67.1
3	R	130	5.0	0.369	16.5	LOS B	1.0	7.4	0.47	0.80	63.7
Approach		159	5.0	0.369	16.0	LOS B	1.0	7.4	0.44	0.78	64.3
East: Golden Highway											
4	L	37	5.0	0.021	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	175	5.0	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		212	5.0	0.093	2.3	NA	0.0	0.0	0.00	0.13	92.9
West: Golden Highway											
11	T	574	5.0	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	60	5.0	0.051	13.8	LOS A	0.2	1.5	0.31	0.70	67.0
Approach		634	5.0	0.152	1.3	NA	0.2	1.5	0.03	0.07	95.6
All Vehicles		1005	5.0	0.369	3.8	NA	1.0	7.4	0.09	0.19	88.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 12:58:18 PM

SIDRA INTERSECTION 5.1.13.2093

Project: C:\Program Files\SIDRA RESULTS\MTW Intersections\MTW Intersections 2014.sip

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Golden Hwy Broke Road
Intersection 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	84	5.0	0.215	21.5	LOS B	0.8	5.6	0.72	0.94	57.2
3	R	47	5.0	0.254	34.1	LOS C	0.9	6.7	0.84	0.98	45.5
Approach		131	5.0	0.254	26.0	LOS B	0.9	6.7	0.76	0.95	52.4
East: Golden Highway											
4	L	228	5.0	0.127	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	773	5.0	0.409	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		1001	5.0	0.409	3.0	NA	0.0	0.0	0.00	0.17	90.9
West: Golden Highway											
11	T	301	5.0	0.080	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	43	5.0	0.098	20.3	LOS B	0.3	2.5	0.72	0.93	58.5
Approach		344	5.0	0.098	2.5	NA	0.3	2.5	0.09	0.12	92.0
All Vehicles		1476	5.0	0.409	4.9	NA	0.9	6.7	0.09	0.23	85.7

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 3:08:19 PM

SIDRA INTERSECTION 5.1.13.2093

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Golden Hwy Broke Road
Intersection 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	31	5.0	0.032	14.0	LOS A	0.1	0.8	0.30	0.70	67.1
3	R	138	5.0	0.397	17.1	LOS B	1.2	8.6	0.49	0.82	62.8
Approach		169	5.0	0.397	16.5	LOS B	1.2	8.6	0.45	0.80	63.5
East: Golden Highway											
4	L	39	5.0	0.022	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	186	5.0	0.098	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		225	5.0	0.098	2.3	NA	0.0	0.0	0.00	0.13	92.9
West: Golden Highway											
11	T	608	5.0	0.161	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	64	5.0	0.055	13.9	LOS A	0.2	1.6	0.32	0.70	67.0
Approach		672	5.0	0.161	1.3	NA	0.2	1.6	0.03	0.07	95.6
All Vehicles		1066	5.0	0.397	3.9	NA	1.2	8.6	0.09	0.20	88.1

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 3:11:16 PM

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Golden Hwy MLOR
Intersection 2014 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Line Road											
1	L	528	5.0	0.700	20.6	LOS B	7.1	52.1	0.73	1.10	58.3
3	R	9	5.0	0.036	20.5	LOS B	0.1	0.6	0.61	0.83	58.3
Approach		537	5.0	0.700	20.6	LOS B	7.1	52.1	0.73	1.09	58.3
East: Putty Road											
4	L	7	5.0	0.004	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	416	5.0	0.220	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		423	5.0	0.220	0.2	NA	0.0	0.0	0.00	0.01	99.3
West: Golden Highway											
11	T	163	5.0	0.043	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	165	5.0	0.176	15.1	LOS B	0.7	5.4	0.48	0.79	65.7
Approach		328	5.0	0.176	7.6	NA	0.7	5.4	0.24	0.40	79.4
All Vehicles		1288	5.0	0.700	10.6	NA	7.1	52.1	0.36	0.56	73.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 12:43:11 PM

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Golden Hwy MLOR
Intersection 2014 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Line Road											
1	L	67	7.0	0.067	13.9	LOS A	0.2	1.8	0.27	0.70	67.3
3	R	6	7.0	0.022	19.0	LOS B	0.1	0.4	0.55	0.78	60.5
Approach		73	7.0	0.067	14.4	LOS A	0.2	1.8	0.29	0.71	66.7
East: Putty Road											
4	L	12	7.0	0.007	13.2	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	145	7.0	0.078	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		157	7.0	0.078	1.0	NA	0.0	0.0	0.00	0.06	96.8
West: Golden Highway											
11	T	378	7.0	0.101	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	326	7.0	0.270	14.0	LOS A	1.3	9.7	0.32	0.71	67.0
Approach		704	7.0	0.270	6.5	NA	1.3	9.7	0.15	0.33	81.6
All Vehicles		934	7.0	0.270	6.2	NA	1.3	9.7	0.14	0.31	82.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 12:46:05 PM

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Golden Hwy MLOR
Intersection 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Line Road											
1	L	560	5.0	0.766	22.5	LOS B	9.0	65.9	0.78	1.18	56.0
3	R	10	5.0	0.041	21.3	LOS B	0.1	0.8	0.63	0.86	57.4
Approach		570	5.0	0.766	22.5	LOS B	9.0	65.9	0.78	1.17	56.0
East: Putty Road											
4	L	7	5.0	0.004	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	441	5.0	0.234	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		448	5.0	0.234	0.2	NA	0.0	0.0	0.00	0.01	99.3
West: Golden Highway											
11	T	173	5.0	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	175	5.0	0.193	15.3	LOS B	0.8	5.9	0.50	0.81	65.4
Approach		348	5.0	0.193	7.7	NA	0.8	5.9	0.25	0.41	79.2
All Vehicles		1366	5.0	0.766	11.4	NA	9.0	65.9	0.39	0.60	71.7

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 3:00:36 PM

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Golden Hwy MLOR
Intersection 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Line Road											
1	L	71	7.0	0.072	14.0	LOS A	0.3	2.0	0.28	0.71	67.2
3	R	6	7.0	0.023	19.5	LOS B	0.1	0.4	0.57	0.79	59.8
Approach		77	7.0	0.072	14.4	LOS A	0.3	2.0	0.30	0.71	66.6
East: Putty Road											
4	L	13	7.0	0.007	13.2	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	154	7.0	0.083	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		167	7.0	0.083	1.0	NA	0.0	0.0	0.00	0.06	96.7
West: Golden Highway											
11	T	401	7.0	0.107	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	346	7.0	0.289	14.1	LOS A	1.4	10.5	0.34	0.71	66.8
Approach		747	7.0	0.289	6.5	NA	1.4	10.5	0.16	0.33	81.5
All Vehicles		991	7.0	0.289	6.2	NA	1.4	10.5	0.14	0.31	82.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 3:03:20 PM

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: MT Thorley CHPP Broke Road
Access 2014 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	1	4.0	0.065	12.5	LOS A	0.0	0.0	0.00	1.53	63.3
2	T	122	4.0	0.065	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		123	4.0	0.065	0.1	NA	0.0	0.0	0.00	0.01	99.6
North: Broke Road											
8	T	245	4.0	0.138	0.5	LOS A	0.9	6.3	0.27	0.00	85.8
9	R	11	4.0	0.138	13.4	LOS A	0.9	6.3	0.27	1.37	65.9
Approach		256	4.0	0.138	1.1	NA	0.9	6.3	0.27	0.06	84.9
West: CHPP Access											
10	L	1	4.0	0.003	11.2	LOS A	0.0	0.1	0.32	0.58	53.0
12	R	1	4.0	0.003	11.1	LOS A	0.0	0.1	0.32	0.69	53.2
Approach		2	4.0	0.003	11.1	LOS A	0.0	0.1	0.32	0.63	53.1
All Vehicles		381	4.0	0.138	0.8	NA	0.9	6.3	0.19	0.05	88.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 11:59:47 AM

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: MT Thorley CHPP Broke Road
Access 2014 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	1	4.0	0.074	12.5	LOS A	0.0	0.0	0.00	1.53	63.3
2	T	140	4.0	0.074	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		141	4.0	0.074	0.1	NA	0.0	0.0	0.00	0.01	99.7
North: Broke Road											
8	T	97	4.0	0.052	0.5	LOS A	0.3	2.2	0.28	0.00	85.9
9	R	1	4.0	0.052	13.1	LOS A	0.3	2.2	0.28	1.34	66.0
Approach		98	4.0	0.052	0.7	NA	0.3	2.2	0.28	0.01	85.7
West: CHPP Access											
10	L	19	4.0	0.023	10.0	LOS A	0.1	0.6	0.26	0.63	54.2
12	R	3	4.0	0.023	9.9	LOS A	0.1	0.6	0.26	0.71	54.6
Approach		22	4.0	0.023	10.0	LOS A	0.1	0.6	0.26	0.64	54.3
All Vehicles		261	4.0	0.074	1.1	NA	0.3	2.2	0.13	0.07	88.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 12:02:47 PM

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: MT Thorley CHPP Broke Road
Access 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	1	4.0	0.068	12.5	LOS A	0.0	0.0	0.00	1.53	63.3
2	T	129	4.0	0.068	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		130	4.0	0.068	0.1	NA	0.0	0.0	0.00	0.01	99.7
North: Broke Road											
8	T	260	4.0	0.145	0.6	LOS A	0.9	6.7	0.29	0.00	85.3
9	R	11	4.0	0.145	13.4	LOS A	0.9	6.7	0.29	1.36	66.0
Approach		271	4.0	0.145	1.1	NA	0.9	6.7	0.29	0.06	84.5
West: CHPP Access											
10	L	1	4.0	0.003	11.4	LOS A	0.0	0.1	0.33	0.58	52.8
12	R	1	4.0	0.003	11.3	LOS A	0.0	0.1	0.33	0.69	53.0
Approach		2	4.0	0.003	11.3	LOS A	0.0	0.1	0.33	0.63	52.9
All Vehicles		403	4.0	0.145	0.8	NA	0.9	6.7	0.19	0.04	88.6

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 2:54:36 PM

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INTERSECTION

MOVEMENT SUMMARY

Site: MT Thorley CHPP Broke Road
Access 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	1	4.0	0.078	12.5	LOS A	0.0	0.0	0.00	1.53	63.3
2	T	148	4.0	0.078	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		149	4.0	0.078	0.1	NA	0.0	0.0	0.00	0.01	99.7
North: Broke Road											
8	T	103	4.0	0.055	0.6	LOS A	0.3	2.4	0.29	0.00	85.5
9	R	1	4.0	0.055	13.2	LOS A	0.3	2.4	0.29	1.34	66.1
Approach		104	4.0	0.055	0.7	NA	0.3	2.4	0.29	0.01	85.3
West: CHPP Access											
10	L	19	4.0	0.023	10.1	LOS A	0.1	0.6	0.27	0.63	54.2
12	R	3	4.0	0.023	10.0	LOS A	0.1	0.6	0.27	0.71	54.6
Approach		22	4.0	0.023	10.1	LOS A	0.1	0.6	0.27	0.64	54.2
All Vehicles		275	4.0	0.078	1.1	NA	0.3	2.4	0.13	0.06	88.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Warkworth Putty Road Access
2014 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Putty Road											
5	T	9	3.0	0.005	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
6	R	94	3.0	0.078	12.9	LOS A	0.3	2.0	0.12	0.70	62.5
Approach		103	3.0	0.078	11.7	NA	0.3	2.0	0.11	0.64	65.2
North: Warkworth Access											
7	L	108	3.0	0.093	9.2	LOS A	0.4	2.5	0.11	0.65	54.9
9	R	3	3.0	0.006	10.0	LOS A	0.0	0.1	0.29	0.62	54.2
Approach		111	3.0	0.093	9.3	LOS A	0.4	2.5	0.12	0.64	54.9
West: Putty Road											
10	L	7	3.0	0.004	12.7	LOS A	0.0	0.0	0.00	0.75	63.3
11	T	31	3.0	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		38	3.0	0.016	2.3	NA	0.0	0.0	0.00	0.14	92.2
All Vehicles		252	3.0	0.093	9.2	NA	0.4	2.5	0.10	0.57	62.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: Warkworth Putty Road Access
2014 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Putty Road											
5	T	47	6.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
6	R	7	6.0	0.006	13.0	LOS A	0.0	0.1	0.10	0.70	62.6
Approach		54	6.0	0.025	1.7	NA	0.0	0.1	0.01	0.09	94.3
North: Warkworth Access											
7	L	72	6.0	0.063	9.4	LOS A	0.2	1.7	0.10	0.65	54.9
9	R	1	6.0	0.002	9.5	LOS A	0.0	0.0	0.22	0.61	54.5
Approach		73	6.0	0.063	9.4	LOS A	0.2	1.7	0.10	0.65	54.9
West: Putty Road											
10	L	1	6.0	0.001	12.5	LOS A	0.0	0.0	0.00	0.75	63.3
11	T	30	6.0	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		31	6.0	0.016	0.4	NA	0.0	0.0	0.00	0.02	98.6
All Vehicles		158	6.0	0.063	5.0	NA	0.2	1.7	0.05	0.33	71.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 1:23:39 PM

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Warkworth Putty Road Access
2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Putty Road											
5	T	10	3.0	0.005	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
6	R	94	3.0	0.078	12.9	LOS A	0.3	2.0	0.12	0.70	62.4
Approach		104	3.0	0.078	11.6	NA	0.3	2.0	0.11	0.63	65.5
North: Warkworth Access											
7	L	108	3.0	0.093	9.3	LOS A	0.4	2.5	0.12	0.64	54.9
9	R	3	3.0	0.006	10.1	LOS A	0.0	0.1	0.30	0.62	54.2
Approach		111	3.0	0.093	9.3	LOS A	0.4	2.5	0.12	0.64	54.8
West: Putty Road											
10	L	7	3.0	0.004	12.7	LOS A	0.0	0.0	0.00	0.75	63.3
11	T	33	3.0	0.017	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		40	3.0	0.017	2.2	NA	0.0	0.0	0.00	0.13	92.6
All Vehicles		255	3.0	0.093	9.1	NA	0.4	2.5	0.10	0.56	62.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 3:13:00 PM

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Warkworth Putty Road Access
2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Putty Road											
5	T	50	6.0	0.027	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
6	R	7	6.0	0.006	13.0	LOS A	0.0	0.1	0.10	0.70	62.6
Approach		57	6.0	0.027	1.6	NA	0.0	0.1	0.01	0.09	94.6
North: Warkworth Access											
7	L	72	6.0	0.063	9.4	LOS A	0.2	1.7	0.11	0.65	54.9
9	R	1	6.0	0.002	9.6	LOS A	0.0	0.0	0.23	0.61	54.5
Approach		73	6.0	0.063	9.4	LOS A	0.2	1.7	0.11	0.65	54.9
West: Putty Road											
10	L	1	6.0	0.001	12.5	LOS A	0.0	0.0	0.00	0.75	63.3
11	T	32	6.0	0.017	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		33	6.0	0.017	0.4	NA	0.0	0.0	0.00	0.02	98.7
All Vehicles		163	6.0	0.063	4.8	NA	0.2	1.7	0.05	0.32	71.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD Golden Hwy Broke Road
Intersection 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	130	5.0	0.332	22.8	LOS B	1.3	9.8	0.75	0.97	55.7
3	R	47	5.0	0.258	34.6	LOS C	0.9	6.8	0.84	0.98	45.2
Approach		177	5.0	0.332	25.9	LOS B	1.3	9.8	0.78	0.98	52.4
East: Golden Highway											
4	L	228	5.0	0.127	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	773	5.0	0.409	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		1001	5.0	0.409	3.0	NA	0.0	0.0	0.00	0.17	90.9
West: Golden Highway											
11	T	301	5.0	0.080	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	51	5.0	0.117	20.4	LOS B	0.4	3.0	0.72	0.93	58.4
Approach		352	5.0	0.117	3.0	NA	0.4	3.0	0.10	0.14	90.8
All Vehicles		1530	5.0	0.409	5.6	NA	1.3	9.8	0.11	0.26	83.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD Golden Hwy Broke Road
Intersection 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	46	5.0	0.048	14.0	LOS A	0.2	1.2	0.31	0.71	67.0
3	R	138	5.0	0.412	18.1	LOS B	1.3	9.4	0.52	0.86	61.4
Approach		184	5.0	0.412	17.1	LOS B	1.3	9.4	0.47	0.82	62.8
East: Golden Highway											
4	L	39	5.0	0.022	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	186	5.0	0.098	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		225	5.0	0.098	2.3	NA	0.0	0.0	0.00	0.13	92.9
West: Golden Highway											
11	T	608	5.0	0.161	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	106	5.0	0.092	13.9	LOS A	0.4	2.7	0.33	0.71	66.9
Approach		714	5.0	0.161	2.1	NA	0.4	2.7	0.05	0.11	93.3
All Vehicles		1123	5.0	0.412	4.6	NA	1.3	9.4	0.11	0.23	86.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD Golden Hwy MLOR
Intersection 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Line Road											
1	L	560	5.0	0.766	22.5	LOS B	9.0	65.9	0.78	1.18	56.0
3	R	10	5.0	0.041	21.3	LOS B	0.1	0.8	0.63	0.86	57.4
Approach		570	5.0	0.766	22.5	LOS B	9.0	65.9	0.78	1.17	56.0
East: Putty Road											
4	L	7	5.0	0.004	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	441	5.0	0.234	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		448	5.0	0.234	0.2	NA	0.0	0.0	0.00	0.01	99.3
West: Golden Highway											
11	T	173	5.0	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	175	5.0	0.193	15.3	LOS B	0.8	5.9	0.50	0.81	65.4
Approach		348	5.0	0.193	7.7	NA	0.8	5.9	0.25	0.41	79.2
All Vehicles		1366	5.0	0.766	11.4	NA	9.0	65.9	0.39	0.60	71.7

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD Golden Hwy MLOR
Intersection 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Line Road											
1	L	71	7.0	0.072	14.0	LOS A	0.3	2.0	0.28	0.71	67.2
3	R	6	7.0	0.023	19.5	LOS B	0.1	0.4	0.57	0.79	59.8
Approach		77	7.0	0.072	14.4	LOS A	0.3	2.0	0.30	0.71	66.6
East: Putty Road											
4	L	13	7.0	0.007	13.2	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	154	7.0	0.083	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		167	7.0	0.083	1.0	NA	0.0	0.0	0.00	0.06	96.7
West: Golden Highway											
11	T	401	7.0	0.107	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	346	7.0	0.289	14.1	LOS A	1.4	10.5	0.34	0.71	66.8
Approach		747	7.0	0.289	6.5	NA	1.4	10.5	0.16	0.33	81.5
All Vehicles		991	7.0	0.289	6.2	NA	1.4	10.5	0.14	0.31	82.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD MT Thorley CHPP Broke
Road Access 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	1	4.0	0.093	12.5	LOS A	0.0	0.0	0.00	1.53	63.3
2	T	175	4.0	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		176	4.0	0.093	0.1	NA	0.0	0.0	0.00	0.01	99.8
North: Broke Road											
8	T	268	4.0	0.150	0.8	LOS A	1.0	7.3	0.34	0.00	82.9
9	R	11	4.0	0.150	13.6	LOS A	1.0	7.3	0.34	1.32	66.6
Approach		279	4.0	0.150	1.3	NA	1.0	7.3	0.34	0.05	82.3
West: CHPP Access											
10	L	1	4.0	0.003	11.9	LOS A	0.0	0.1	0.39	0.58	52.2
12	R	1	4.0	0.003	11.8	LOS A	0.0	0.1	0.39	0.70	52.5
Approach		2	4.0	0.003	11.9	LOS A	0.0	0.1	0.39	0.64	52.4
All Vehicles		457	4.0	0.150	0.9	NA	1.0	7.3	0.21	0.04	88.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD MT Thorley CHPP Broke
Road Access 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	1	4.0	0.086	12.5	LOS A	0.0	0.0	0.00	1.53	63.3
2	T	163	4.0	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		164	4.0	0.086	0.1	NA	0.0	0.0	0.00	0.01	99.7
North: Broke Road											
8	T	145	4.0	0.077	0.7	LOS A	0.5	3.5	0.31	0.00	84.5
9	R	1	4.0	0.077	13.3	LOS A	0.5	3.5	0.31	1.32	66.3
Approach		146	4.0	0.077	0.8	NA	0.5	3.5	0.31	0.01	84.4
West: CHPP Access											
10	L	19	4.0	0.024	10.2	LOS A	0.1	0.6	0.29	0.63	54.1
12	R	3	4.0	0.024	10.2	LOS A	0.1	0.6	0.29	0.73	54.4
Approach		22	4.0	0.024	10.2	LOS A	0.1	0.6	0.29	0.65	54.1
All Vehicles		332	4.0	0.086	1.0	NA	0.5	3.5	0.16	0.05	87.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 3:56:16 PM

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD Warkworth Putty Road
Access 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Putty Road											
5	T	14	3.0	0.007	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
6	R	94	3.0	0.078	12.9	LOS A	0.3	2.0	0.15	0.69	62.2
Approach		108	3.0	0.078	11.3	NA	0.3	2.0	0.13	0.60	66.3
North: Warkworth Access											
7	L	108	3.0	0.095	9.3	LOS A	0.4	2.6	0.15	0.64	54.7
9	R	3	3.0	0.006	10.3	LOS A	0.0	0.1	0.32	0.62	53.9
Approach		111	3.0	0.095	9.4	LOS A	0.4	2.6	0.15	0.64	54.7
West: Putty Road											
10	L	7	3.0	0.004	12.7	LOS A	0.0	0.0	0.00	0.75	63.3
11	T	52	3.0	0.027	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		59	3.0	0.027	1.5	NA	0.0	0.0	0.00	0.09	94.9
All Vehicles		278	3.0	0.095	8.4	NA	0.4	2.6	0.11	0.51	64.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD Warkworth Putty Road
Access 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Putty Road											
5	T	67	6.0	0.036	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
6	R	7	6.0	0.006	13.0	LOS A	0.0	0.1	0.11	0.70	62.5
Approach		74	6.0	0.036	1.2	NA	0.0	0.1	0.01	0.07	95.8
North: Warkworth Access											
7	L	72	6.0	0.063	9.4	LOS A	0.2	1.7	0.12	0.64	54.8
9	R	1	6.0	0.002	9.8	LOS A	0.0	0.0	0.26	0.61	54.3
Approach		73	6.0	0.063	9.4	LOS A	0.2	1.7	0.12	0.64	54.8
West: Putty Road											
10	L	1	6.0	0.001	12.5	LOS A	0.0	0.0	0.00	0.75	63.3
11	T	38	6.0	0.020	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		39	6.0	0.020	0.3	NA	0.0	0.0	0.00	0.02	98.9
All Vehicles		186	6.0	0.063	4.3	NA	0.2	1.7	0.05	0.28	74.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: WSD+BUO Golden Hwy Broke
Road Intersection 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	130	5.0	0.335	23.0	LOS B	1.4	9.9	0.76	0.98	55.5
3	R	47	5.0	0.261	34.9	LOS C	0.9	6.9	0.84	0.98	44.9
Approach		177	5.0	0.335	26.2	LOS B	1.4	9.9	0.78	0.98	52.2
East: Golden Highway											
4	L	240	5.0	0.134	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	773	5.0	0.409	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		1013	5.0	0.409	3.1	NA	0.0	0.0	0.00	0.18	90.6
West: Golden Highway											
11	T	301	5.0	0.080	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	51	5.0	0.119	20.6	LOS B	0.4	3.0	0.73	0.93	58.2
Approach		352	5.0	0.119	3.0	NA	0.4	3.0	0.11	0.14	90.8
All Vehicles		1542	5.0	0.409	5.7	NA	1.4	9.9	0.11	0.26	83.7

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD+BUO Golden Hwy Broke
Road Intersection 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	46	5.0	0.048	14.0	LOS A	0.2	1.2	0.31	0.71	67.0
3	R	150	5.0	0.448	18.5	LOS B	1.5	10.8	0.53	0.88	60.9
Approach		196	5.0	0.448	17.5	LOS B	1.5	10.8	0.48	0.84	62.2
East: Golden Highway											
4	L	39	5.0	0.022	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	186	5.0	0.098	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		225	5.0	0.098	2.3	NA	0.0	0.0	0.00	0.13	92.9
West: Golden Highway											
11	T	608	5.0	0.161	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	106	5.0	0.092	13.9	LOS A	0.4	2.7	0.33	0.71	66.9
Approach		714	5.0	0.161	2.1	NA	0.4	2.7	0.05	0.11	93.3
All Vehicles		1135	5.0	0.448	4.8	NA	1.5	10.8	0.11	0.24	85.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD+BUO Golden Hwy MLOR
Intersection 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Line Road											
1	L	568	5.0	0.781	23.1	LOS B	9.6	69.9	0.80	1.20	55.4
3	R	10	5.0	0.042	21.4	LOS B	0.1	0.8	0.64	0.86	57.3
Approach		578	5.0	0.781	23.1	LOS B	9.6	69.9	0.79	1.19	55.4
East: Putty Road											
4	L	7	5.0	0.004	13.0	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	445	5.0	0.236	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		452	5.0	0.236	0.2	NA	0.0	0.0	0.00	0.01	99.3
West: Golden Highway											
11	T	173	5.0	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	175	5.0	0.193	15.4	LOS B	0.8	5.9	0.50	0.81	65.3
Approach		348	5.0	0.193	7.7	NA	0.8	5.9	0.25	0.41	79.1
All Vehicles		1378	5.0	0.781	11.7	NA	9.6	69.9	0.40	0.61	71.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD+BUO Golden Hwy MLOR
Intersection 2017 PM Peak

T Intersection
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Mitchell Line Road											
1	L	71	7.0	0.072	14.0	LOS A	0.3	2.0	0.28	0.71	67.2
3	R	6	7.0	0.023	19.7	LOS B	0.1	0.4	0.57	0.79	59.6
Approach		77	7.0	0.072	14.5	LOS A	0.3	2.0	0.30	0.71	66.6
East: Putty Road											
4	L	13	7.0	0.007	13.2	LOS A	0.0	0.0	0.00	0.76	69.1
5	T	154	7.0	0.083	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		167	7.0	0.083	1.0	NA	0.0	0.0	0.00	0.06	96.7
West: Golden Highway											
11	T	405	7.0	0.109	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
12	R	354	7.0	0.296	14.1	LOS A	1.5	10.8	0.34	0.71	66.8
Approach		759	7.0	0.296	6.6	NA	1.5	10.8	0.16	0.33	81.4
All Vehicles		1003	7.0	0.296	6.3	NA	1.5	10.8	0.14	0.32	82.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD+BUO MT Thorley CHPP
Broke Road Access 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	1	4.0	0.093	12.5	LOS A	0.0	0.0	0.00	1.53	63.3
2	T	175	4.0	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		176	4.0	0.093	0.1	NA	0.0	0.0	0.00	0.01	99.8
North: Broke Road											
8	T	280	4.0	0.156	0.8	LOS A	1.1	7.6	0.34	0.00	82.8
9	R	11	4.0	0.156	13.6	LOS A	1.1	7.6	0.34	1.32	66.6
Approach		291	4.0	0.156	1.3	NA	1.1	7.6	0.34	0.05	82.2
West: CHPP Access											
10	L	1	4.0	0.003	12.0	LOS A	0.0	0.1	0.40	0.58	52.1
12	R	1	4.0	0.003	11.9	LOS A	0.0	0.1	0.40	0.70	52.4
Approach		2	4.0	0.003	12.0	LOS A	0.0	0.1	0.40	0.64	52.2
All Vehicles		469	4.0	0.156	0.9	NA	1.1	7.6	0.22	0.04	87.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: WSD+BUO MT Thorley CHPP
Broke Road Access 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Broke Road											
1	L	1	4.0	0.093	12.5	LOS A	0.0	0.0	0.00	1.53	63.3
2	T	175	4.0	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		176	4.0	0.093	0.1	NA	0.0	0.0	0.00	0.01	99.8
North: Broke Road											
8	T	145	4.0	0.077	0.7	LOS A	0.5	3.5	0.32	0.00	84.0
9	R	1	4.0	0.077	13.3	LOS A	0.5	3.5	0.32	1.31	66.4
Approach		146	4.0	0.077	0.8	NA	0.5	3.5	0.32	0.01	83.8
West: CHPP Access											
10	L	19	4.0	0.025	10.3	LOS A	0.1	0.6	0.30	0.64	54.0
12	R	3	4.0	0.025	10.2	LOS A	0.1	0.6	0.30	0.73	54.3
Approach		22	4.0	0.025	10.3	LOS A	0.1	0.6	0.30	0.65	54.1
All Vehicles		344	4.0	0.093	1.0	NA	0.5	3.5	0.16	0.05	88.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 4:17:49 PM

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD+BUO Warkworth Putty
Road Access 2017 AM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Putty Road											
5	T	14	3.0	0.007	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
6	R	94	3.0	0.078	12.9	LOS A	0.3	2.0	0.15	0.69	62.2
Approach		108	3.0	0.078	11.3	NA	0.3	2.0	0.13	0.60	66.3
North: Warkworth Access											
7	L	108	3.0	0.095	9.3	LOS A	0.4	2.6	0.15	0.64	54.7
9	R	3	3.0	0.006	10.3	LOS A	0.0	0.1	0.32	0.62	53.9
Approach		111	3.0	0.095	9.4	LOS A	0.4	2.6	0.15	0.64	54.7
West: Putty Road											
10	L	7	3.0	0.004	12.7	LOS A	0.0	0.0	0.00	0.75	63.3
11	T	52	3.0	0.027	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		59	3.0	0.027	1.5	NA	0.0	0.0	0.00	0.09	94.9
All Vehicles		278	3.0	0.095	8.4	NA	0.4	2.6	0.11	0.51	64.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: WSD+BUO Warkworth Putty
Road Access 2017 PM Peak

T Intersection
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Putty Road											
5	T	67	6.0	0.036	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
6	R	7	6.0	0.006	13.0	LOS A	0.0	0.1	0.11	0.70	62.5
Approach		74	6.0	0.036	1.2	NA	0.0	0.1	0.01	0.07	95.8
North: Warkworth Access											
7	L	72	6.0	0.063	9.4	LOS A	0.2	1.7	0.12	0.64	54.8
9	R	1	6.0	0.002	9.8	LOS A	0.0	0.0	0.26	0.61	54.3
Approach		73	6.0	0.063	9.4	LOS A	0.2	1.7	0.12	0.64	54.8
West: Putty Road											
10	L	1	6.0	0.001	12.5	LOS A	0.0	0.0	0.00	0.75	63.3
11	T	38	6.0	0.020	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		39	6.0	0.020	0.3	NA	0.0	0.0	0.00	0.02	98.9
All Vehicles		186	6.0	0.063	4.3	NA	0.2	1.7	0.05	0.28	74.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 17 March 2014 4:12:19 PM

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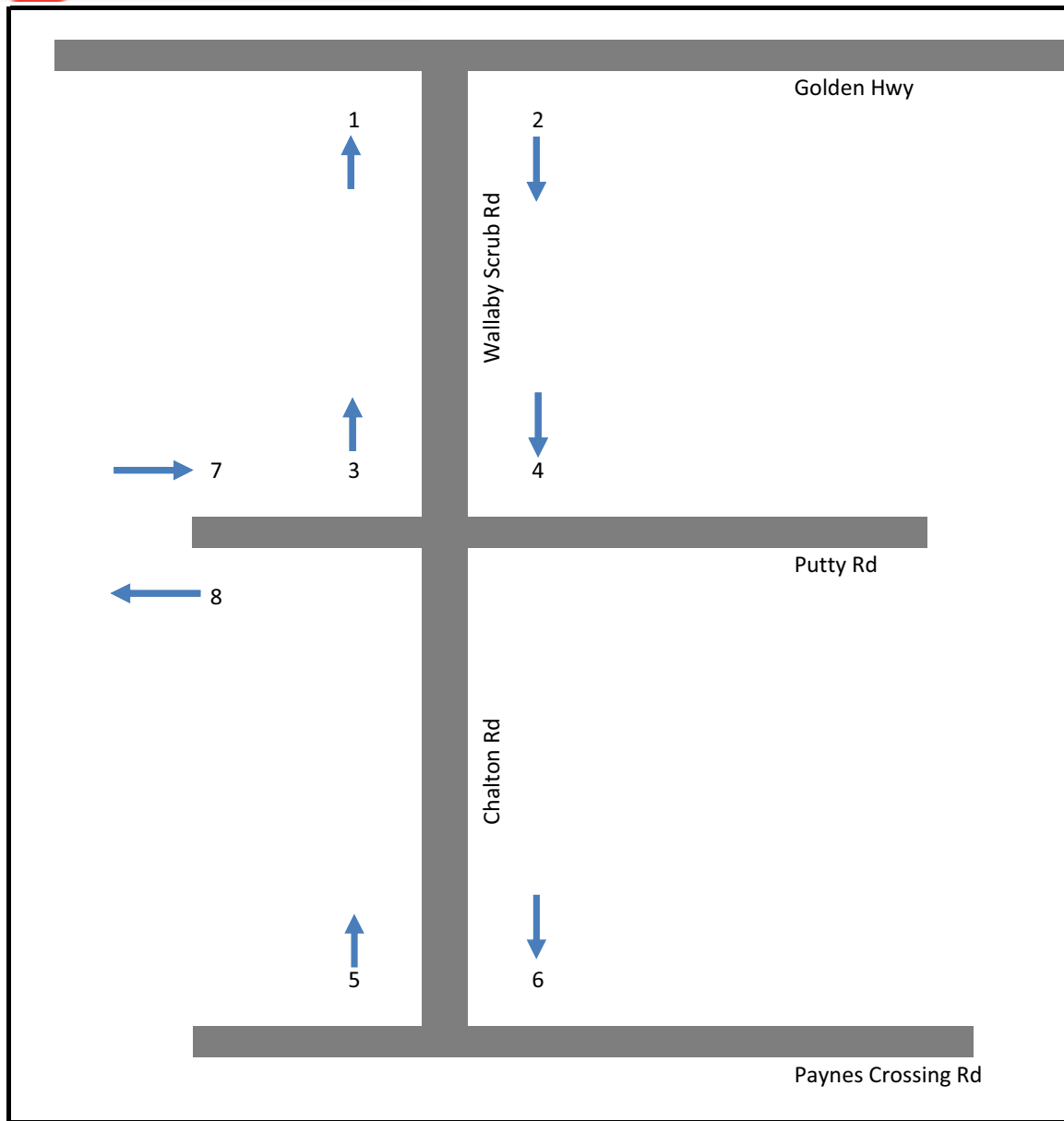
Appendix D

Origin Destination traffic surveys



SKYHIGH

THE TRAFFIC SURVEY COMPANY



Job	: Wallaby Scrub Road
Description	: Origin Destination Matrices
Date	: Tues 4th March

RAW MATCH

Time Period : 05:00 to 17:00

	Out	1	3	4	6	8	Totals
In	Vol	318	333	273	350	381	1655
2	266			224	132	52	408
3	333	285					285
4	273				133	52	185
5	369	186	193			22	401
7	458	79	75		21		175
Totals	1699	550	268	224	286	126	1454

Time Period : 05:00 to 06:00

	Out	1	3	4	6	8	Totals
In	Vol	44	59	6	5	7	121
2	7			3	1	1	5
3	59	39					39
4	6				1	3	4
5	52	35	37			1	73
7	37	5	6		1		12
Totals	161	79	43	3	3	5	133

Time Period : 06:00 to 07:00

	Out	1	3	4	6	8	Totals
In	Vol	77	76	12	13	9	187
2	13			10	7	1	18
3	76	63					63
4	12				8	1	9
5	71	50	53			0	103
7	50	7	6		0		13
Totals	222	120	59	10	15	2	206

Time Period : 07:00 to 08:00

	Out	1	3	4	6	8	Totals
In	Vol	29	31	20	30	22	132
2	22			17	10	5	32
3	31	29					29
4	20				9	4	13
5	21	13	13			0	26
7	42	10	9		1		20
Totals	136	52	22	17	20	9	120

Time Period : 08:00 to 09:00

	Out	1	3	4	6	8	Totals
In	Vol	30	29	16	29	31	135
2	14			9	7	4	20
3	29	24					24
4	16				12	3	15
5	38	19	19			5	43
7	62	7	5		6		18
Totals	159	50	24	9	25	12	120

Time Period : 09:00 to 10:00

	Out	1	3	4	6	8	Totals
In	Vol	14	16	15	22	30	97
2	15			13	8	5	26
3	16	14					14
4	15				8	5	13
5	14	8	8			3	19
7	43	8	7		4		19
Totals	103	30	15	13	20	13	91

Time Period : 10:00 to 11:00

	Out	1	3	4	6	8	Totals
In	Vol	15	14	14	11	29	83
2	12			11	7	4	22
3	14	14					14
4	14				7	4	11
5	27	6	6			0	12
7	32	9	8		0		17
Totals	99	29	14	11	14	8	76

Time Period : 11:00 to 12:00



EXPANDED MATCH TO ALLOW FOR MISSED NUMBER PLATES

Time Period : 05:00 to 17:00

	Out	1	3	4	6	8	Totals
In	Vol	318	333	273	350	381	1655
2	266			230	168	54	452
3	333	313					313
4	273				168	53	221
5	369	215	232			23	470
7	458	81	90		29		200
Totals	1699	609	322	230	365	130	1656

Time Period : 05:00 to 06:00

	Out	1	3	4	6	8	Totals
In	Vol	44	59	6	5	7	121
2	7			5	2	2	9
3	59	44					44
4	6				1	3	4
5	52	38	48			1	87
7	37	6	10		2		18
Totals	161	88	58	5	5	6	162

Time Period : 06:00 to 07:00

	Out	1	3	4	6	8	Totals
In	Vol	77	76	12	13	9	187
2	13			10	9	1	20
3	76	76					76
4	12				10	1	11
5	71	64	68			0	132
7	50	8	8		0		16
Totals	222	148	76	10	19	2	255

Time Period : 07:00 to 08:00

	Out	1	3	4	6	8	Totals
In	Vol	29	31	20	30	22	132
2	22			17	13	5	35
3	31	29					29
4	20				11	4	15
5	21	15	15			0	30
7	42	11	11		1		23
Totals	136	55	26	17	25	9	132

Time Period : 08:00 to 09:00

	Out	1	3	4	6	8	Totals
In	Vol	30	29	16	29	31	135
2	14			9	9	4	22
3	29	27					27
4	16				16	3	19
5	38	23	23			5	51
7	62	6	6		8		20
Totals	159	56	29	9	33	12	139

Time Period : 09:00 to 10:00

	Out	1	3	4	6	8	Totals
In	Vol	14	16	15	22	30	97
2	15			13	10	5	28
3	16	14					14
4	15				10	5	15
5	14	8	8			3	18
7	43	7	8		6		21
Totals	103	28	16	13	26	13	96

Time Period : 10:00 to 11:00

	Out	1	3	4	6	8	Totals
In	Vol	15	14	14	11	29	83
2	12			11	9	4	24
3	14	15					15
4	14				9	4	13
5	27	6	6			0	12
7	32	8	8		0		16
Totals	99	29	14	11	18	8	80

Time Period : 11:00 to 12:00

	Out	1	3	4	6	8	Totals
In	Vol	15	14	10	15	33	87
2	13			9	5	3	17
3	14	13					13
4	10				5	4	9
5	28	7	8			2	17
7	37	5	5		3		13
Totals	102	25	13	9	13	9	69

Time Period : 12:00 to 13:00

	Out	1	3	4	6	8	Totals
In	Vol	22	22	17	21	31	113
2	16			13	7	7	27
3	22	21					21
4	17				4	7	11
5	24	10	10			2	22
7	33	6	5		0		11
Totals	112	37	15	13	11	16	92

Time Period : 13:00 to 14:00

	Out	1	3	4	6	8	Totals
In	Vol	22	22	21	26	29	120
2	20		14	4	4	4	22
3	22	20					20
4	21				6	5	11
5	34	16	16			2	34
7	25	3	4		1		8
Totals	122	39	20	14	11	11	95

Time Period : 14:00 to 15:00

	Out	1	3	4	6	8	Totals
In	Vol	16	18	35	55	56	180
2	30		31	17	6		54
3	18	17					17
4	35				17	5	22
5	24	8	8			3	19
7	36	6	7		4		17
Totals	143	31	15	31	38	14	129

Time Period : 15:00 to 16:00

	Out	1	3	4	6	8	Totals
In	Vol	17	13	71	72	44	217
2	68			60	37	5	102
3	13	15					15
4	71				37	5	42
5	18	5	5			3	13
7	30	7	7		0		14
Totals	200	27	12	60	74	13	186

Time Period : 16:00 to 17:00

	Out	1	3	4	6	8	Totals
In	Vol	17	19	36	51	60	183
2	36			34	22	7	63
3	19	16					16
4	36				19	6	25
5	18	9	10			1	20
7	31	6	6		1		13
Totals	140	31	16	34	42	14	137

	Out	1	3	4	6	8	Totals
In	Vol	15	14	10	15	33	87
2	13			9	6	3	18
3	14	14					14
4	10				6	4	10
5	28	9	9			3	21
7	37	5	5		4		14
Totals	102	28	14	9	16	10	77

Time Period : 12:00 to 13:00

	Out	1	3	4	6	8	Totals
In	Vol	22	22	17	21	31	113
2	16			13	9	7	29
3	22	22					22
4	17				5	7	12
5	24	11	12			2	25
7	33	6	6		0		12
Totals	112	39	18	13	14	16	100

Time Period : 13:00 to 14:00

	Out	1	3	4	6	8	Totals
In	Vol	22	22	21	26	29	120
2	20			18	6	5	29
3	22	22					22
4	21				9	6	15
5	34	17	17			2	36
7	25	3	5		1		9
Totals	122	42	22	18	16	13	111

Time Period : 14:00 to 15:00

	Out	1	3	4	6	8	Totals
In	Vol	16	18	35	55	56	180
2	30		31	21	6		58
3	18	16					16
4	35				21	5	26
5	24	10	10			3	23
7	36	6	8		6		20
Totals	143	32	18	31	48	14	143

Time Period : 15:00 to 16:00

	Out	1	3	4	6	8	Totals
In	Vol	17	13	71	72	44	217
2	68			60	46	5	111
3	13	17					17
4	71				46	5	51
5	18	5	5			3	13
7	30	8	8		0		16
Totals	200	30	13	60	92	13	208

Time Period : 16:00 to 17:00

	Out	1	3	4	6	8	Totals
In	Vol	17	19	36	51	60	183
2	36			34	28	7	69
3	19	17					17
4	36				24	6	30
5	18	10	11			1	22
7	31	7	7		1		15
Totals	140	34	18	34	53	14	153

Appendix E

Rural Fire Service response - Wallaby Scrub Road



NSW RURAL FIRE SERVICE

Mr. Mark Molan
Operations Support & Projects
Coal and Allied
127 John St
Singleton NSW
2330

Your reference
Our reference: 2014/05:Ops

19th May 2014

Dear Mr Molan,

Wallaby Scrub Rd

I refer to our meeting on the 15th April 2014 in regards to the proposed development of the Mt Thorley mine complex and the forecast closure of Wallaby Scrub Rd.

Wallaby Scrub Rd provides important access between the townships of Broke, Bulga and Jerrys Plains during bushfires and other emergencies where additional units from the Rural Fire Brigades can be quickly brought in to assist each other. Typical incidents range from bush, grass and scrub fires, house fires as well as motor vehicle accidents and fires. Wallaby Scrub Rd is also an important containment line option during major bushfires.

Whilst our preferred option would be the relocation of Wallaby Scrub Rd to maintain access for emergency services, an acceptable second option is the construction of a suitable fire trail on the perimeter of the proposed expansion and constructed to a standard as documented in the NSW Bushfire Coordinating Committee policy No. 2/2007. Our recommendation would be a strategic classification of Essential. This is a fire trail without which fire response and suppression in an area would be severely compromised. All reasonable efforts must be made to ensure that this trail is trafficable to the agreed vehicle carrying capacity at all times. Sudden problems such as tree falls and land slips should be rectified as soon as identified. This trail should be checked on occasions throughout each year, and particularly before the commencement of the local bush fire season.

Physical barriers to vehicle access must not be deliberately installed, unless they are readily breached by fire fighters. That is, a locked gate with key access for fire fighters would be acceptable; fixed bollards, felled trees, piles of rock and the like would not be acceptable, as the obstruction cannot be removed by a fire fighting crew without additional machinery.

Further more detailed information on the construction standards is available on the RFS website or by contacting myself at the local office.

Regards,

S. Brown

Inspector Steve Brown
Operations Officer

Hunter Valley Team

Postal address

NSW Rural Fire Service
Hunter Valley Team
PO Box 3111
SINGLETON NSW 2330

Street address

NSW Rural Fire Service
Hunter Valley Team
2116 Putty Road
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