Traffic Assessment

Appendix 16

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TRANSPORT STUDY

PROPOSED COAL MINE DEVELOPMENT

ANVIL HILL PROJECT

May – July 2006

UMWELT (AUSTRALIA) PTY LIMITED
(Client)

Muswellbrook Shire Council Local Government Area

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1. INTRODUCTION

1.1. – The Project

TPK & Associates (TPK) was invited by Umwelt (Australia) Pty Limited to join a project team undertaking evaluation of the proposed Anvil Hill coal mine project (the project) on behalf of Centennial Hunter Pty Limited (Centennial).

The site is located some 20 kilometres (km) west of Muswellbrook on the south side of Wybong Road. Figure 1 shows the site location relative to the surrounding area.

1.2. – Task Description

The transport study by TPK was to evaluate the impact of potential traffic generation from the project on the surrounding road network and determine appropriate transport improvements and strategies as seen necessary.

The road assessment and report by TPK will determine: -

- Suitability of the road network to service all road user needs in terms of road safety and traffic management.
- Appropriate traffic management to ensure the impact of additional traffic is minimised.
- Appropriate road safety and traffic management guidelines and standards to be addressed by the proposal.

This assessment report is intended to provide information for the Environmental Assessment (EA) documentation for the project.

1.3. – Project Representative

Mr. Terry Keating, Director, TPK & Associates Pty Ltd undertook the evaluation and preparation of the report. He has over 39 years experience in the road safety and traffic management profession, including the assessment of traffic generating developments.

1.4. – References

The assessment and report have been provided as an outcome of reference to:

- Muswellbrook Shire Council Transport Strategy
- RTA Guide to Traffic Generating Developments
- Austroads Part 5 Intersections at Grade
- Austroads Part 2 Roadway Capacity

FIGURE 1.1

Locality Plan

2. ROAD NETWORK

2.1 – Site Location

The proposed mine is located in a rural environment generally referred to as Wybong; some 20km to the west of Muswellbrook Township on the southern side of Wybong Road (refer to Figure 2)

2.2 – Existing Road Network

Site access is proposed to be via Wybong Road, a local road that facilitates a transport link between Muswellbrook and Sandy Hollow to the west. The existing road network is depicted in Figure 2.

Wybong Road intersects with the Golden Highway (SH27) to the west of Anvil Hill Project site at Sandy Hollow. The Golden Highway is part of the major transport link between Dubbo and Newcastle and passes through Denman en route to intersecting with the New England Highway to the south of Singleton.

Wybong Road intersects Kayuga Road on the outskirts of Muswellbrook. Kayuga Road crosses the Hunter River over a single lane bridge prior to affording options to turn left or right to move through the Muswellbrook local road network to the New England Highway.

New England Highway is the major transport route between Newcastle and Muswellbrook, passing through Singleton.

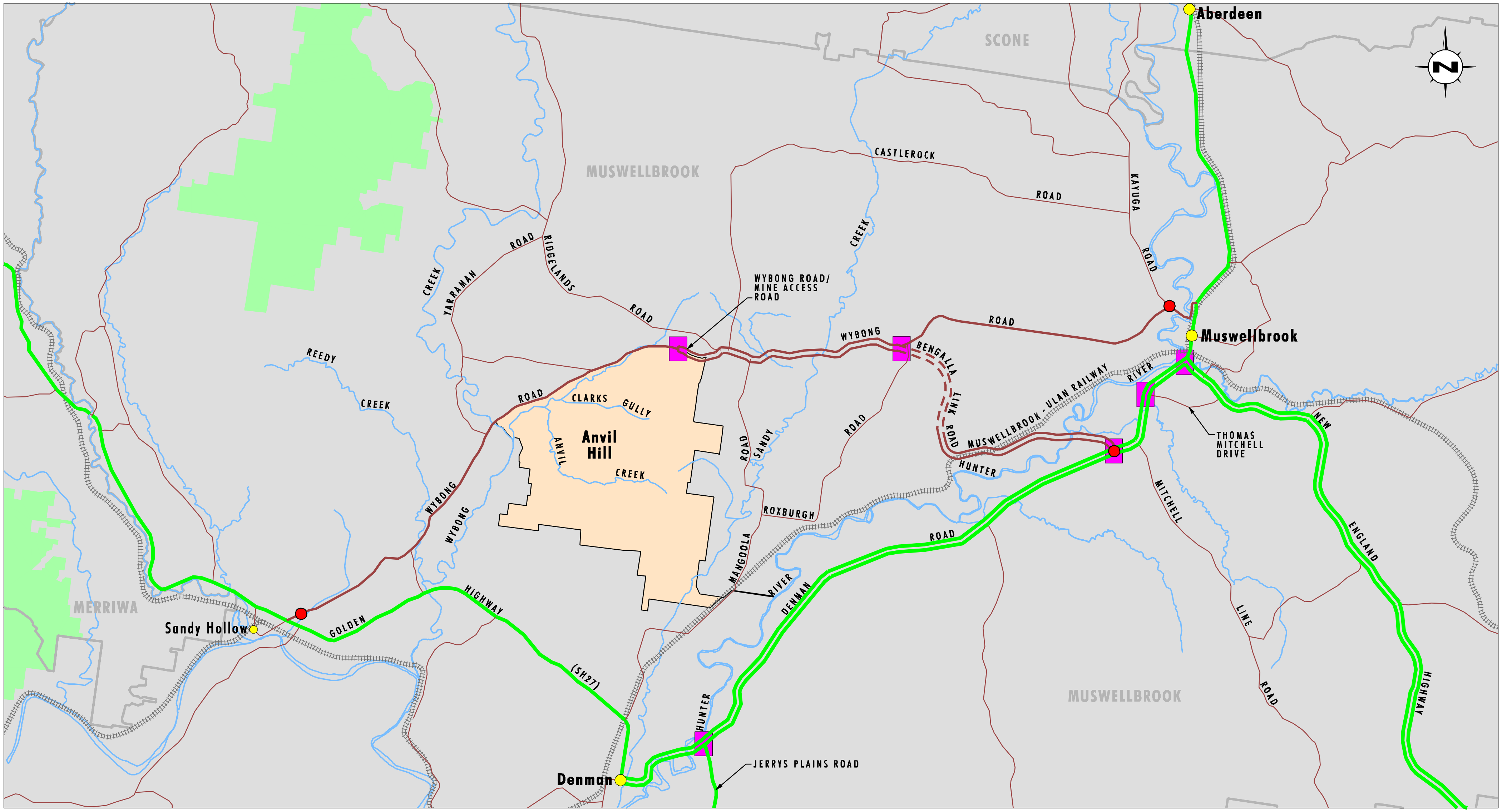
The road network around the project site has been reviewed; an area map and an audit summation are provided in Appendix A of this report.

2.3 – Traffic Flow

RTA provides traffic flow data in their publication Traffic Volume Data 2004; examination of that data disclosed the following relevant to this assessment:

- Annual Average Daily Traffic (AADT) for New England Highway of 16253 vehicles per day (vpd) south of Sydney Street at Muswellbrook
- AADT for Golden Highway of 2343vpd just north of Denman
- AADT for Denman Road (MR 219) of 8860vpd, west of New England Highway at Muswellbrook

Umwelt
Environmental Consultants



Base Map: Dept. of Lands (2003)

0 2.0 4.0 8km

Legend

- Project Application Area
- National Parks
- Local Government Boundary
- Major Road
- Primary Transport Route
- Proposed Road
- Creek
- Railway Line
- Traffic Count Location
- Intersection Modelling Locations

FIGURE 2

Existing Road Network

TPK also arranged for:

- An Average Daily Traffic (ADT) hourly volume traffic count on Wybong Road, 1 to 2km east of The Golden Highway
- An Intersection count in the peak periods for Wybong and Kayuga Roads
- An Intersection count in the peak periods for Denman Road and Bengalla Link Road
- An intersection count in the peak periods for Denman Road and Thomas Mitchell Drive

The TPK traffic survey data collected for this project is provided in Appendix B of this report.

It should be noted that RTA AADT is derived from field data and formulae to adjust volumes for seasonal factors; ADT is derived from a smaller field sample and not adjusted for seasonal factors.

3. TRANSPORT PROPOSALS

3.1. – Rail Transportation

The project includes construction of a rail loop onto the site from the Muswellbrook – Merriwa rail line; this rail service will provide transport services for coal removed from the site.

There are no proposals to haul any mined product from the site by road.

3.2. – Road Transportation

The project will present an increase in traffic demand once operational from the following traffic generators

- Staff (227 shift employees, 13 day employees)
- Visitors (Average 20 visitors per day)
- Service and Delivery (Average 10 heavy vehicles per day)

The quantum and impact of trips generated in the typical peak period will be examined in Sections 4 and 5 of this report.

Typical employment catchment areas in this general locality have been previously researched by Coakes Consulting (1999). *Upper Hunter Mining Industry and Employee Survey Report* on behalf of Coal Operations Australia Limited. It suggests the following residential catchments would be applicable for this project:

Muswellbrook (48%)
Denman (8%)
Scone (12%)
Singleton (14%)
Aberdeen (6%)
Cessnock (1%)
Maitland (2%)
Newcastle (1%)
Other (8%)
TOTAL (100%)

3.3. – Nominated Transport Route

Given the residency findings of Section 3.2 the staff and visitor/delivery origin destination trips will focus to the key routes:

- SH9, New England Highway
- MR209, Denman Road

Muswellbrook Shire Council has advised TPK that beyond those two key routes the following strategies will control the acceptable trip paths of traffic generated by the project:

1. Wybong Road east of Roxburgh Road should be considered as non existent in assessing traffic impact associated with this project as the road will be removed from service at some stage.
2. Access to/from Wybong Road is to be "directed" to use the planned extension of Bengalla Link Road as a link between Denman Road and Wybong Road, thereby minimising impact on the local road network.
3. There are to be initiatives in place to protect local roads such as Mangoola and Roxburgh Roads from significant traffic increase as a result of traffic generated by this project.

The key intersection for converge of potential trips will be Denman and Bengalla Link Roads, Muswellbrook. All approaches to the existing intersection are shown in the photos below.

1. DENMAN RD FROM DENMAN

2. DENMAN RD FROM MUSWELLBROOK

3. BENGALLA LINK RD VIEWED FROM DENMAN RD

Based on the personnel and catchments stated in Section 3.2 TPK has determined the highest potential peak demand at the Denman/Bengalla Link Roads intersection, due to the Anvil Hill Project based on:

- Employees restricted to using the nominated route Bengalla Link Road to Wybong Road to the mine site.
- 2 shifts per day with all day-employees arriving at the same time as the day shift employees commence.
- Arrival and departure mine shift traffic trips will not coincide at this intersection.
- 90% of traffic to/from the mine on Muswellbrook approach; 10% to/from Denman approach.
- Approximately 25% of total shift employees are working at any one shift. This is based on data from existing mining operations that utilise 12 hour shift rosters.
- Approximately 30% of day employees leave work at the same time as the employees that have just finished day shift.
- A conservative level of car sharing has been adopted resulting in a high car usage rate of between 80% and 85%.
- Half of all heavy vehicle movement arrivals coincide with the day shift change. It is likely that heavy vehicle movements would be distributed more evenly over the day.
- Half of all visitor arrivals coincide with the day shift change. It is likely that visitor movements would be distributed more evenly over the day.
- No adjustment in daily employee levels for annual leave, training, or sick leave.

The resulting peak morning and evening traffic flows as a result of the Anvil Hill Project are listed in Table 1 below.

Table 1: Peak Anvil Hill Project Traffic Movements

Peak Anvil Hill Project AM Movements (0630-0730 hrs)

				Movements in Worst Case Hour		
Activity	Total Employees	Number on Site per Day	Sharing Adjustment	Arrivals	Departures	Total
Shift Employees#	227	118	0.825	49	49	98
Day Employees*	13	13	0.825	11	0	11
Visitors		20		10	0	10
Heavy Vehicles		10		5	1	6
Total	240	161		75	50	125

Peak Anvil Hill Project PM Movements (1830-1930 hrs)

				Movements in Worst Case Hour		
Activity	Total Employees	Number on Site per day	Sharing Adjustment	Arrivals	Departures	Total
Shift Employees#	227	118	0.825	49	49	98
Day Employees*	13	13	0.825	0	4	4
Visitors		20		0	1	1
Heavy Vehicles		10		1	2	3
Total	240	161		50	56	106

Notes:

 # Shift Employees include all Open Cut and CPP employees including Shift Coordinators

** Day Employees include all employees within central administration such as the General Manager, senior managers, and administration staff*

In addition, allowance has been made for the projected Mount Pleasant mine employee numbers as outlined in the Mt Pleasant Mine Environmental Impact Statement Volume 1 (ERM Mitchell McCotter 1997). Using similar assumptions as listed above for the Anvil Hill Project, the projected peak morning and evening traffic flows for Mount Pleasant are listed in Table 2 on the following page.

Table 2: Peak Mount Pleasant Mine Traffic Movements

Peak Mount Pleasant Mine AM Movements (0630-0730hrs)						
				Movements in Worst Case Hour		
Activity	Total Employees	Number on Site per day	Sharing Adjustment	Arrivals	Departures	Total
Shift Employees#	350	176	0.825	73	73	146
Day Employees*	30	25	0.825	21	0	21
Visitors		20		10	0	10
Heavy Vehicles		10		5	1	6
Total	380	199		109	74	183

Peak Mount Pleasant Mine PM Movements (1830-1930hrs)						
				Movements in Worst Case Hour		
Activity	Total Employees	Number on Site per day	Sharing Adjustment	Arrivals	Departures	Total
Shift Employees#	350	176	0.825	73	73	146
Day Employees*	30	25	0.825	0	8	8
Visitors		20		0	1	1
Heavy Vehicles		10		1	2	3
Total	380	199		74	84	158

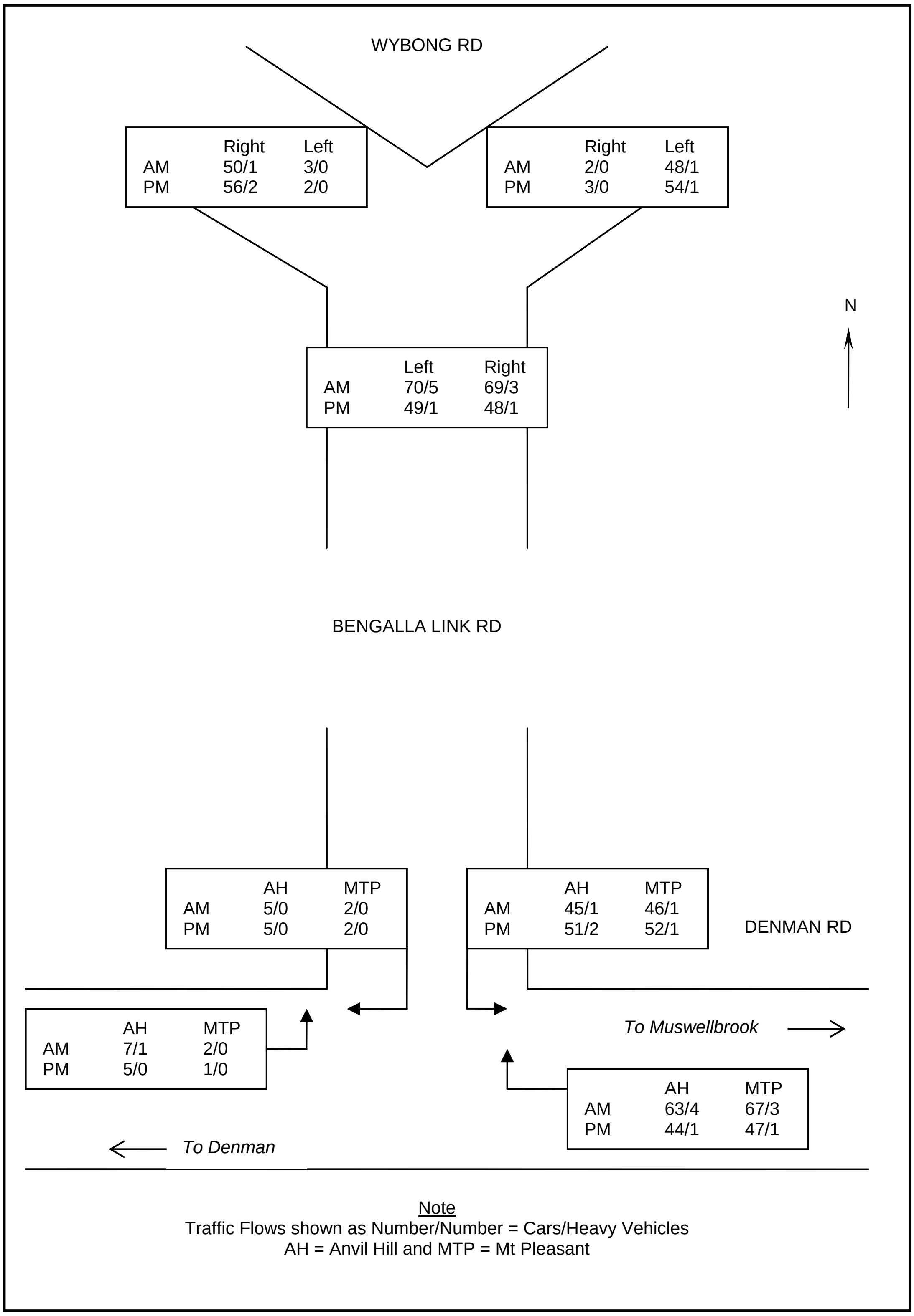
The Mt Pleasant Mine Environmental Impact Statement Volume 1 (ERM Mitchell McCotter 1997) distributed the potential traffic generations assuming access to catchments via routes other than Bengalla Link Road. They indicated that the Table 2 totals are then split into the following route proportions as outlined:

- 3% of the traffic will travel west via Wybong Rd
- 66% of the traffic will travel south via Bengalla Link Rd. Once this traffic reaches the Denman Rd intersection, 63% will travel east along Denman Rd towards Muswellbrook and 3% will travel west along Denman Rd towards Denman.

Figure 3 on the following page summarises these traffic generation and distributions at the key intersections either end of Bengalla Link Road.

Figure 3 shows the typical inbound and outbound highest peak hour trips (Cars/HV).

FIGURE 3 – POTENTIAL DISTRIBUTION OF ADDITIONAL TRAFFIC GENERATIONS



4. ASSESSMENT OF NOMINATED TRANSPORT ROUTE

4.1 – Route Description

The route for site traffic is described to be:

- Travel towards Muswellbrook via established main roads
- Transit Denman Road (MR 209) or Thomas Mitchell Drive to the Bengalla Link Road intersection
- Transit Bengalla Link Road to Wybong Road
- Transit Wybong Road to Anvil Hill Access Road
- Transit the reverse of the above description for exiting trips

4.2. – Relevant Issues

TPK have assessed the following as key traffic matters to be addressed following road network assessment audits:

- Consideration to be given to route capacity.
- Key intersections on the nominated route require assessment with regard to capacity
- Wybong Road between the intersection with Bengalla Link Road (extended) and Anvil Hill Mine Access to be upgraded to meet standard requirements.
- The Anvil Hill Access Road and Wybong Road intersection to be constructed at a point that provides adequate sight distance.

4.3. – Identified Solutions

TPK have identified the following in respect of the items listed in 4.2 above:

- Route and Intersection capacity to be analysed in detail in Section 5 of this report

- Wybong Road to be upgraded as a joint venture between Muswellbrook Shire Council and Centennial.

  Centennial Coal will be required to enhance the road environment relative to the increase in traffic and potential increased traffic interaction. This could include provision of improved road surface, centreline marking and enhanced road safety areas such as school bus bays.

Appendix A is a summation of the key findings of the roads assessment audits including Wybong Road; the section shaded (green) is most relevant to this project assessment.

TPK submit that the following issues currently require attention for this section of Wybong Road to meet the appropriate local road standards regardless of this project:

- ❖ Provide and maintain trafficable shoulders/clear zones. Currently vegetation restricts or covers basic traffic facilities such as guide posts and signs but of more concern it hides exposed bridge abutments. There are limited opportunities to confidently move off the sealed carriageway.
- ❖ Safe intersection sight distance for all accesses through control of foliage and improved road geometry.
- ❖ Provision of standard warning signs (and protection if warranted) for hazards such as bridge abutments and culverts.

Centennial Coal proposes to upgrade Wybong Road as follows:

- ❖ Upgrade Wybong Road sealed carriageway to ensure a minimum carriageway width of 6.5m over the section between the Bengalla Link Road (extended) and the mine access road intersection.
- ❖ Provide roadmarked centreline and raised reflective pavement markers (RPM) to required standards.
- ❖ Enhance curve advisory and hazard signposting to improve awareness for drivers unfamiliar with the road environment.
- ❖ Upgrade locations subject to activity by vulnerable road users such as school children to enhance road safety. The only site identified during site inspection was the school bus pick up/set down operation near Castlerock Road; confirmation of current sites would need to be obtained at the Wybong Road detail design stage.

- The location of the new access road as proposed has been confirmed by detail survey with respect to safe intersection sight distance (SISD); an optimum centreline point for the access road has been identified that achieves sight distance for the prevailing road environment within tolerances of road design guide best practice; 273m SISD will be available to the left and 244m to the right.

5. ROUTE AND INTERSECTION CAPACITY

5.1 – Route Capacity

Austroads Part 2 Table 3.9 provides Maximum AADT figures for Various Levels of Service (LoS see page 12) and Types of Terrain for two lane Two Way rural roads. The key routes to experience any potential impact from traffic generated by this project's traffic will be:

- Denman Road

  Current AADT in Muswellbrook is around 9000vpd on the urban arterial section of this route and diminishing to less than 4000vpd on the rural two lane road section towards the Bengalla Link Road intersection.

  Total intersection demand for controlled sites such as The New England Highway and Denman Road does not exceed 1100vph.

  Austroads states a maximum AADT of 7900vpd for LoS C in two lane rural roads whilst in the urban road environment the focus is more on hourly volume lane capacity where 1800vph, one way is stated as an indicative capacity for interrupted flow.

  The total daily traffic increase in Muswellbrook will not exceed 310vpd due to this project and TPK submit that the daily increase is not significant for AADT nor will the hourly rate impact spread over the various approaches of controlled intersections reduce intersection capacity. Consequently, TPK submit that there will be no measurable change in the roadway capacity.

- Bengalla Link Road

  Bengalla Link Road currently caters for less than 1500vpd and is to ultimately have a broader network role once extended to Wybong Road; Austroads states the maximum AADT for LoS C is 7900vpd. Given the daily increase from this project is expected to be around 300 to 340vpd TPK submit such daily volumes will not have an adverse impact on present or ultimate route capacity.

- Wybong Road

  ADT measured at the Golden Highway end of the route indicates combined volumes of around 300vpd. Extrapolating the Muswellbrook end from Kayuga Road peak hour intersection counts the average ADT is seen to be around 1000vpd. Significant road strategies, under planning by Muswellbrook Council, will impact on Wybong Road east of Roxburgh Road. However westerly towards the proposed access for this project it is realistic to expect an ADT around 500vpd and an hourly peak flow of 50vph for existing traffic. In terms of route capacity the mine traffic increase is not significant.

5.2. – Intersections

Denman and Bengalla Link Roads

The traffic critical intersection for potential impact from this project is seen to be Denman and Bengalla Link Roads. TPK has arranged peak hour intersection counts to obtain existing traffic flows. Utilising the potential traffic distributions set out in Figure 3 of this report TPK has completed a series of intersection models based on the existing geometric layout.

TPK have modelled ten scenarios for this intersection and outcomes are provided on the following pages as Tables 3 to 12; the scenarios are:

3 Existing traffic AM Peak
4. Existing traffic AM Peak with Anvil Hill inbound shift traffic added
5. Existing traffic AM Peak with Anvil Hill & Mt Pleasant inbound shift traffic added
6. Existing traffic AM Peak with Anvil Hill outbound shift traffic added
7. Existing traffic AM Peak with Anvil Hill & Mt Pleasant outbound shift traffic added
8. Existing traffic PM Peak
9. Existing traffic PM Peak with Anvil Hill inbound shift traffic added
10. Existing traffic PM Peak with Anvil Hill & Mt Pleasant inbound shift traffic added
11. Existing traffic PM Peak with Anvil Hill outbound shift traffic added
12. Existing traffic PM Peak with Anvil Hill & Mt Pleasant outbound shift traffic added

TPK utilise the intersection-modeling program SIDRA to review intersection performance. The outcomes of the model include key indicators:

- Approach Level of Service
- Approach Average Delay
- Approach 95% Back of Queue
- Approach Degree of Saturation

The term Level of Service (LoS) is one output parameter of the SIDRA model and provides an insight into “operating conditions” of the intersection and each approach. The output range is indicated in the range LoS A to LoS F where A indicates good operating conditions reducing to F where other forms of control should be considered.

Table of Abbreviations used in SIDRA Movement Summary

Some of the column headers are explained below to assist in interpretation; those not listed are self explanatory or measures of performance requiring detailed interpretation.
Mov No = Movement Number given to each movement
Dem Flow (veh/hr) = Actual volumes adjusted SIDRA for relativity in the model
Turn = Direction, either Through (T), Left (L) or Right (R)
%HV = Percent of Heavy Vehicles in the flow
Level of Service = See page 12

Table 3 – Movement Summary

DENMAN and BENGALLA LINK ROADS, MUSWELLBROOK. EXISTING TRAFFIC AM PEAK

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	94	25.8	0.056	0.0	LOS A	0	0.00	0.00	80.0
6	R	118	9.3	0.096	11.9	LOS B	4	0.24	0.68	57.7
Approach		**211**	**16.6**	**0.096**	**6.7**	**LOS A**	**4**	**0.13**	**0.38**	**65.9**
BENGALLA LINK ROAD										
7	L	25	16.0	0.033	12.6	LOS B	1	0.23	0.67	57.6
9	R	1	0.0	0.002	14.2	LOS B	0	0.47	0.66	54.5
Approach		**26**	**15.4**	**0.033**	**12.6**	**LOS B**	**1**	**0.24**	**0.67**	**57.5**
DENMAN ROAD										
10	L	7	0.0	0.063	10.9	LOS B	0	0.00	0.73	58.9
11	T	112	6.3	0.063	0.0	LOS A	0	0.00	0.00	80.0
Approach		**118**	**5.9**	**0.063**	**0.6**	**LOS A**		**0.00**	**0.04**	**78.4**
All Vehicles		**355**	**13.0**	**0.096**	**5.1**	**Not Applicable**	**4**	**0.10**	**0.29**	**68.8**

TPK submit intersection performance is satisfactory

Table 4 – Movement Summary

DENMAN & BENGALLA LINK ROADS MUSWELLBROOK – EXISTING TRAFFIC AM PEAK WITH AH INBOUND SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	112	6.3	0.059	0.0	LOS A	0	0.00	0.00	80.0
6	R	188	7.9	0.152	11.9	LOS B	6	0.25	0.68	57.6
Approach		**300**	**7.3**	**0.152**	**7.5**	**LOS A**	**6**	**0.16**	**0.43**	**64.4**
BENGALLA LINK ROAD										
7	L	25	16.0	0.033	12.6	LOS B	1	0.23	0.67	57.6
9	R	1	0.0	0.002	15.2	LOS C	0	0.52	0.68	53.4
Approach		**26**	**15.4**	**0.033**	**12.7**	**LOS B**	**1**	**0.24**	**0.67**	**57.4**
DENMAN ROAD										
10	L	7	0.0	0.059	10.9	LOS B	0	0.00	0.73	58.9
11	T	94	25.8	0.059	0.0	LOS A	0	0.00	0.00	80.0
Approach		**100**	**24.0**	**0.059**	**0.8**	**LOS A**		**0.00**	**0.05**	**78.1**
All Vehicles		**426**	**11.7**	**0.152**	**6.2**	**Not Applicable**	**6**	**0.13**	**0.36**	**66.7**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 5 – Movement Summary

DENMAN & BENGALLA LINK ROADS MUSWELLBROOK – EXISTING TRAFFIC AM PEAK WITH AH and Mt.P INBOUND SHIFTS ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	112	6.3	0.059	0.0	LOS A	0	0.00	0.00	80.0
6	R	262	6.9	0.210	11.9	LOS B	9	0.27	0.68	57.5
Approach		**373**	**6.7**	**0.210**	**8.4**	**LOS A**	**9**	**0.19**	**0.48**	**62.9**
BENGALLA LINK ROAD										
7	L	25	16.0	0.033	12.6	LOS B	1	0.24	0.67	57.6
9	R	1	0.0	0.002	16.4	LOS C	0	0.55	0.70	52.0
Approach		**26**	**15.4**	**0.033**	**12.7**	**LOS B**	**1**	**0.25**	**0.67**	**57.3**
DENMAN ROAD										
10	L	15	0.0	0.064	10.9	LOS B	0	0.00	0.73	58.9
11	T	94	25.8	0.064	0.0	LOS A	0	0.00	0.00	80.0
Approach		**108**	**22.2**	**0.064**	**1.5**	**LOS A**		**0.00**	**0.10**	**76.3**
All Vehicles		**507**	**10.5**	**0.210**	**7.1**	**Not Applicable**	**9**	**0.15**	**0.41**	**65.0**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 6 – Movement Summary

DENMAN & BENGALLA LINK ROADS MUSWELLBROOK – EXISTING TRAFFIC AM PEAK WITH AH OUTBOUND SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	112	6.3	0.059	0.0	LOS A	0	0.00	0.00	80.0
6	R	118	9.3	0.096	11.9	LOS B	4	0.24	0.68	57.7
Approach		**229**	**7.9**	**0.096**	**6.1**	**LOS A**	**4**	**0.12**	**0.35**	**66.8**
BENGALLA LINK ROAD										
7	L	74	6.8	0.086	11.9	LOS B	2	0.23	0.68	57.6
9	R	6	0.0	0.011	14.3	LOS B	0	0.48	0.72	54.4
Approach		**79**	**6.3**	**0.086**	**12.1**	**LOS B**	**2**	**0.25**	**0.68**	**57.3**
DENMAN ROAD										
10	L	7	0.0	0.059	10.9	LOS B	0	0.00	0.73	58.9
11	T	94	25.8	0.059	0.0	LOS A	0	0.00	0.00	80.0
Approach		**100**	**24.0**	**0.059**	**0.8**	**LOS A**		**0.00**	**0.05**	**78.1**
All Vehicles		**408**	**11.5**	**0.096**	**6.0**	**Not Applicable**	**4**	**0.12**	**0.34**	**67.1**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 7 – Movement Summary

DENMAN & BENGALLA LINK ROADS MUSWELLBROOK – EXISTING TRAFFIC AM PEAK WITH AH and Mt. P OUTBOUND SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	112	6.3	0.059	0.0	LOS A	0	0.00	0.00	80.0
6	R	118	9.3	0.096	11.9	LOS B	4	0.24	0.68	57.7
Approach		**229**	**7.9**	**0.096**	**6.1**	**LOS A**	**4**	**0.12**	**0.35**	**66.8**
BENGALLA LINK ROAD										
7	L	123	4.9	0.142	11.8	LOS B	4	0.23	0.68	57.6
9	R	8	0.0	0.015	14.4	LOS B	0	0.48	0.73	54.3
Approach		**131**	**4.6**	**0.141**	**12.0**	**LOS B**	**4**	**0.25**	**0.68**	**57.4**
DENMAN ROAD										
10	L	7	0.0	0.059	10.9	LOS B	0	0.00	0.73	58.9
11	T	94	25.8	0.059	0.0	LOS A	0	0.00	0.00	80.0
Approach		**100**	**24.0**	**0.059**	**0.8**	**LOS A**		**0.00**	**0.05**	**78.1**
All Vehicles		**460**	**10.4**	**0.142**	**6.6**	**Not Applicable**	**4**	**0.13**	**0.38**	**65.8**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 8 – Movement Summary

DENMAN and BENGALLA ROADS, MUSWELLBROOK. EXISTING TRAFFIC PM PEAK

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	158	10.1	0.086	0.0	LOS A	0	0.00	0.00	80.0
6	R	12	36.4	0.012	14.1	LOS B	1	0.29	0.67	57.4
Approach		**169**	**11.8**	**0.086**	**0.9**	**LOS A**	**1**	**0.02**	**0.04**	**78.0**
BENGALLA LINK ROAD										
7	L	55	20.0	0.076	13.0	LOS B	2	0.28	0.69	57.3
9	R	1	0.0	0.002	13.9	LOS B	0	0.46	0.66	54.9
Approach		**56**	**19.6**	**0.076**	**13.0**	**LOS B**	**2**	**0.28**	**0.69**	**57.3**
DENMAN ROAD										
10	L	3	0.0	0.075	10.9	LOS B	0	0.00	0.73	58.9
11	T	126	19.8	0.075	0.0	LOS A	0	0.00	0.00	80.0
Approach		**129**	**19.4**	**0.075**	**0.3**	**LOS A**		**0.00**	**0.02**	**79.4**
All Vehicles		**354**	**15.8**	**0.086**	**2.6**	**Not Applicable**	**2**	**0.05**	**0.14**	**74.3**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 9 – Movement Summary

DENMAN & BENGALLA LINK ROADS MUSWELLBROOK – EXISTING TRAFFIC PM PEAK WITH AH INBOUND SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	157	4.5	0.082	0.0	LOS A	0	0.00	0.00	80.0
6	R	57	5.3	0.044	11.6	LOS B	2	0.20	0.67	57.9
Approach		**213**	**4.7**	**0.082**	**3.1**	**LOS A**	**2**	**0.05**	**0.18**	**72.7**
BENGALLA LINK ROAD										
7	L	58	6.9	0.068	11.8	LOS B	2	0.20	0.67	57.8
9	R	1	0.0	0.002	13.7	LOS B	0	0.44	0.66	55.2
Approach		**59**	**6.8**	**0.068**	**11.8**	**LOS B**	**2**	**0.20**	**0.67**	**57.7**
DENMAN ROAD										
10	L	5	0.0	0.051	10.9	LOS B	0	0.00	0.73	58.9
11	T	88	9.1	0.050	0.0	LOS A	0	0.00	0.00	80.0
Approach		**93**	**8.6**	**0.050**	**0.6**	**LOS A**		**0.00**	**0.04**	**78.5**
All Vehicles		**365**	**6.0**	**0.082**	**3.9**	**Not Applicable**	**2**	**0.06**	**0.22**	**71.1**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 10 – Movement Summary

DENMAN & BENGALLA LINK ROADS MUSWELLBROOK – EXISTING TRAFFIC PM PEAK WITH AH and Mt.P INBOUND SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	157	4.5	0.082	0.0	LOS A	0	0.00	0.00	80.0
6	R	107	3.7	0.081	11.5	LOS B	3	0.21	0.68	57.9
Approach		**263**	**4.2**	**0.082**	**4.7**	**LOS A**	**3**	**0.08**	**0.27**	**69.3**
BENGALLA LINK ROAD										
7	L	58	6.9	0.068	11.8	LOS B	2	0.20	0.67	57.8
9	R	1	0.0	0.002	14.3	LOS B	0	0.48	0.66	54.5
Approach		**59**	**6.8**	**0.068**	**11.8**	**LOS B**	**2**	**0.20**	**0.67**	**57.7**
DENMAN ROAD										
10	L	6	0.0	0.051	10.9	LOS B	0	0.00	0.73	58.9
11	T	88	9.1	0.051	0.0	LOS A	0	0.00	0.00	80.0
Approach		**94**	**8.5**	**0.051**	**0.7**	**LOS A**		**0.00**	**0.05**	**78.2**
All Vehicles		**416**	**5.5**	**0.082**	**4.8**	**Not Applicable**	**3**	**0.08**	**0.28**	**69.2**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 11 – Movement Summary

DENMAN & BENGALLA LINK ROADS MUSWELLBROOK – EXISTING TRAFFIC PM PEAK WITH AH OUTBOUND SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	157	4.5	0.082	0.0	LOS A	0	0.00	0.00	80.0
6	R	9	22.2	0.008	12.7	LOS B	0	0.21	0.66	57.8
Approach		**165**	**5.5**	**0.082**	**0.7**	**LOS A**	**0**	**0.01**	**0.04**	**78.4**
BENGALLA LINK ROAD										
7	L	114	5.3	0.130	11.7	LOS B	4	0.20	0.68	57.7
9	R	6	0.0	0.010	13.2	LOS B	0	0.41	0.69	55.8
Approach		**119**	**5.0**	**0.130**	**11.8**	**LOS B**	**4**	**0.21**	**0.68**	**57.6**
DENMAN ROAD										
10	L	1	0.0	0.048	10.9	LOS B	0	0.00	0.73	58.9
11	T	88	9.1	0.048	0.0	LOS A	0	0.00	0.00	80.0
Approach		**89**	**9.0**	**0.048**	**0.1**	**LOS A**		**0.00**	**0.01**	**79.7**
All Vehicles		**373**	**6.2**	**0.130**	**4.1**	**Not Applicable**	**4**	**0.07**	**0.23**	**70.7**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 12 – Movement Summary

DENMAN & BENGALLA LINK ROADS MUSWELLBROOK – EXISTING TRAFFIC PM PEAK WITH AH and Mt.P OUTBOUND SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
DENMAN ROAD FROM M'BROOK										
5	T	157	4.5	0.082	0.0	LOS A	0	0.00	0.00	80.0
6	R	9	22.2	0.008	12.7	LOS B	0	0.21	0.66	57.8
Approach		**165**	**5.5**	**0.082**	**0.7**	**LOS A**	**0**	**0.01**	**0.04**	**78.4**
BENGALLA LINK ROAD										
7	L	169	4.1	0.192	11.7	LOS B	6	0.21	0.68	57.7
9	R	8	0.0	0.013	13.2	LOS B	0	0.41	0.70	55.8
Approach		**177**	**4.0**	**0.192**	**11.7**	**LOS B**	**6**	**0.22**	**0.68**	**57.6**
DENMAN ROAD										
10	L	1	0.0	0.048	10.9	LOS B	0	0.00	0.73	58.9
11	T	88	9.1	0.048	0.0	LOS A	0	0.00	0.00	80.0
Approach		**89**	**9.0**	**0.048**	**0.1**	**LOS A**		**0.00**	**0.01**	**79.7**
All Vehicles		**431**	**5.6**	**0.192**	**5.1**	**Not Applicable**	**6**	**0.10**	**0.29**	**68.6**

TPK submit that the intersection performance is satisfactory for this scenario.

Wybong Road and Anvil Hill Access Road

Austroads Part 5, Intersections at Grade, Figure 5.23a provides warrants for various geometric rural intersection layouts with a key element being the volume turning right into the side road.

The potential traffic generation distributions adopted for this report maintain minimal right turn into the mine Access Road from Wybong Road will eventuate. The major traffic movements for mine traffic will be left into and right out of the mine Access Road.

Austroads Figure 5.23a could provide argument for provision of only a simple Type A Rural T-Intersection. TPK submit that in view of the potential for some heavy vehicle mine traffic flow that the provision of a Type B rural layout, with a left turn auxiliary lane would be preferable in the interests of road safety. The Type B layout provides preferable overtaking on the near side width for traffic passing traffic turning right into the site and the left turn into the site will be the main inward movement.

TPK have modeled the suggested layout based on typical existing peak hourly flows on Wybong Road and the higher volume inbound and outbound mine shifts traffic coinciding at this intersection See Figure 4); this is the worst case scenario see Table 13 for the SIDRA output. It should be noted:

- The trips to/from Sandy Hollow are included as unaccounted trips as there is no expectation for traffic on those movements; they were included for sensitivity of the model.
- Type B geometric parameters adopted in the model were for a 100kph speed limit, 3.25m lanes and a 1950vph saturation flow was adopted.

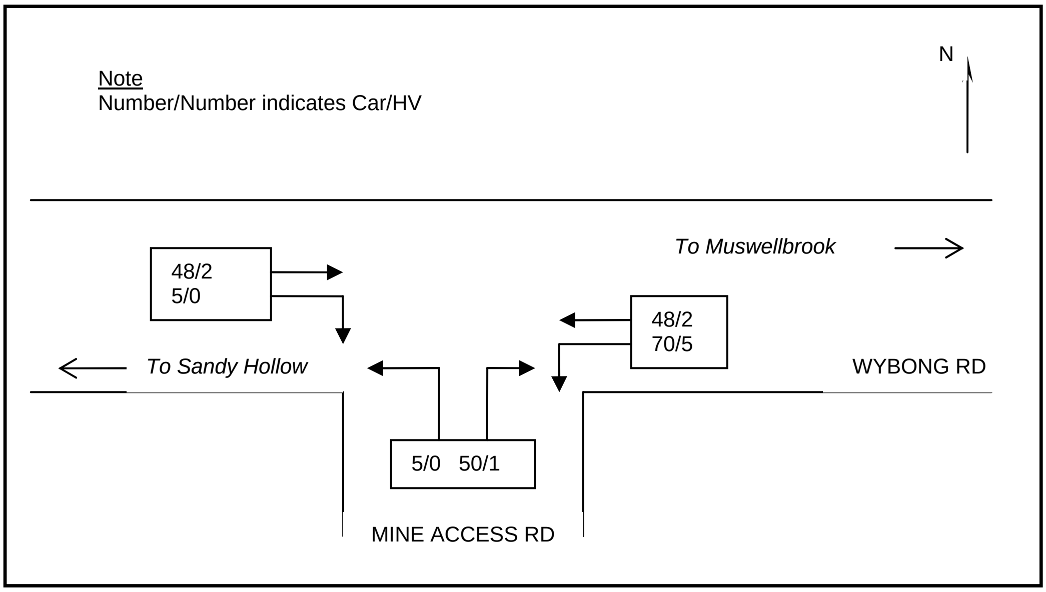


FIGURE 4 – POTENTIAL MAXIMUM PEAK

Table 13 – Movement Summary

WYBONG ROAD & ANVIL HILL MINE ACCESS ROAD – POTENTIAL PEAK HOUR - ARRIVAL & DEPARTURE SHIFTS COINCIDE

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
ANVIL HILL ACCESS RD										
1	L	5	0.0	0.006	12.9	LOS B	0	0.19	0.68	67.8
3	R	54	1.9	0.074	14.0	LOS B	3	0.32	0.71	67.0
Approach		**59**	**1.7**	**0.075**	**13.9**	**LOS B**	**3**	**0.31**	**0.71**	**67.1**
WYBONG RD FROM MBROOK										
4	L	79	6.3	0.044	13.2	LOS B	0	0.00	0.76	69.1
5	T	53	3.8	0.028	0.0	LOS A	0	0.00	0.00	100.0
Approach		**132**	**5.3**	**0.044**	**7.9**	**LOS A**		**0.00**	**0.45**	**79.1**
WYBONG ROAD										
11	T	53	3.8	0.016	0.2	LOS A	1	0.11	0.00	96.1
12	R	5	0.0	0.016	12.9	LOS B	1	0.25	0.68	67.8
Approach		**58**	**3.4**	**0.016**	**1.3**	**LOS A**	**1**	**0.12**	**0.06**	**92.8**
All Vehicles		**249**	**4.0**	**0.074**	**7.8**	**Not Applicable**	**3**	**0.10**	**0.42**	**78.5**

TPK submit that the proposed intersection geometry will manage potential traffic generations from Anvil Hill Mine and have minimum impact on Wybong road.

Denman Road and Thomas Mitchell Drive

TPK has modelled the subject intersection using recent intersection counts for the existing scenarios and additional traffic flows shown in Figure 4.

TPK have modelled 6 scenarios for this intersection and outcomes are provided on the following pages as Tables 14 to 19; the scenarios are:

14 Existing traffic AM Peak
15 Existing traffic AM Peak with Anvil Hill & Mt Pleasant inbound shift traffic added
16 Existing traffic AM Peak with Anvil Hill & Mt Pleasant outbound shift traffic added
17 Existing traffic PM Peak
18 Existing traffic PM Peak with Anvil Hill & Mt Pleasant inbound shift traffic added
19 Existing traffic PM Peak with Anvil Hill & Mt Pleasant outbound shift traffic added

FIGURE 4 – POTENTIAL DISTRIBUTION OF ADDITIONAL TRAFFIC GENERATIONS

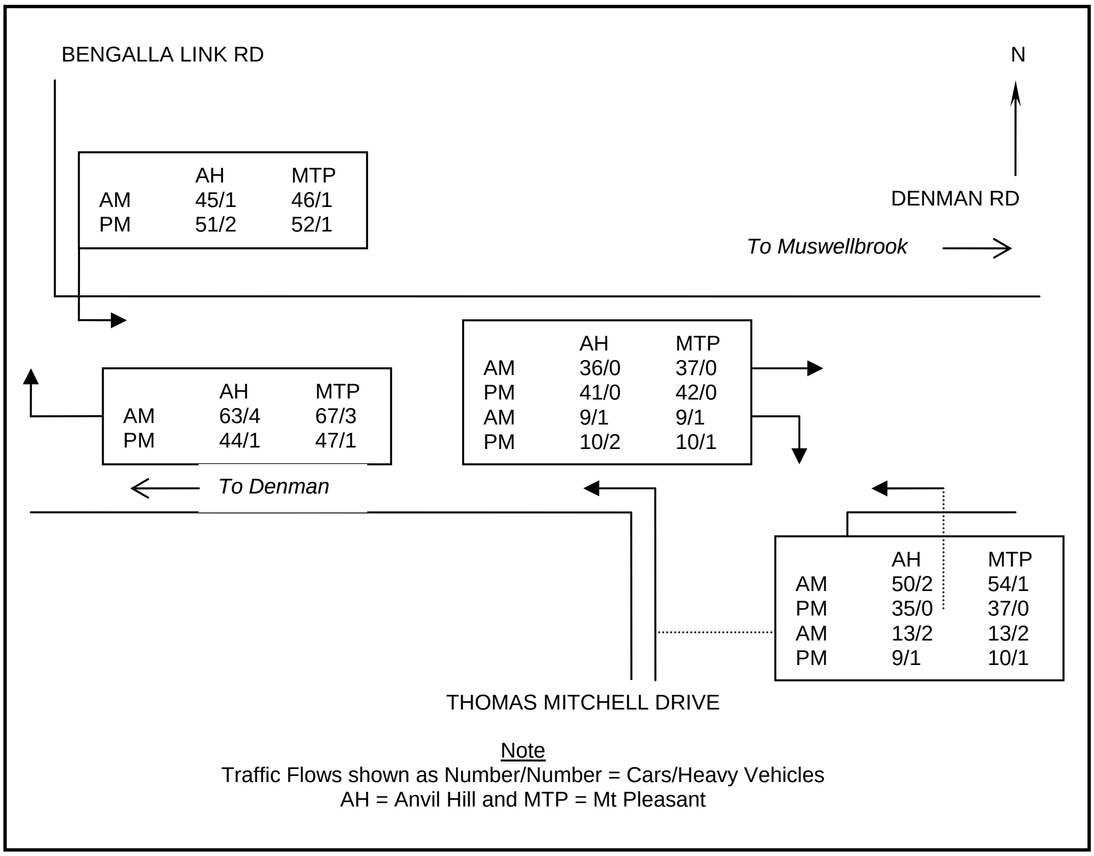


Table 14 – Movement Summary

DENMAN RD & THOMAS MITCHELL DRV, MUSWELLBROOK – AM PEAK, EXISTING TRAFFIC

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
THOMAS MITCHELL DRV										
1	L	75	16.0	0.106	14.4	LOS B	4	0.45	0.77	55.5
3	R	124	17.7	0.378	24.1	LOS C	19	0.70	0.98	45.6
Approach		**199**	**17.1**	**0.378**	**20.4**	**LOS C**	**19**	**0.60**	**0.90**	**48.9**
DENMAN RD FROM M'BROOK										
4	L	376	6.9	0.212	11.3	LOS B	0	0.00	0.73	58.9
5	T	161	7.5	0.087	0.0	LOS A	0	0.00	0.00	80.0
Approach		**536**	**7.1**	**0.212**	**7.9**	**LOS A**		**0.00**	**0.51**	**64.1**
DENMAND ROAD										
11	T	92	4.4	0.048	0.0	LOS A	0	0.00	0.00	80.0
12	R	60	5.0	0.074	13.9	LOS B	3	0.51	0.79	55.3
Approach		**151**	**4.6**	**0.074**	**5.5**	**LOS A**	**3**	**0.20**	**0.31**	**68.1**
All Vehicles		**886**	**8.9**	**0.378**	**10.3**	**Not Applicable**	**19**	**0.17**	**0.56**	**60.5**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 15 – Movement Summary

DENMAN RD & THOMAS MITCHELL DRV, MUSWELLBROOK – AM PEAK, EXISTING TRAFFIC WITH AH AND Mt P AM INWARD SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
THOMAS MITCHELL DRV										
1	L	106	15.0	0.176	15.6	LOS C	7	0.53	0.85	53.9
3	R	124	17.7	0.481	30.7	LOS D	25	0.80	1.04	40.5
Approach		**231**	**16.5**	**0.480**	**23.7**	**LOS C**	**25**	**0.68**	**0.95**	**45.8**
DENMAN RD FROM M'BROOK										
4	L	376	6.9	0.212	11.3	LOS B	0	0.00	0.73	58.9
5	T	284	5.3	0.151	0.0	LOS A	0	0.00	0.00	80.0
Approach		**659**	**6.2**	**0.212**	**6.5**	**LOS A**		**0.00**	**0.42**	**66.6**
DENMAND ROAD										
11	T	92	4.4	0.048	0.0	LOS A	0	0.00	0.00	80.0
12	R	60	5.0	0.086	14.8	LOS B	3	0.56	0.84	54.2
Approach		**151**	**4.6**	**0.086**	**5.9**	**LOS A**	**3**	**0.22**	**0.33**	**67.4**
All Vehicles		**1041**	**8.3**	**0.481**	**10.2**	**Not Applicable**	**25**	**0.18**	**0.52**	**60.6**

TPK submit that the impact of both potential mine traffic inward peaks has minimal impact on intersection performance.

The worst approach movement (RT from Thomas Mitchell Drive) only incurred a 6.6 second increase in average delay and a 6m (I vehicle) increase in 95% back of queue.

Table 16 – Movement Summary

DENMAN RD & THOMAS MITCHELL DRV, MUSWELLBROOK – AM PEAK EXISTING TRAFFIC WITH AH AND Mt P AM OUTWARD SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
THOMAS MITCHELL DRV										
1	L	75	16.0	0.106	14.4	LOS B	4	0.45	0.77	55.5
3	R	124	17.7	0.458	29.1	LOS D	23	0.78	1.03	41.7
Approach		**199**	**17.1**	**0.457**	**23.6**	**LOS C**	**23**	**0.66**	**0.93**	**46.0**
DENMAN RD FROM M'BROOK										
4	L	376	6.9	0.212	11.3	LOS B	0	0.00	0.73	58.9
5	T	161	7.5	0.087	0.0	LOS A	0	0.00	0.00	80.0
Approach		**536**	**7.1**	**0.212**	**7.9**	**LOS A**		**0.00**	**0.51**	**64.1**
DENMAND ROAD										
11	T	168	2.4	0.087	0.0	LOS A	0	0.00	0.00	80.0
12	R	81	6.2	0.101	14.1	LOS B	4	0.52	0.81	55.2
Approach		**249**	**3.6**	**0.101**	**4.6**	**LOS A**	**4**	**0.17**	**0.26**	**69.9**
All Vehicles		**984**	**8.2**	**0.458**	**10.2**	**Not Applicable**	**23**	**0.18**	**0.53**	**60.6**

TPK submit that the impact of both potential mine traffic outward peaks has minimal impact on intersection performance.

The worst approach movement (RT from Thomas Mitchell Drive) only incurred a 5 second increase in average delay and a 4m (less than I vehicle) increase in 95% back of queue.

Table 17 – Movement Summary

DENMAN RD & THOMAS MITCHELL DRV, MUSWELLBROOK – PM PEAK EXISTING TRAFFIC

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
THOMAS MITCHELL DRV										
1	L	52	13.7	0.057	12.8	LOS B	2	0.30	0.69	57.2
3	R	304	6.6	0.657	24.0	LOS C	51	0.76	1.13	45.1
Approach		**355**	**7.6**	**0.657**	**22.4**	**LOS C**	**51**	**0.69**	**1.06**	**46.5**
DENMAN RD FROM M'BROOK										
4	L	98	24.5	0.062	12.4	LOS B	0	0.00	0.73	58.9
5	T	118	11.0	0.065	0.0	LOS A	0	0.00	0.00	80.0
Approach		**216**	**17.1**	**0.065**	**5.6**	**LOS A**		**0.00**	**0.33**	**68.9**
DENMAND ROAD										
11	T	175	5.2	0.075	0.3	LOS A	4	0.07	0.00	78.2
12	R	46	39.1	0.075	15.2	LOS C	4	0.40	0.72	56.4
Approach		**220**	**12.3**	**0.075**	**3.4**	**LOS A**	**4**	**0.14**	**0.15**	**72.5**
All Vehicles		**791**	**11.5**	**0.657**	**12.5**	**Not Applicable**	**51**	**0.35**	**0.61**	**57.4**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 18 – Movement Summary

DENMAN RD & THOMAS MITCHELL DRV, MUSWELLBROOK – PM PEAK EXISTING TRAFFIC WITH AH & Mt P INWARD SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
THOMAS MITCHELL DRV										
1	L	74	12.3	0.087	13.2	LOS B	3	0.37	0.72	56.8
3	R	304	6.6	0.743	29.4	LOS D	63	0.82	1.23	41.0
Approach		**377**	**7.7**	**0.743**	**26.2**	**LOS D**	**63**	**0.73**	**1.13**	**43.3**
DENMAN RD FROM M'BROOK										
4	L	98	24.5	0.062	12.4	LOS B	0	0.00	0.73	58.9
5	T	194	6.7	0.104	0.0	LOS A	0	0.00	0.00	80.0
Approach		**292**	**12.7**	**0.104**	**4.2**	**LOS A**		**0.00**	**0.25**	**71.5**
DENMAND ROAD										
11	T	175	5.2	0.079	0.4	LOS A	4	0.07	0.00	78.4
12	R	46	39.1	0.079	15.9	LOS C	4	0.45	0.75	55.5
Approach		**220**	**12.3**	**0.079**	**3.6**	**LOS A**	**4**	**0.15**	**0.16**	**72.2**
All Vehicles		**889**	**10.5**	**0.743**	**13.4**	**Not Applicable**	**63**	**0.35**	**0.60**	**56.3**

TPK submit that the impact of both potential mine traffic inward peaks has minimal impact on intersection performance.

The worst approach movement (RT from Thomas Mitchell Drive) only incurred a 5.4 second increase in average delay and a 12m (2 vehicles) increase in 95% back of queue.

Table 19 – Movement Summary

DENMAN RD & THOMAS MITCHELL DRV, MUSWELLBROOK – PM PEAK EXISTING TRAFFIC WITH AH & Mt P OUTWARD SHIFT ADDED

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
THOMAS MITCHELL DRV										
1	L	52	13.7	0.057	12.8	LOS B	2	0.30	0.69	57.2
3	R	304	6.6	0.794	33.6	LOS D	72	0.86	1.31	38.3
Approach		**355**	**7.6**	**0.793**	**30.6**	**LOS D**	**72**	**0.78**	**1.22**	**40.2**
DENMAN RD FROM M'BROOK										
4	L	98	24.5	0.062	12.4	LOS B	0	0.00	0.73	58.9
5	T	118	11.0	0.065	0.0	LOS A	0	0.00	0.00	80.0
Approach		**216**	**17.1**	**0.065**	**5.6**	**LOS A**		**0.00**	**0.33**	**68.9**
DENMAND ROAD										
11	T	262	3.4	0.109	0.3	LOS A	6	0.08	0.00	78.0
12	R	71	30.0	0.109	14.4	LOS B	6	0.40	0.72	56.6
Approach		**332**	**9.0**	**0.109**	**3.3**	**LOS A**	**6**	**0.15**	**0.15**	**72.4**
All Vehicles		**903**	**10.4**	**0.794**	**14.6**	**Not Applicable**	**72**	**0.36**	**0.62**	**54.7**

TPK submit that the impact of both potential mine traffic outward peaks has minimal impact on intersection performance.

The worst approach movement (RT from Thomas Mitchell Drive) only incurred a 9.6 second increase in average delay and a 21m (around 3 vehicles) increase in 95% back of queue.

The mine traffic on their own do not create and adverse impact however council should not the performance of Thomas Mitchell Drive, right turn in terms of long term strategic planning as consideration of seagull channelisation may arise from additional growth in the Industrial Estate

Wybong Road and Bengalla Link Road

The project team in discussion with Muswellbrook Council agreed to evaluate roundabout and T-Junction geometric layouts for this future intersection; TPK had raised concern with a roundabout layout in rural higher speed road environment prevailing at this location.

TPK has modelled the subject (future) intersection for the am and pm peak, using volumes determined from project assessment; the volumes are shown in Figure 5.

TPK, in the absence of approved intersection designs and built form has used best practice geometric parameters for the scenarios modelled. For the T-Intersection geometric layout (Figure 6) the priority for traffic was assigned to Bengalla Link Road-Wybong Rd to/from the west.

The SIDRA Movement Summaries are shown on the following pages, Tables 20 to 23

FIGURE 5 – POTENTIAL DISTRIBUTION OF ADDITIONAL TRAFFIC GENERATIONS

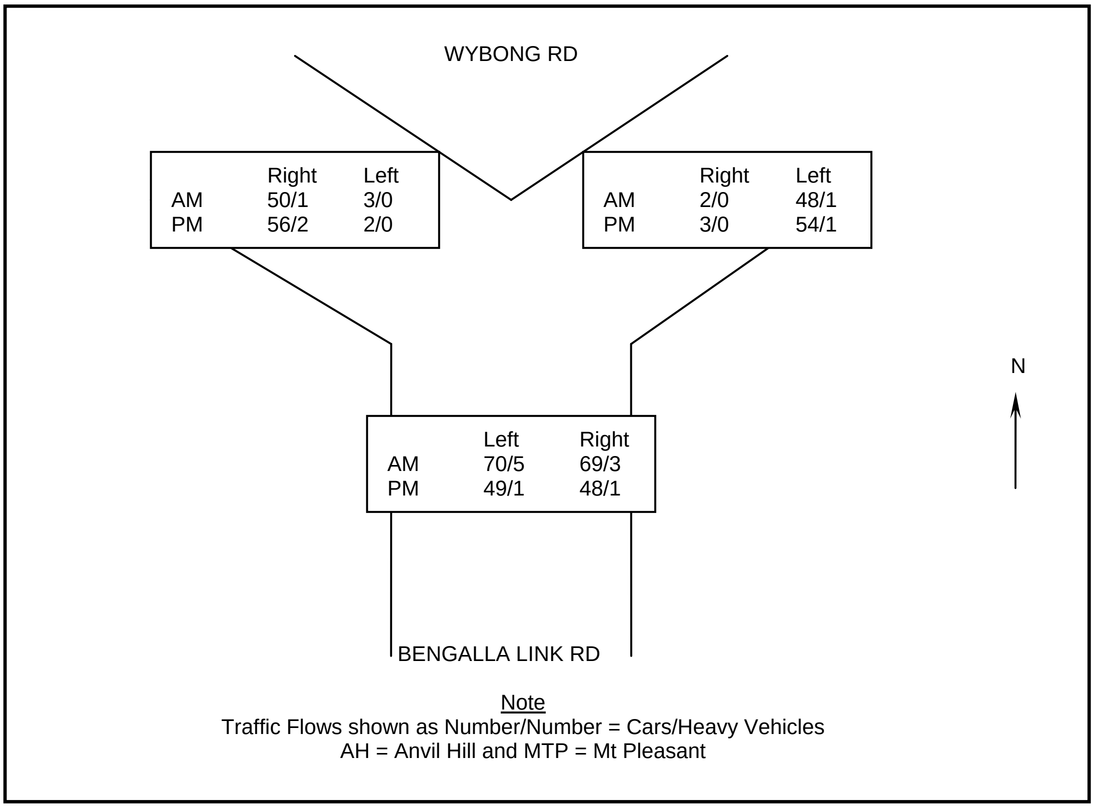


FIGURE 6 – POTENTIAL GEOMETRIC LAYOUT

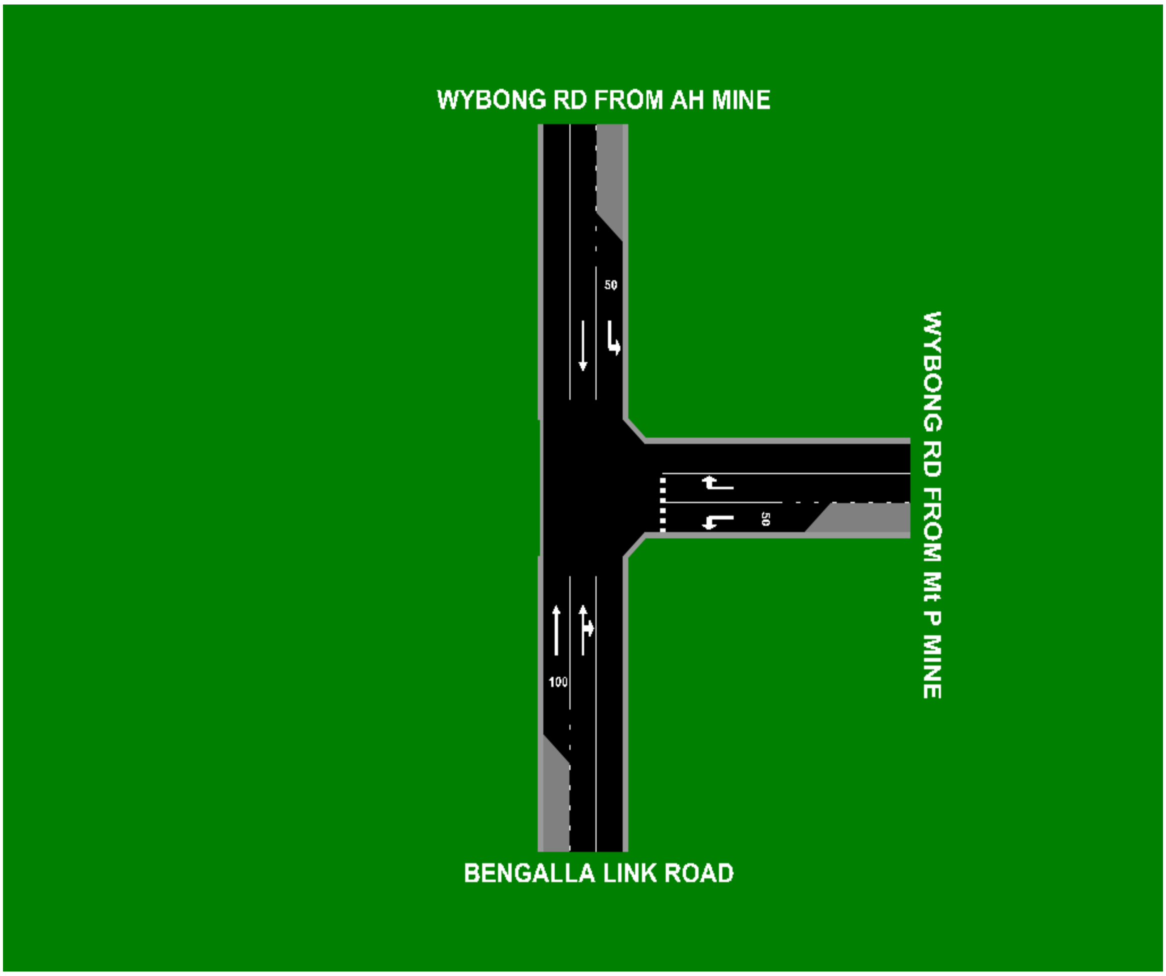


Table 20 – Movement Summary

BENGALLA LINK & WYBONG ROADS (FUTURE INTRSECTION), M'BROOK – POTENTIAL AM PEAK, T-INTERSECTION

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BENGALLA LINK ROAD										
2	T	79	6.3	0.042	0.0	LOS A	0	0.00	0.00	100.0
3	R	76	3.9	0.056	13.1	LOS B	2	0.15	0.70	68.2
Approach		**155**	**5.2**	**0.056**	**6.4**	**LOS A**	**2**	**0.07**	**0.34**	**81.6**
WYBONG RD FROM Mt P MINE										
4	L	52	1.9	0.052	13.0	LOS B	2	0.14	0.70	68.1
6	R	2	0.0	0.003	14.3	LOS B	0	0.37	0.66	66.2
Approach		**54**	**1.9**	**0.052**	**13.0**	**LOS B**	**2**	**0.15**	**0.70**	**68.1**
WYBONG RD FROM AH MINE										
7	L	3	0.0	0.002	12.6	LOS B	0	0.00	0.75	69.1
8	T	54	1.9	0.028	0.0	LOS A	0	0.00	0.00	100.0
Approach		**57**	**1.8**	**0.028**	**0.7**	**LOS A**		**0.00**	**0.04**	**97.8**
All Vehicles		**266**	**3.8**	**0.056**	**6.5**	**Not Applicable**	**2**	**0.07**	**0.35**	**81.3**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 21 – Movement Summary

BENGALLA LINK & WYBONG ROADS (FUTURE INTRSECTION), M'BROOK – POTENTIAL PM PEAK, T-INTERSECTION

Give-way

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BENGALLA LINK ROAD										
2	T	53	1.9	0.028	0.0	LOS A	0	0.00	0.00	100.0
3	R	52	1.9	0.038	12.9	LOS B	1	0.15	0.70	68.2
Approach		**105**	**1.9**	**0.038**	**6.4**	**LOS A**	**1**	**0.08**	**0.34**	**81.4**
WYBONG RD FROM Mt P MINE										
4	L	58	1.7	0.059	13.0	LOS B	2	0.15	0.70	68.1
6	R	3	0.0	0.004	13.9	LOS B	0	0.32	0.67	66.9
Approach		**61**	**1.6**	**0.059**	**13.0**	**LOS B**	**2**	**0.16**	**0.70**	**68.0**
WYBONG RD FROM AH MINE										
7	L	2	0.0	0.001	12.6	LOS B	0	0.00	0.75	69.1
8	T	61	3.3	0.032	0.0	LOS A	0	0.00	0.00	100.0
Approach		**63**	**3.2**	**0.032**	**0.4**	**LOS A**		**0.00**	**0.02**	**98.6**
All Vehicles		**229**	**2.2**	**0.059**	**6.5**	**Not Applicable**	**2**	**0.08**	**0.35**	**81.2**

TPK submit that the intersection performance is satisfactory for this scenario.

Table 22 – Movement Summary

BENGALLA LINK & WYBONG ROADS (FUTURE INTERSECTION) M'BROOK – AM PEAK, ROUNDABOUT CONTROL

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BENGALLA LINK RD										
1	T	79	5.2	0.097	14.9	LOS B	3	0.02	0.70	66.3
1	R	76	5.2	0.097	14.9	LOS B	3	0.02	0.70	66.3
Approach		**155**	**5.2**	**0.097**	**14.9**	**LOS B**	**3**	**0.02**	**0.70**	**66.3**
WYBONG RD FROM Mt P MINE										
4	L	52	1.9	0.036	12.3	LOS B	1	0.02	0.66	69.3
4	R	2	1.9	0.036	12.3	LOS B	1	0.02	0.66	69.3
Approach		**54**	**1.9**	**0.036**	**12.3**	**LOS B**	**1**	**0.02**	**0.66**	**69.3**
WYBONG RD FROM AH MINE										
7	L	54	1.8	0.048	12.3	LOS B	2	0.16	0.62	68.2
7	T	3	1.8	0.048	12.3	LOS B	2	0.16	0.62	68.2
Approach		**57**	**1.8**	**0.048**	**12.3**	**LOS B**	**2**	**0.16**	**0.62**	**68.2**
All Vehicles		**266**	**3.8**	**0.097**	**13.8**	**LOS B**	**3**	**0.05**	**0.67**	**67.2**

TPK submit that the intersection performance is satisfactory for this scenario.

It is interesting to note that the intersection performance for the modelled traffic volumes operated with less delay and better level of service under a Type B – Intersection geometric layout.

Table 23 – Movement Summary

BENGALLA LINK & WYBONG ROADS (FUTURE INTERSECTION) M'BROOK – PM PEAK, ROUNDABOUT CONTROL

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
BENGALLA LINK RD										
1	T	53	1.9	0.068	14.7	LOS B	2	0.02	0.69	66.2
1	R	52	1.9	0.068	14.7	LOS B	2	0.02	0.69	66.2
Approach		**105**	**1.9**	**0.068**	**14.7**	**LOS B**	**2**	**0.02**	**0.69**	**66.2**
WYBONG RD FROM Mt P MINE										
4	L	58	1.6	0.040	12.3	LOS B	1	0.02	0.66	69.2
4	R	3	1.6	0.040	12.3	LOS B	1	0.02	0.66	69.2
Approach		**61**	**1.6**	**0.040**	**12.3**	**LOS B**	**1**	**0.02**	**0.66**	**69.2**
WYBONG RD FROM AH MINE										
7	L	61	3.2	0.052	12.3	LOS B	2	0.13	0.62	68.5
7	T	2	3.2	0.052	12.3	LOS B	2	0.13	0.62	68.5
Approach		**63**	**3.2**	**0.052**	**12.3**	**LOS B**	**2**	**0.13**	**0.62**	**68.5**
All Vehicles		**229**	**2.2**	**0.068**	**13.4**	**LOS B**	**2**	**0.05**	**0.67**	**67.6**

TPK submit that the intersection performance is satisfactory for this scenario.

It is interesting to note that the intersection performance for the modelled traffic volumes operated with less delay and better level of service under a Type B – Intersection geometric layout.

Other intersections TPK reviewed as part of this project assessment were:

- Denman Road and New England Highway, Muswellbrook
- Denman Road and Jerry's Plain Road (Golden Highway)

Denman Road and New England Highway

TPK observed peak period operation of the traffic signal control at this intersection and suggest the current LoS does not exceed LoS C. TPK submit that the maximum overall intersection increase in traffic demand will be around 150vph and given it will be spread across various movements concluded that there would be no impact on the current LoS of this intersection; no SIDRA model was undertaken for this intersection.

The increased volumes from this project on the through traffic (less than 100vph) will not increase volumes to a level that will reduce current level of service. TPK submit that this project will have minimal impact on this intersection.

Denman and Jerry's Plain Roads

AADT's on these roads do not exceed 3000vpd and minimal increase in traffic generated from this project is expected to this intersection generated from this project.

The intersection is basically a rural Type B and as can be seen from the photos below the Jerry's Plain Road approach has adequate sight distance available.

4. DENMAN RD LOOKING TOWARDS MUSWELLBROOK

5. DENMAN RD LOOKING TOWARDS DENMAN

TPK submit that this project will have no impact on this intersection.

5.3 – Accident History

The RTA provided details of reported accident data for the following locations:

1. Wybong Road between Golden Highway and Kayuga Road
2. Denman Road between Golden Highway and New England Highway

That data is provided in Appendix C of this report; examination by TPK has disclosed:

1. Only 4 reported accidents over 5 years had occurred along the section of Wybong Road relevant to where this project has potential impact.
2. No accidents had been reported at the intersection of Denman Road and Bengalla Link Road.

TPK submit that given the road improvements proposed in conjunction with this project, and the adequate road and intersection capacity expected to be available to the increased traffic, then the past accident trends of the main traffic routes have not disclosed evidence of road conditions that require review of the measures proposed.

6. SUMMATION

The assessment by TPK & Associates has concluded that:

1. The traffic generated by the project will not have an adverse impact on road network or intersection capacity.

2. The inclusion in the mine's business strategy of employment conditions on transport routes will ensure that the impacts on Mangoola and Roxburgh Roads are minimised.

3. The road improvements, discussed as part of this study will provide improved road safety for existing community traffic flow and any additional traffic generated by this project.

A P P E N D I X A

TRAFFIC ASSESSMENT AUDITS

ANVIL HILL PROJECT
ROAD NETWORK INSPECTION/EVALUATION - SUMMATION

Date Various December 2005 to February 2006
Inspected by T Keating, TPK & Associates

Audit Inspection points along Wybong Road are depicted in Figure 5.

DISTANCE	AUDIT POINT	IDENTIFICATION & COMMENT	PHOTO
0.0	1	Start of preliminary inspection on Wybong Road at SH27. Top photograph shows The Golden Highway at the Wybong road intersection, Sandy Hollow. Second photograph shows Wybong Road looking towards Anvil Hill at the highway intersection.	 
0.8	2	Causeway, road to date around 6-7m of seal, grassed shoulders and guide posts 100kph speed limit road environment	
1.7	3	Centreline guidance by use of RPM's Adjoining photograph is typical view of unmarked road section of Wybong Road. Wybong is an average width of 6.5m.	
2.24	4	Culvert	
2.5	5	Comment, guide posts appear to be at standard spacing	
2.7	6	Upgrade in Wybong Road	
3.3	7	Crest in Wybong road	
3.6	8	Start of winding section; advisory 55-65kph plus CAM's	
4.78	9	Reddy Creek Road on the right; this route also provides connection to SH27	
5.4	10	RPM centreline continues; 75kph curve & seal around 6m maximum after Reddy Creek Rd intersection	
7.3	11	Undulating; 6-7m seal	

7.95	12	Crest in Wybong Road	
8.35	13	Causeway	
8.75	14	Land Environment changes from bush land to open plain	
9.5	15	Yarraman Road on the left; note Wybong Road seal is 5-6m around this section	
9.7	16	Wybong Creek Bridge	
10.3	17	RPM centreline continues	
11.02	18	Anvil Access on the right; 6-7m seal; SISD is OK & RPM centreline continues (Not project site access)	
12.75	19	Scattered Development	
13.00	20	Transmission Line	
13.5	21	Wybong PO Road. Area is undulating 75/85kph curves. Note at this time in the trip 2 opposing vehicles & 1 overtook in the travel direction	
16.59	22	Eastern boundary of Amaroo Homestead	
16.72	**23**	**Proposed Project Access Intersection to Wybong Road** **Looking towards Muswellbrook; SISD available is 244m.** **Looking towards Sandy Hollow; SISD available is 273m.**	 
17.97	24	Ridgelands Road on the left; first sighting of School Bus signage. End of Black Jack Mountain Landscape Catchment Area. Winding section of Wybong Road	
18.1	25	Castlerock Road on the left. Adjoining photograph shows School Bus Stop off street bay on north east corner of intersection.	
18.48	26	Limvardy Road on the right	

18.88	27	Mangoola Road on the right RPM centreline continues, 6-7m seal Photograph shows poor SISD looking from Mangoola Road towards Muswellbrook	
19.4	28	Spring Creek Bridge Adjoining photograph is typical of road maintenance required for traffic facilities, clear zone and sight distance to roadside hazards such as bridge abutments	
20.5	29	Road environment continues in terms of traffic facilities and road maintenance; varied carriageway road surface conditions	
21.29	30	Sandy Creek Bridge	
24.2	31	Roxburgh Road on the right. This is the intended area for the new Bengalla Road (from Denman road to join to Wybong Road. Existing SISD is poor	
25.5	32	Commencement of roadmarked centreline & higher standard road surface	
26.0	33	Crest in Wybong road provides view to mines and Muswellbrook & following is a long straight stretch of road.	
27.05	34	Blasting Signage	
28.45	35	Skippens Lane on the left	
28.75	36	Mine Works on the right; standard guide posts	
30.43	37	Overton Road on the right	
31.39	38	Logues Lane on the left; Rosebrook Creek Bridge adjoins the intersection	
32.1	39	Edge of urban area	
32.45	40	Dip in road	
32.78	41	Change of Speed Limit from 100 to 80	
33.55	42	Kayuga Road T-junction	
34.3	43	Centre Kayuga Bridge; inbound traffic has priority	

34.4	44	Aberdeen Street T-junction off the bridge; bridge exit traffic is the non continuous leg and has right of way	 
Approx. 35.1	45	New England Highway intersection. Auxiliary lanes provided; sight distance appears OK	

Commentary on other existing road assessments is provided on the following page.

TPK also assessed other local roads:

1. Mangoola Road between Denman (The Golden Highway) and Wybong (Wybong Road)
2. Roxburgh Road between Mangoola Road and Wybong Road

Mangoola Road traverses rural road environment however the road environment is not conducive to increased traffic demand without significant road improvements including:

- Upgrade of three railway level crossings
- Upgrade of road environment for best practice traffic facilities
- Roadworks to provide intersection, crest and curve sight distances
- Roadworks to provide appropriate sealed surface in terms of width and condition, some sections of seal are only 3m wide
- Roadworks to provide minimum clear zones

Roxburgh Road traverses rural road environment however the road environment is not conducive to increased traffic demand without significant road improvements including:

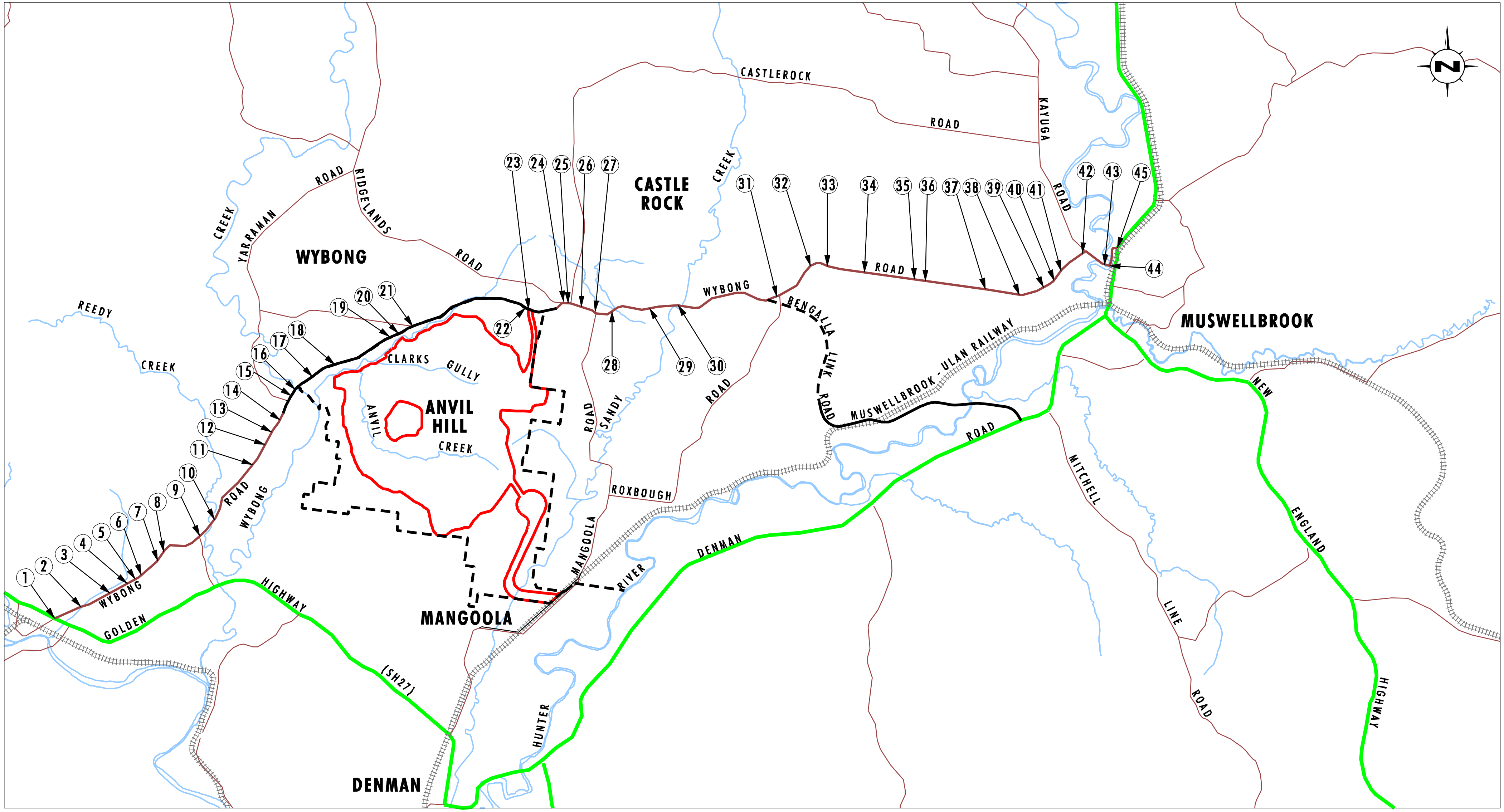
- Upgrade of road environment for best practice traffic facilities
- Roadworks to provide intersection, crest and curve sight distances
- Roadworks to provide appropriate sealed surface in terms of width and condition
- Roadworks to provide minimum clear zones

The following photographs provide sample views of issues raised

Mangoola Road departing The Golden Highway

Roxburgh Rd looking right at Mangoola Rd

Umwelt
Environmental Consultants



Base Map: Dept. of Lands (2003)

0 2.0 4.0 8km

Legend
- Proposed Disturbance Area
- Project Application Area
- Road
- Proposed Road
- Creek
- Railway Line
- ① Audit Point

FIGURE 5

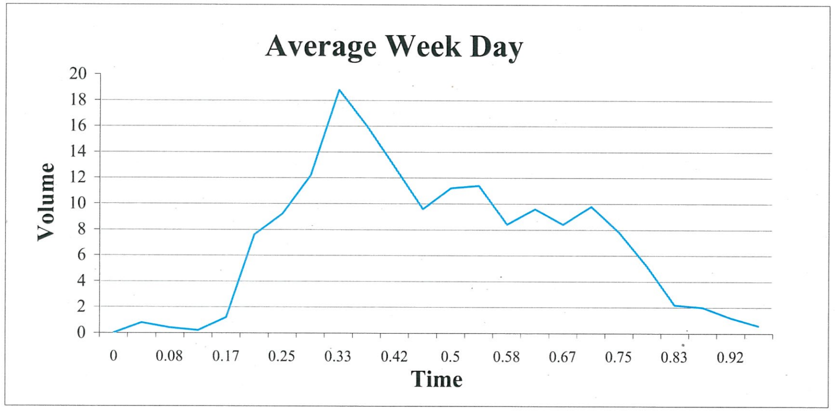
Traffic Assessment Audits

A P P E N D I X B

TRAFFIC SURVEY DATA

Wybong Road North of the Golden Highway, Sandy Hollow — Northbound

Day / Time	Wed 07-Dec-05	Thu 08-Dec-05	Fri 09-Dec-05	Sat 10-Dec-05	Sun 11-Dec-05	Mon 12-Dec-05	Tue 13-Dec-05	W/Day Ave.	7 Day Ave
00:00	0	0	0	0	1	0	0	0	0
01:00	2	1	0	1	0	0	1	1	1
02:00	0	0	1	0	0	1	0	0	0
03:00	0	1	0	0	0	0	0	0	0
04:00	1	2	0	1	0	2	1	1	1
05:00	10	9	7	2	1	5	7	8	6
06:00	8	10	6	0	0	12	10	9	7
07:00	13	16	10	3	2	10	12	12	9
08:00	15	19	22	15	9	24	14	19	17
09:00	19	14	10	12	7	18	19	16	14
10:00	15	16	14	10	10	8	11	13	12
11:00	10	12	7	7	13	11	8	10	10
12:00	11	12	13	4	6	11	9	11	9
13:00	12	17	8	4	9	11	9	11	10
14:00	8	6	7	9	5	15	6	8	8
15:00	5	8	15	6	5	12	8	10	8
16:00	7	10	11	5	12	8	6	8	8
17:00	8	8	12	5	9	10	11	10	9
18:00	9	8	8	13	7	5	9	8	8
19:00	5	8	5	3	6	7	1	5	5
20:00	2	1	2	4	1	5	1	2	2
21:00	2	2	4	2	1	0	2	2	2
22:00	1	3	1	1	0	0	1	1	1
23:00	1	0	1	1	0	1	0	1	1
Total	**164**	**183**	**164**	**108**	**104**	**176**	**146**	**167**	**149**



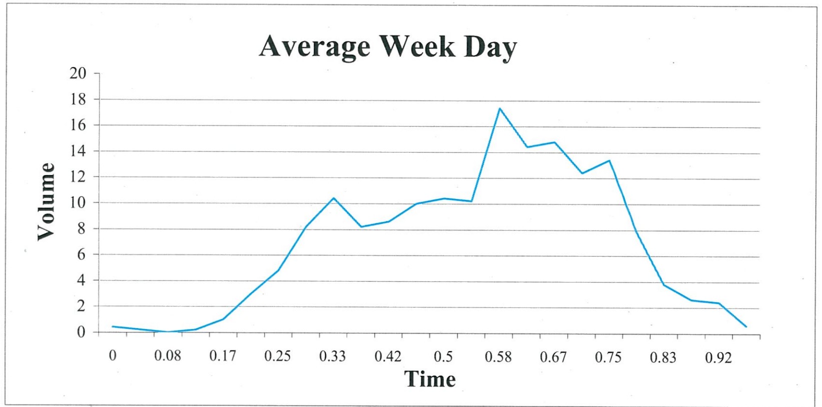
Summary

	from	to	
AM Peak	8:00 AM	9:00 AM	24
PM Peak	1:00 PM	2:00 PM	17
Week Day Average			167
Weekend Day Average			106
7 Day Average			149

Wybong Road North of the Golden Highway, Sandy Hollow

Southbound

Day / Time	Wed 07-Dec-05	Thu 08-Dec-05	Fri 09-Dec-05	Sat 10-Dec-05	Sun 11-Dec-05	Mon 12-Dec-05	Tue 13-Dec-05	W/Day Ave.	7 Day Ave
00:00	0	0	1	0	1	0	1	0	0
01:00	0	0	0	0	0	1	0	0	0
02:00	0	0	0	0	0	0	0	0	0
03:00	1	0	0	1	1	0	0	0	0
04:00	1	1	1	0	1	1	1	1	1
05:00	6	4	2	0	0	1	2	3	2
06:00	8	6	2	0	0	4	4	5	3
07:00	9	6	8	8	8	7	11	8	8
08:00	10	12	11	1	7	8	11	10	9
09:00	8	7	9	2	8	9	8	8	7
10:00	11	11	7	10	12	8	6	9	9
11:00	11	11	10	11	9	11	7	10	10
12:00	11	11	9	8	12	10	11	10	10
13:00	11	10	16	11	9	9	5	10	10
14:00	16	22	18	10	13	14	17	17	16
15:00	18	18	14	10	5	12	10	14	12
16:00	18	15	14	5	7	14	13	15	12
17:00	6	14	15	7	9	13	14	12	11
18:00	11	12	16	4	5	13	15	13	11
19:00	4	9	8	9	6	11	7	8	8
20:00	4	4	4	3	5	3	4	4	4
21:00	6	1	0	1	1	0	6	3	2
22:00	1	6	1	2	0	3	1	2	2
23:00	0	0	3	2	0	0	0	1	1
Total	**171**	**180**	**169**	**105**	**119**	**152**	**154**	**165**	**150**



Summary

	from	to	
AM Peak	8:00 AM	9:00 AM	**12**
PM Peak	2:00 PM	3:00 PM	**22**
Week Day Average			**165**
Weekend Day Average			**112**
7 Day Average			**150**

8/2/2006 - Kayuga Road / Wybong Road, Muswellbrook

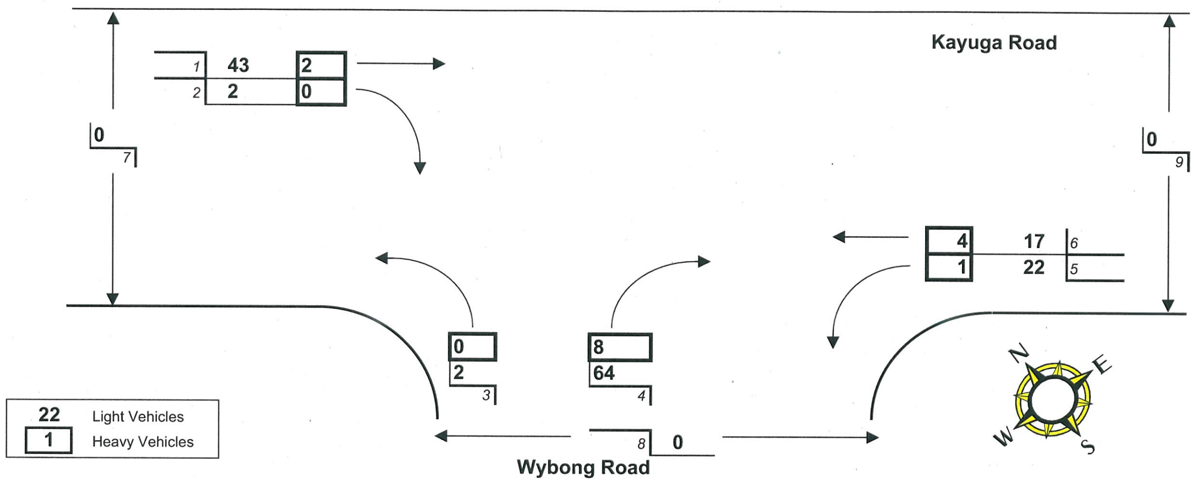
09:15 <<< HOUR ENDING **Wednesday**

Summary:

Kayuga Road / Wybong Road

150	Total Light Vehicles
15	Total Heavy Vehicles
0	Total Pedestrians

Quality Surveys



8/2/2006 - Kayuga Road / Wybong Road, Muswellbrook

Light Vehicles

	1	2	3	4	5	6	7	8	9	Total Vehicles 15 MIN	Total Vehicles HOUR
06:45	13	0	0	9	4	6	0	0	0	32	
07:00	8	0	0	8	3	4	0	0	0	23	
07:15	4	0	0	8	4	2	0	0	0	18	
07:30	11	0	0	12	2	6	0	0	0	31	104
07:45	12	0	0	5	6	8	0	0	0	31	103
08:00	9	1	0	12	7	10 <	0	0	0	39	119
08:15	11	0	1	12	3	1	0	0	0	28	129
08:30	12	1 <	1	21	5	4	0	0	0	44	142
08:45	13 <	0 <	1 <	12	8 <	5	0	0	0	39	150 <
09:00	8	1 <	0 <	22 <	5	3	0	0	0	39	150 <
09:15	10	0 <	0	9	4	5	0	0	0	28	150 <
09:30	5	0	0	8	5	5	0	0	0	23	129

Heavy Vehicles

	1	2	3	4	5	6	Total Vehicles 15 MIN	Total Vehicles HOUR
06:45	0	0	0	0	4	0	4	
07:00	0	0	0	1	1	0	2	
07:15	0	0	0	0	1	0	1	
07:30	0	1 <	0	0	0 <	1	2	9
07:45	0	0 <	0	2	0	0	2	7
08:00	0	0 <	0	0	3	1	4	9
08:15	0	0 <	0	2	1	0	3	11
08:30	1	0	0	2	0	2	5	14
08:45	0	0	0	1	1	0	2	14
09:00	0	0	0	3 <	0	1	4	14
09:15	1 <	0	0	2 <	0	1 <	4	15 <
09:30	1 <	0	0	0	1	1	3	13

All Vehicles

	1	2	3	4	5	6	7	8	9	Total Vehicles 15 MIN	Total Vehicles HOUR
06:45	13	0	0	9	8	6	0	0	0	36	
07:00	8	0	0	9	4	4	0	0	0	25	
07:15	4	0	0	8	5	2	0	0	0	19	
07:30	11	1	0	12	2	7	0	0	0	33	113
07:45	12	0	0	7	6	8	0	0	0	33	110
08:00	9	1 <	0	12	10	11 <	0	0	0	43	128
08:15	11	0 <	1	14	4	1	0	0	0	31	140
08:30	13	1 <	1	23	5	6	0	0	0	49	156
08:45	13 <	0 <	1 <	13	9 <	5	0	0	0	41	164
09:00	8	1 <	0 <	25 <	5	4	0	0	0	43	164
09:15	11	0 <	0	11	4	6	0	0	0	32	165 <
09:30	6	0	0	8	6	6	0	0	0	26	142

Note : Arrows "<" indicate the end time for the peak hour for each turning movement.

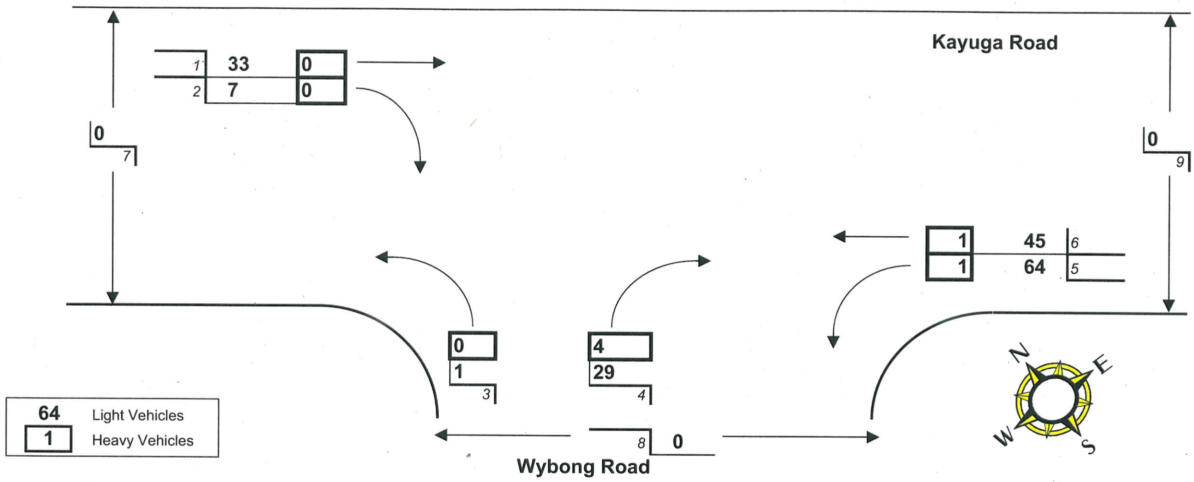
7/2/2006 - Kayuga Road / Wybong Road, Muswellbrook

17:30 <<< HOUR ENDING **Tuesday**

Summary:
Kayuga Road / Wybong Road

179	**Total Light Vehicles**
6	**Total Heavy Vehicles**
0	**Total Pedestrians**

Quality Surveys



7/2/2006 - Kayuga Road / Wybong Road, Muswellbrook

Light Vehicles

	1	2	3	4	5	6	7	8	9	Total Vehicles 15 MIN	HOUR
14:45	7	4	0	8	8	4	0	0	0	31	
15:00	8	0	0	5	7	3	0	0	0	23	
15:15	7	0	1	8	10	10	0	0	0	36	
15:30	3	0	0 <	5	10	9	0	0	0	27	117
15:45	6	0	0 <	7	15	13	0	0	0	41	127
16:00	3	0	0 <	3	8	9	0	0	0	23	127
16:15	3	0	1 <	6	13	10	0	0	0	33	124
16:30	3	0	0 <	3	18	6	0	0	0	30	127
16:45	9	1	0 <	11	13	13	0	0	0	47	133
17:00	13	3	0 <	7	15	13	0	0	0	51	161
17:15	3	1	1 <	5	22 <	10	0	0	0	42	170
17:30	8 <	2 <	0 <	6 <	14	9 <	0	0	0	39	179 <

Heavy Vehicles

	1	2	3	4	5	6	Total Vehicles 15 MIN	HOUR
14:45	0	0	0	1	0	0	1	
15:00	2	0	0	0	1	0	3	
15:15	1	0	0	1	2	0	4	
15:30	1 <	0	0	1	0	0	2	10
15:45	0 <	0	0	1	1	0	2	11
16:00	0	0	0	1	3 <	1 <	5	13
16:15	0	0	0	3 <	2 <	0 <	5	14 <
16:30	1	0	0	0	0 <	0 <	1	13
16:45	0	0	0	0	0	0 <	0	11
17:00	0	0	0	2	0	0	2	8
17:15	0	0	0	1	0	1 <	2	5
17:30	0	0	0	1	1	0 <	2	6

All Vehicles

	1	2	3	4	5	6	7	8	9	Total Vehicles 15 MIN	HOUR
14:45	7	4	0	9	8	4	0	0	0	32	
15:00	10	0	0	5	8	3	0	0	0	26	
15:15	8	0	1	9	12	10	0	0	0	40	
15:30	4	0	0 <	6	10	9	0	0	0	29	127
15:45	6	0	0 <	8	16	13	0	0	0	43	138
16:00	3	0	0 <	4	11	10	0	0	0	28	140
16:15	3	0	1 <	9	15	10	0	0	0	38	138
16:30	4	0	0 <	3	18	6	0	0	0	31	140
16:45	9	1	0 <	11	13	13	0	0	0	47	144
17:00	13	3	0 <	9	15	13	0	0	0	53	169
17:15	3	1	1 <	6	22 <	11	0	0	0	44	175
17:30	8 <	2 <	0 <	7 <	15	9 <	0	0	0	41	185 <

Note : Arrows "<" indicate the end time for the peak hour for each turning movement.

8/2/2006 - Denman Road / Bengalla Road, Muswllbrook

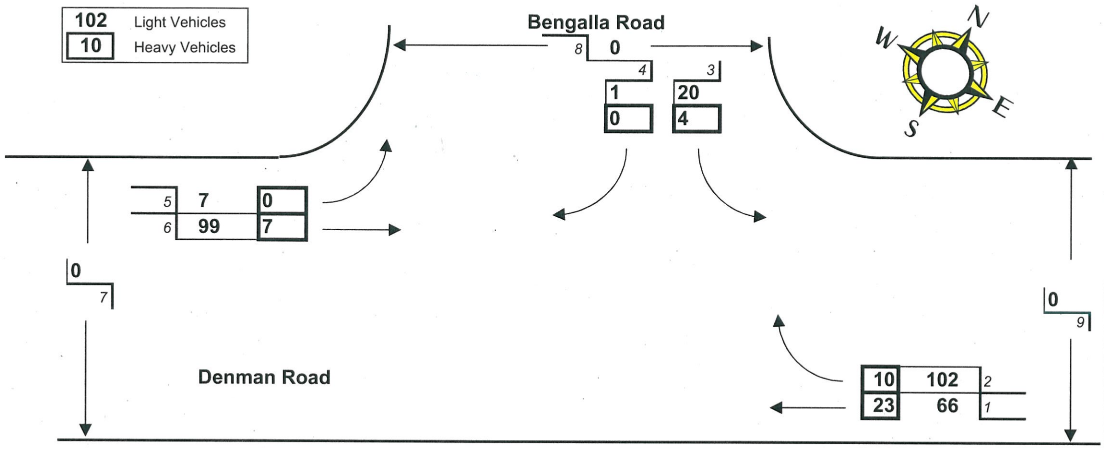
07:30 <<< HOUR ENDING **Wednesday**

Summary:

Denman Road / Bengalla Road

295	**Total Light Vehicles**
44	**Total Heavy Vehicles**
0	**Total Pedestrians**

Quality Surveys



8/2/2006 - Denman Road / Bengalla Road, Muswllbrook

Light Vehicles

	1	2	3	4	5	6	7	8	9	Total Vehicles 15 MIN	HOUR
06:45	19	49	0	0	5	36	0	0	0	109	
07:00	15	27	3	0	2	32	0	0	0	79	
07:15	16	12	5	1	0	13	0	0	0	47	
07:30	16	14 <	12	0	0 <	18	0	0	0	60	295 <
07:45	17	5	7	1	1	20	0	0	0	51	237
08:00	10	17	4	0	0	34	0	0	0	65	223
08:15	16	9	6 <	0	0	25	0	0	0	56	232
08:30	20	9	1	0	0	15	0	0	0	45	217
08:45	20	3	4	0	0	29	0	0	0	56	222
09:00	11 <	2	5	2	0	32	0	0	0	52	209
09:15	13	3	5	1 <	0	31	0	0	0	53	206
09:30	15	6	5	0 <	0	31 <	0	0	0	57	218

Heavy Vehicles

	1	2	3	4	5	6	Total Vehicles 15 MIN	HOUR
06:45	3	4	1	0	0	4	12	
07:00	3	1	0	0	0	0	4	
07:15	9	2	1	0	0	3	15	
07:30	8	3	2	0	0	0	13	44
07:45	13	2	2	0	0	3	20	52
08:00	4 <	3	0	0	0	2	9	57
08:15	7	2	2	0	0	5	16	58 <
08:30	3	4 <	1	0	0	5	13	58 <
08:45	0	2 <	2	0	0	5	9	47
09:00	3	0	2 <	0	1 <	3	9	47
09:15	5	0	1	0	0 <	6 <	12	43
09:30	2	0	2 <	1 <	0 <	2	7	37

All Vehicles

	1	2	3	4	5	6	7	8	9	Total Vehicles 15 MIN	HOUR
06:45	22	53	1	0	5	40	0	0	0	121	
07:00	18	28	3	0	2	32	0	0	0	83	
07:15	25	14	6	1	0	16	0	0	0	62	
07:30	24	17 <	14	0	0 <	18	0	0	0	73	339 <
07:45	30 <	7	9	1	1	23	0	0	0	71	289
08:00	14	20	4	0	0	36	0	0	0	74	280
08:15	23	11	8 <	0	0	30	0	0	0	72	290
08:30	23	13	2	0	0	20	0	0	0	58	275
08:45	20	5	6	0	0	34	0	0	0	65	269
09:00	14	2	7	2	1	35	0	0	0	61	256
09:15	18	3	6	1	0	37	0	0	0	65	249
09:30	17	6	7	1 <	0	33 <	0	0	0	64	255

Note : Arrows "<" indicate the end time for the peak hour for each turning movement.

7/2/2006 - Denman Road / Bengalla Road, Bengalla Road

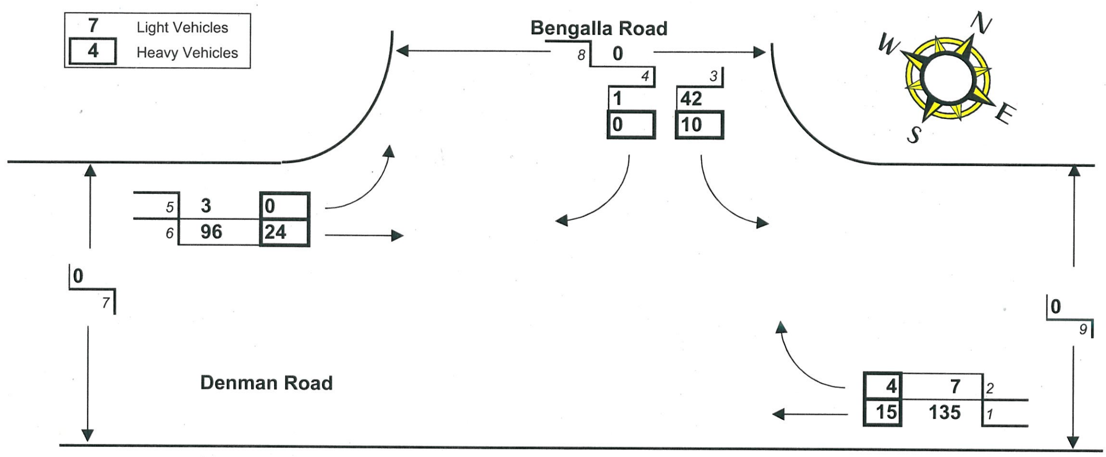
16:30 <<< HOUR ENDING **Tuesday**

Summary:

Denman Road / Bengalla Road

284	**Total Light Vehicles**
53	**Total Heavy Vehicles**
0	**Total Pedestrians**

Quality Surveys



7/2/2006 - Denman Road / Bengalla Road, Bengalla Road

Light Vehicles

	1	2	3	4	5	6	7	8	9	Total Vehicles 15 MIN	HOUR
14:45	15	4	8	0	0	18	0	0	0	45	
15:00	19	8	6	1	0	18	0	0	0	52	
15:15	20	2	13	1	0	21	0	0	0	57	
15:30	15	4 <	10	0 <	0	41	0	0	0	70	224
15:45	29	3	10	0 <	0	19	0	0	0	61	240
16:00	29	1	6	0	2	28 <	0	0	0	66	254
16:15	45	2	14	1	1 <	21 <	0	0	0	84	281
16:30	32	1	12	0	0 <	28	0	0	0	73	284
16:45	35	2	12	0	0 <	17	0	0	0	66	289 <
17:00	28	2	9	0	0	21	0	0	0	60	283
17:15	40	3	15	1	0	13	0	0	0	72	271
17:30	39 <	0	15 <	0	0	25	0	0	0	79	277

Heavy Vehicles

	1	2	3	4	5	6	Total Vehicles 15 MIN	HOUR
14:45	2	0	0	1	0	2	5	
15:00	4	1	1	0	0	2	8	
15:15	1	0	1	0	1	2	5	
15:30	3	1	0	0 <	0 <	6	10	28
15:45	5	1	0	0	0 <	10	16	39
16:00	8 <	1	4	0	0 <	5	18	49
16:15	1 <	1 <	2	0	0	5 <	9	53 <
16:30	1	1 <	4	0	0	4	10	53 <
16:45	3	0	2 <	0	0	3	8	45
17:00	0	1	1	0	0	1	3	30
17:15	3	0	1	0	0	2	6	27
17:30	1	1	0	0	0	2	4	21

All Vehicles

	1	2	3	4	5	6	7	8	9	Total Vehicles 15 MIN	HOUR
14:45	17	4	8	1	0	20	0	0	0	50	
15:00	23	9	7	1	0	20	0	0	0	60	
15:15	21	2	14	1	1	23	0	0	0	62	
15:30	18	5 <	10	0 <	0	47	0	0	0	80	252
15:45	34	4 <	10	0	0	29	0	0	0	77	279
16:00	37	2	10	0	2 <	33	0	0	0	84	303
16:15	46	3	16	1	1 <	26 <	0	0	0	93	334
16:30	33	2	16	0	0 <	32	0	0	0	83	337 <
16:45	38 <	2	14 <	0	0 <	20	0	0	0	74	334
17:00	28	3	10 <	0	0	22	0	0	0	63	313
17:15	43	3	16 <	1	0	15	0	0	0	78	298
17:30	40	1	15	0	0	27	0	0	0	83	298

Note : Arrows "<" indicate the end time for the peak hour for each turning movement.

APPENDIX C

ACCIDENT DATA

Wybong Road
Golden Highway to Kaygua Road
Muswellbrook LGA

5 years final crash history - 1/1/2000 to 31/12/2004

29/11/2005

ACCNO	ACCDEG3	ACDATE	ACCDAY	ACTIME	ACCRYR	ACCST	ACSTTYP	ACCDIST	ACCDIRN	ACCIDOB	ACIDTYP	ACCTOWN	DCA	DCA	TUST	TUDIRN	TUMAN	TUAGE	TUSEX	TUDIRN2	TUMAN2	ACCKILL	ACCINJ	ACCSFCND	ACCWTHR	ACCNATLT	ACCFAST	ACCTIRED	TUTYPEG	TUTYPEG2	LONG	LAT	XCOORD	YCOORD
004588043	Injury	20001023	Monday	0700	2000	WYBONG	RD	1500	East	ROXBURGH	RD	CASTLE ROCK	804	L	WYBONG	East	10	19	Male	No second vehicle	0	0	1	Dry	Fine	Daylight	Yes	No	Car	No second vehicle	150.752598	-32.264466	9653215.36	4602853.02
003562307	Towaway	20000703	Monday	2020	2000	BENGALLA	RD	0	Right on Spot	ROXBURGH	RD	MUSWELLBROOK	709	0	BENGALLA	West	10	38	Male	No second vehicle	0	0	0	Dry	Overcast	Darkness	No	Yes	Car	No second vehicle	150.852830	-32.261039	9662659.46	4602889.12
011619763	Towaway	20010308	Thursday	1420	2001	WYBONG	RD	3600	East	WYBONG HALL	RD	CASTLE ROCK	201	0	WYBONG	West	16	23	Female	East	10	0	0	Wet	Raining	Daylight	Yes	No	Car	Car	150.720073	-32.264958	9650153.28	4602908.06
014674586	Injury	20011027	Saturday	1720	2001	WYBONG	RD	2000	West	OVERTON	RD	MUSWELLBROOK	703	0	WYBONG	East	10	18	Male	No second vehicle	0	0	2	Dry	Fine	Daylight	Yes	No	Car	No second vehicle	150.831832	-32.258465	9660694.37	4603246.78
014682535	Injury	20011119	Monday	1005	2001	WYBONG	RD	2000	South	OVERTON	RD	MUSWELLBROOK	301	0	WYBONG	South	10	72	Male	South	10	0	2	Wet	Raining	Daylight	No	No	Light Truck	Car	150.831832	-32.258465	9660694.37	4603246.78
013663632	Towaway	20010909	Sunday	1330	2001	WYBONG	RD	3000	East	OVERTON	RD	MUSWELLBROOK	803	R	WYBONG	East	10	43	Female	No second vehicle	0	0	0	Dry	Fine	Daylight	Yes	No	Car	No second vehicle	150.880390	-32.253139	9665284.96	4603667.83
021699247	Towaway	20020215	Friday	2150	2002	WYBONG	RD	0	Right on Spot	CALLATOOTA	GT	WYBONG	609	0	WYBONG	East	10	20	Male	East	10	0	0	Dry	Fine	Darkness	No	No	Car	Car	150.651217	-32.280953	9643612.89	4601365.58
023738642	Towaway	20020731	Wednesday	1800	2002	WYBONG	RD	20000	West	KAYUGA	RD	CASTLE ROCK	609	0	WYBONG	South	10	99	Female	No second vehicle	0	0	0	Dry	Fine	Darkness	No	No	Light Truck	No second vehicle	150.684908	-32.267431	9646835.01	4602751.49
023743301	Towaway	20020818	Sunday	1730	2002	WYBONG	RD	4650	West	MANGOOLA	RD	CASTLE ROCK	803	R	WYBONG	West	10	27	Male	No second vehicle	0	0	0	Dry	Fine	Dusk	No	No	Car	No second vehicle	150.691018	-32.265818	9647416.25	4602909.85
024778326	Towaway	20021221	Saturday	0015	2002	WYBONG	RD	11000	West	KAYUGA	RD	MUSWELLBROOK	804	L	WYBONG	West	10	23	Male	No second vehicle	0	0	0	Dry	Fine	Darkness	Yes	No	Car	No second vehicle	150.771544	-32.262073	9655007.44	4603053.84
022742149	Towaway	20020603	Monday	1120	2002	WYBONG	RD	5000	West	KAYUGA	RD	MUSWELLBROOK	704	0	WYBONG	East	10	40	Male	No second vehicle	0	0	0	Dry	Fine	Daylight	No	No	Car	No second vehicle	150.833204	-32.258658	9660822.64	4603220.65
021708899	Towaway	20020325	Monday	0225	2002	WYBONG	RD	400	South	KAYUGA	RD	MUSWELLBROOK	609	0	WYBONG	South	10	38	Male	No second vehicle	0	0	0	Dry	Fog or Mist	Darkness	No	No	Car	No second vehicle	150.878015	-32.254583	9665055.63	4603516.22
023733808	Towaway	20020707	Sunday	0518	2002	WYBONG	RD	0	Right on Spot	POLE 355	OT	MUSWELLBROOK	803	R	WYBONG	East	10	23	Male	No second vehicle	0	0	0	Dry	Fine	Darkness	Yes	No	Car	No second vehicle	150.875845	-32.255924	9664845.93	4603375.31
024766257	Injury	20021120	Wednesday	1450	2002	KAYUGA	RD	100	East	WYBONG	RD	MUSWELLBROOK	406	0	KAYUGA	South	25	34	Female	East	10	0	2	Dry	Fine	Daylight	No	No	Car	Car	150.881480	-32.252476	9665390.29	4603737.46
033821313	Towaway	20030725	Friday	0840	2003	WYBONG	RD	900	South	YARRAMAN	RD	WYBONG	803	L	WYBONG	North	10	51	Female	No second vehicle	0	0	0	Dry	Fine	Daylight	Yes	No	Car	No second vehicle	150.641341	-32.292052	9642641.03	4600168.86
031791814	Injury	20030323	Sunday	1715	2003	WYBONG	RD	19000	West	KYUGA	RD	MUSWELLBROOK	803	L	WYBONG	East	10	22	Female	No second vehicle	0	0	1	Dry	Fine	Daylight	Yes	No	Car	No second vehicle	150.694390	-32.263684	9647741.81	4603134.89
032797903	Towaway	20030415	Tuesday	1640	2003	WYBONG	RD	2000	North	ROCKY CREEK RD	UK	WYBONG	401	0	WYBONG	South	11	17	Male	South	10	0	0	Dry	Fine	Daylight	No	No	Car	Light Truck	150.668479	-32.274524	9645261.74	4602020.52
034871398	Injury	20031208	Monday	0800	2003	WYBONG	RD	100	East	NUMBER 2121	HN	WYBONG	304	0	WYBONG	East	24	38	Female	East	10	0	4	Dry	Fine	Daylight	No	No	Car	Car	150.669268	-32.274095	9645337.64	4602065.45
031786391	Towaway	20030225	Tuesday	0115	2003	WYBONG	RD	1000	West	RIDGELANDS	RD	CASTLE ROCK	705	0	WYBONG	West	10	99	Unknown/Not Stated	No second vehicle	0	0	0	Dry	Fine	Darkness	No	No	Light Truck	No second vehicle	150.718386	-32.264593	9649995.95	4602954.16
033832775	Injury	20030918	Thursday	0605	2003	WYBONG	WA	865	West	MANGOOLA	RD	MUSWELLBROOK	801	R	WYBONG	East	10	20	Male	No second vehicle	0	0	1	Dry	Fine	Dawn	Yes	No	Car	No second vehicle	150.728846	-32.262508	9650988.38	4603149.89
043908312	Injury	20040813	Friday	0610	2004	WYBONG	RD	1000	West	RIDGELANDS	RD	WYBONG	802	L	WYBONG	West	10	33	Male	No second vehicle	0	0	1	Dry	Fine	Dawn	Yes	No	Car	No second vehicle	150.718386	-32.264593	9649995.95	4602954.16
044922281	Injury	20041024	Sunday	1330	2004	WYBONG	RD	1300	West	BENGALLA	RD	MUSWELLBROOK	803	L	WYBONG	West	10	31	Male	No second vehicle	0	0	1	Dry	Fine	Daylight	Yes	Yes	Car	No second vehicle	150.839272	-32.259332	9661390.83	4603125.12

13/02/2006

Denman Road
Golden Highway to New England Highway
Muswellbrook

Data presented is from 1 January 2000 to 30 June 2005
plus PRELIMINARY DATA from 1 July 2005 to 22 January 2006

ACCNO	ACCDEG3	ACDATE	ACCDAY	ACTIME	ACCRYR	ACCST	ACSTTYP	ACCDIST	ACCDIRN	ACCIDOB	ACIDTYP	ACCTOWN	DCA	DCA	TUST	TUDIRN	TUMAN	TUAGE	TUSEX	TUDIRN2	TUMAN2	ACCKILL	ACCINJ	ACCSFCND	ACCWTHR	ACCNATLT	ACCFAST	ACCTIRED	TUTYPEG	TUTYPEG2	LONG	LAT	XCOORD	YCOORD
002538013	Injury	20000402	Sunday	1930	2000	DENMAN	RD	1000	North	EDDERTON	RD	MUSWELLBROOK	705	0	DENMAN	South	10	18	Male	No second vehicle	0	0	1	Wet	Overcast	Darkness	No	Yes	Light Truck	No second vehicle	150.826039	-32.308446	9659946.55	4597732.43
002544867	Injury	20000429	Saturday	0640	2000	EDDERTON	RD	12	South	DENMAN	RD	MUSWELLBROOK	301	0	EDDERTON	North	10	33	Male	North	1	0	1	Dry	Fog or Mist	Daylight	No	No	Light Truck	Car	150.817976	-32.314414	9659164.16	4597099.35
002544870	Injury	20000429	Saturday	0640	2000	DENMAN	RD	60	West	EDDERTON	RD	MUSWELLBROOK	603	0	DENMAN	East	10	45	Male	West	5	0	1	Dry	Fog or Mist	Daylight	No	No	Car	Articulated Truck	150.817437	-32.314646	9659112.50	4597075.59
002552388	Towaway	20000529	Monday	1918	2000	NEW ENGLAND	HY	2	South	SYDNEY	ST	MUSWELLBROOK	309	0	NEW ENGLAND	West	21	34	Male	West	21	0	0	Dry	Fine	Darkness	No	No	Articulated Truck	Car	150.886926	-32.268011	9665838.67	4601998.23
002558764	Injury	20000617	Saturday	0430	2000	DENMAN	RD	1400	East	EDDERTON	RD	MUSWELLBROOK	704	0	DENMAN	East	10	19	Male	No second vehicle	0	0	1	Dry	Fine	Darkness	No	No	Car	No second vehicle	150.829595	-32.306548	9660288.65	4597930.41
003574573	Towaway	20000819	Saturday	1920	2000	SYDNEY	ST	60	West	NEW ENGLAND	HY	MUSWELLBROOK	406	0	SYDNEY	South	25	17	Male	West	10	0	0	Dry	Fine	Darkness	No	No	Car	Car	150.886218	-32.268454	9665770.22	4601951.61
011613342	Injury	20010210	Saturday	2020	2001	DENMAN	RD	1000	West	EDDERTON	RD	MUSWELLBROOK	803	R	DENMAN	West	10	20	Male	No second vehicle	0	0	1	Wet	Raining	Darkness	Yes	No	Car	No second vehicle	150.809283	-32.319474	9658326.30	4596568.92
011621105	Towaway	20010309	Friday	0013	2001	DENMAN	RD	1600	North	MITCHELL LINE	RD	MUSWELLBROOK	803	R	DENMAN	South	10	23	Male	No second vehicle	0	0	0	Wet	Raining	Darkness	Yes	No	Car	No second vehicle	150.872921	-32.277975	9664480.18	4600943.87
011643776	Towaway	20010309	Friday	1431	2001	SYDNEY	ST	0	Right on Spot	SKELLATAR STOC	MS	MUSWELLBROOK	709	0	SKELLATAR STOC	West	10	43	Male	No second vehicle	0	0	0	Wet	Raining	Daylight	No	Yes	Car	No second vehicle	150.873137	-32.277561	9664502.22	4600988.93
012633136	Injury	20010506	Sunday	1510	2001	DENMAN	RD	1000	West	EDDERTON	RD	MUSWELLBROOK	201	0	DENMAN	East	16	99	Male	West	10	0	3	Wet	Raining	Daylight	Yes	No	Car	Car	150.809282	-32.319475	9658326.23	4596568.90
012640183	Injury	20010605	Tuesday	0735	2001	GOLDEN	HY	0	Right on Spot	DENMAN	RD	DENMAN	101	0	GOLDEN	West	10	68	Male	North	10	0	2	Wet	Fog or Mist	Daylight	No	No	Car	Car	150.719357	-32.376270	9649646.88	4590584.68
013657729	Towaway	20010731	Tuesday	2330	2001	DENMAN	RD	10000	South	MUSWELLBROOK	TN	MUSWELLBROOK	609	0	DENMAN	South	10	30	Male	No second vehicle	0	0	0	Dry	Fine	Darkness	No	No	Car	No second vehicle	150.804286	-32.320542	9657852.14	4596467.80
013661304	Towaway	20010820	Monday	2050	2001	NEW ENGLAND	HY	0	Right on Spot	SYDNEY	ST	MUSWELLBROOK	202	0	SYDNEY	East	20	19	Male	West	10	0	0	Dry	Fine	Darkness	No	No	Car	Car	150.886914	-32.267996	9665837.64	4601999.87
013666197	Injury	20010916	Sunday	1215	2001	SYDNEY	ST	86	South	FORBES	ST	MUSWELLBROOK	303	0	SYDNEY	South	10	43	Male	South	22	0	2	Dry	Fine	Daylight	No	No	Other Vehicle	Car	150.879957	-32.272494	9665164.58	4601526.23
014678323	Injury	20011115	Thursday	1337	2001	GOLDEN	HY	0	Right on Spot	DENMAN	RD	DENMAN	207	0	GOLDEN	West	24	86	Male	South	10	0	1	Dry	Overcast	Daylight	No	No	Car	Light Truck	150.719357	-32.376270	9649646.88	4590584.68
021692998	Towaway	20020117	Thursday	0645	2002	SYDNEY	ST	0	Right on Spot	BARRETT	ST	MUSWELLBROOK	202	0	SYDNEY	East	20	54	Male	West	10	0	0	Dry	Fine	Daylight	Yes	No	Car	Car	150.883955	-32.269919	9665551.33	4601797.30
021709073	Towaway	20020328	Thursday	1700	2002	SYDNEY	ST	200	South	NEW ENGLAND	HY	MUSWELLBROOK	301	0	SYDNEY	North	10	18	Male	North	1	0	0	Dry	Overcast	Daylight	No	No	Light Truck	Car	150.885226	-32.269097	9665674.31	4601883.97
022712191	Injury	20020412	Friday	2050	2002	NEW ENGLAND	HY	0	Right on Spot	SYDNEY	ST	MUSWELLBROOK	8	0	NEW ENGLAND	North	20	22	Male	North	42	0	1	Dry	Fine	Darkness	No	No	Car	Other Vehicle	150.886914	-32.267996	9665837.64	4601999.87
022715254	Towaway	20020422	Monday	1215	2002	NEW ENGLAND	HY	1	South	SYDNEY	ST	MUSWELLBROOK	203	0	NEW ENGLAND	East	20	17	Male	West	21	0	0	Wet	Raining	Daylight	No	No	Car	Car	150.886920	-32.268004	9665838.17	4601999.02
022723974	Towaway	20020526	Sunday	2100	2002	SYDNEY	ST	50	South	NEW ENGLAND	HY	MUSWELLBROOK	601	0	SYDNEY	North	10	22	Female	North	2	0	0	Dry	Fine	Darkness	No	No	Car	Car	150.886494	-32.268272	9665796.98	4601970.78
023F02287	Fatal	20020716	Tuesday	2325	2002	SYDNEY	ST	12	South	TARAKAN	AV	MUSWELLBROOK	1	0	SYDNEY	North	10	36	Male	Unknown	59	1	0	Dry	Fine	Darkness	No	No	Light Truck	Other Vehicle	150.877292	-32.274200	9664906.94	4601346.63
023738366	Towaway	20020728	Sunday	1800	2002	DENMAN	RD	2000	East	EDDERTON	RD	MUSWELLBROOK	609	0	DENMAN	West	10	72	Male	No second vehicle	0	0	0	Dry	Fine	Darkness	No	No	Car	No second vehicle	150.835079	-32.303745	9660815.68	4598221.79
023743352	Towaway	20020819	Monday	2010	2002	DENMAN	RD	1400	East	EDDERTON	RD	EDINGLASSIE	609	0	DENMAN	East	10	46	Male	No second vehicle	0	0	0	Dry	Fine	Darkness	Yes	No	Other Vehicle	No second vehicle	150.829617	-32.306537	9660290.71	4597931.54
024768599	Towaway	20021206	Friday	1450	2002	SYDNEY	ST	5	South	SKELLATAR	ST	MUSWELLBROOK	303	0	SYDNEY	North	10	19	Male	North	22	0	0	Dry	Fine	Daylight	No	No	Car	Car	150.882911	-32.270595	9665450.31	4601726.10
024780999	Injury	20021214	Saturday	0130	2002	MUSWELLBROOK	RD	8000	East	DENMAN	TN	DENMAN	703	0	MUSWELLBROOK	West	10	17	Female	No second vehicle	0	0	2	Dry	Fine	Darkness	No	No	Car	No second vehicle	150.745287	-32.345168	9652206.98	4593941.48
024770698	Towaway	20021216	Monday	1600	2002	NEW ENGLAND	HY	0	Right on Spot	SYDNEY	ST	MUSWELLBROOK	309	0	SYDNEY	West	21	40	Male	West	21	0	0	Dry	Fine	Daylight	No	No	Articulated Truck	Car	150.886914	-32.267996	9665837.64	4601999.87
024773367	Towaway	20021227	Friday	1135	2002	SYDNEY	ST	10	West	SKELLATAR	ST	MUSWELLBROOK	301	0	SYDNEY	West	10	99	Female	West	1	0	0	Dry	Fine	Daylight	No	No	Car	Car	150.882866	-32.270624	9665445.99	4601723.06
031779151	Injury	20030126	Sunday	2030	2003	NEW ENGLAND	HY	0	Right on Spot	SYDNEY	ST	MUSWELLBROOK	202	0	NEW ENGLAND	North	20	55	Female	South	10	0	1	Dry	Fine	Darkness	No	No	Car	Car	150.886914	-32.267996	9665837.64	4601999.87
031791273	Towaway	20030315	Saturday	2015	2003	NEW ENGLAND	HY	10	South	SYDNEY	ST	MUSWELLBROOK	301	0	NEW ENGLAND	North	10	27	Male	North	1	0	0	Wet	Raining	Darkness	No	No	Car	Car	150.886975	-32.268073	9665843.07	4601991.21
032808626	Towaway	20030602	Monday	0630	2003	DENMAN	RD	0	Right on Spot	THOMAS MITCHEL	DR	MUSWELLBROOK	101	0	THOMAS MITCHEL	West	10	33	Male	South	10	0	0	Wet	Raining	Daylight	No	No	Light Truck	Car	150.869791	-32.291399	9664130.73	4599468.45
032F03210	Fatal	20030602	Monday	0650	2003	DENMAN	RD	0	Right on Spot	MITCHELL LINE	RD	MUSWELLBROOK	709	0	MITCHELL LINE	West	10	31	Male	No second vehicle	0	1	0	Wet	Raining	Daylight	No	Yes	Articulated Truck	No second vehicle	150.869791	-32.291399	9664130.73	4599468.45
033816924	Injury	20030709	Wednesday	0640	2003	DENMAN	RD	0	Right on Spot	THOMAS MITCHEL	DR	MUSWELLBROOK	202	0	DENMAN	East	20	40	Male	West	10	0	1	Dry	Overcast	Dawn	No	No	Car	Light Truck	150.869791	-32.291399	9664130.73	4599468.45
033818382	Towaway	20030715	Tuesday	0930	2003	SKELLATAR STOC	MS	2	West	SYDNEY	ST	MUSWELLBROOK	103	0	SYDNEY	South	21	16	Male	West	10	0	0	Dry	Fine	Daylight	No	No	Car	Car	150.873156	-32.277570	9664504.00	4600987.91
034852446	Injury	20031204	Thursday	1310	2003	DENMAN	RD	10	East	ROTHBURY	GT	MUSWELLBROOK	403	0	DENMAN	West	11	64	Female	West	2	0	1	Wet	Other (eg Hail)	Daylight	No	No	Car	Car	150.764206	-32.328471	9654051.95	4595726.45
041866897	Towaway	20040209	Monday	1510	2004	GOLDEN	HY	0	Right on Spot	DENMAN	RD	DENMAN	307	0	GOLDEN	North	13	79	Male	North	10	0	0	Dry	Fine	Daylight	No	No	Car	Car	150.719357	-32.376270	9649646.88	4590584.68
041868839	Injury	20040224	Tuesday	1618	2004	SYDNEY	ST	0	Right on Spot	ANZAC	PD	MUSWELLBROOK	303	0	SYDNEY	North	10	18	Male	North	22	0	1	Wet	Raining	Daylight	No	No	Car	Car	150.879159	-32.273004	9665087.46	4601472.48
041876384	Towaway	20040305	Friday	1730	2004	GOLDEN	HY	10	South	DENMAN	RD	DENMAN	301	0	GOLDEN	North	10	18	Male	North	10	0	0	Dry	Fine	Daylight	No	No	Car	Car	150.719277	-32.376331	9649639.09	4590578.20
042899579	Towaway	20040317	Wednesday	1530	2004	DENMAN	RD	5000	West	EDDERTON	RD	MANGOOLA	805	0	DENMAN	East	10	99	Male	No second vehicle	0	0	0	Dry	Fine	Daylight	No	No	Car	No second vehicle	150.768072	-32.327182	9654420.63	4595856.10
041874053	Towaway	20040320	Saturday	0130	2004	DENMAN	RD	1100	East	EDDERTON	RD	MUSWELLBROOK	702	0	DENMAN	North	10	51	Male	No second vehicle	0	0	0	Dry	Fine	Darkness	No	Yes	Light Truck	No second vehicle	150.826885	-32.307933	9660028.19	4597786.39
041876907	Injury	20040330	Tuesday	1454	2004	NEW ENGLAND	HY	0	Right on Spot	SYDNEY	ST	MUSWELLBROOK	202	0	SYDNEY	North	20	22	Male	South	10	0	3	Dry	Fine	Daylight	No	No	Car	Car	150.886914	-32.267996	9665837.64	4601999.87
042878715	Towaway	20040407	Wednesday	1415	2004	DENMAN	RD	2150	North	GOLDEN	HY	DENMAN	801	L	DENMAN	East	10	31	Male	No second vehicle	0	0	0	Dry	Fine	Daylight	No	No	Car	No second vehicle	150.730537	-32.361238	9650756.87	4592211.66
042884478	Towaway	20040505	Wednesday	1215	2004	NEW ENGLAND	HY	0	Right on Spot	SYDNEY	ST	MUSWELLBROOK	202	0	NEW ENGLAND	East	20	18	Male	West	10	0	0	Dry	Fine	Daylight	No	No	Car	Light Truck	150.886914	-32.267996	9665837.64	4601999.87
042893025	Towaway	20040614	Monday	1100	2004	DENMAN	RD	10000	South	NEW ENGLAND	HY	MUSWELLBROOK	703	0	DENMAN	South	10	21	Male	No second vehicle	0	0	0	Dry	Fine	Daylight	No	No	Car	No second vehicle	150.808037	-32.319796	9658207.87	4596537.60
042894851	Injury	20040625	Friday	0600	2004	DENMAN	RD	2000	North	GOLDEN	HY	DENMAN	803	L	DENMAN	South	10	39	Female	No second vehicle	0	0	1	Dry	Fine	Dawn	Yes	No	Car	No second vehicle	150.730390	-32.362545	9650737.85	4592067.45
044937799	Injury	20040829	Sunday	1657	2004	GOLDEN	HY	0	Right on Spot	DENMAN	RD	MUSWELLBROOK	707	L	DENMAN	North	20	28	Female	No second vehicle	0	0	4	Wet	Raining	Daylight	Yes	No	Car	No second vehicle	150.719357	-32.376270	9649646.88	4590584.68
044925143	Injury	20041107	Sunday	2150	2004	DENMAN	RD	5000	West	EDDERTON	RD	DENMAN	609	0	DENMAN	West	10	29	Female	No second vehicle	0	0	3	Dry	Overcast	Darkness	No	No	Car	No second vehicle	150.768072	-32.327182	9654420.63	4595856.10
051941283	Injury	20050118	Tuesday	1540	2005	SYDNEY	ST	0	Right on Spot	MITCHELL	ST	MUSWELLBROOK	302	0	SYDNEY	East	10	34	Male	East	23	0	1	Dry	Fine	Daylight	No	No	Car	Light Truck	150.884954	-32.269273	9665647.92	4601865.37
051961321	Towaway	20050220	Sunday	1815	2005	SYDNEY	ST	33	North	SKELLATAR	ST	MUSWELLBROOK	703	0	SYDNEY	North	10	18	Male	North	2	0	0	Wet	Raining	Daylight	Yes	No	Car	Car	150.873279	-32.277289	9664516.71	4601018.57
052980237	Injury	20050621	Tuesday	1905	2005	DENMAN	RD	600	North	THOMAS MITCHEL	DR	MUSWELLBROOK	609	0	DENMAN	North	10	21	Male	No second vehicle	0	0	1	Dry	Fine	Darkness	No	No	Car	No second vehicle	150.871159	-32.286198	9664280.71	4600039.55
053987704	Towaway	20050804	Thursday	1240	2005	NEW ENGLAND	HY	5	South	SYDNEY	ST	MUSWELLBROOK	301	0	NEW ENGLAND	North	10	36	Male	North	1	0	0	Dry	Fine	Daylight	No	No	Car	Light Truck	150.886944	-32.268034	9665840.30	4601995.63
053990823	Towaway	20050816	Tuesday	2000	2005	DENMAN	RD	6000	West	THOMAS MITCHEL	DR	MUSWELLBROOK	609	0	DENMAN	West	10	23	Female	No second vehicle	0	0	0	Dry	Fine	Darkness	No	No	Car	No second vehicle	150.814183	-32.316764	9658798.00	4596852.24
053994109	Towaway	20050912	Monday	1610	2005	DENMAN	RD	0	Right on Spot	EDDERTON	RD	MUSWELLBROOK	102	0	EDDERTON	West	20	18	Male	North	10	0	0	Dry	Overcast	Daylight	No	No	Car	Light Truck	150.817937	-32.314312	9659160.87	4597110.88
054003878	Towaway	20051101	Tuesday	2140	2005	DENMAN	RD	400	West	BENGALLA	RD	MUSWELLBROOK	609	0	DENMAN	West	10	56	Male	No second vehicle	0	0	0	Dry	Fine	Darkness	No	No	Car	No second vehicle	150.858907	-32.295548	9663090.00	4599046.87

Variables Used in Crash Output	
Abbreviation	**Description**
YQTR	reporting year and quarter
ACCRYR	reporting year
ACCNO	accident number
ACCDEG3	degree of accident
ACDATE	date
ACCDAY	day
ACTIME	time
ACCST	street
ACSTTYP	street type
ACCDIST	distance
ACCDIRN	direction
ACCIDOB	identifying object
ACIDTYP	identifying object type
ACCTOWN	town or place
ACCSFCND	surface condition
ACCWTHR	weather
ACCNATLT	natural lighting
DCA	DCA
DCASUP	DCA supplement
ACCKILL	number killed
ACCINJ	number injured
ACCFAST	speeding involvement
ACCTIRED	fatigue involvement
TUTYPEG	traffic unit group
TUST	street of travel
TUDIRN	direction of travel
TUMAN	manoeuvre
TUAGE	age of controller

Definitions for Coding Accidents - DCA Codes

This code is recorded for the *first* impact according to the table below.

Note : The key vehicle is represented by the dark arrow: ——▸ and is recorded as the first vehicle in the accident.

	0	1	2	3	4	5	6	7	8	9
	PEDESTRIAN on foot, in toy / pram	INTERSECTION VEHICLES FROM ADJACENT APPROACHES	VEHICLES FROM OPPOSING DIRECTIONS	VEHICLES FROM SAME DIRECTION	MANOEUVRING	OVERTAKING	ON PATH	OFF PATH, ON STRAIGHT	OFF PATH, ON CURVE	PASSENGERS & MISCELLANEOUS
00	OTHER 000	OTHER 100	OTHER 200	OTHER 300	OTHER 400	OTHER 500	OTHER 600	OTHER 700	OTHER 800	OTHER 900
01	NEAR SIDE 001	CROSS TRAFFIC 101	HEAD ON (not overtaking) 201	Vehicles in same lane REAR END 301	LEAVING PARKING 401	HEAD ON (incl. side swipe) 501	PARKED 601	OFF CARRIAGEWAY TO LEFT 701	OFF CARRIAGEWAY ON RIGHT BEND 801	FELL IN / FROM VEHICLE 901
02	EMERGING 002	RIGHT-THRU FROM LEFT 102	RIGHT-THRU 202	REAR LEFT 302	ENTERING PARKING 402	OUT OF CONTROL 502	DOUBLE PARKED 602	OFF CARRIAGEWAY TO RIGHT 702	OFF CARRIAGEWAY ON LEFT BEND 802	STRUCK WHILE BOARDING OR ALIGHTING 902
03	FAR SIDE 003	LEFT-THRU FROM LEFT 103	RIGHT-LEFT 203	REAR RIGHT 303	PARKING VEHICLES ONLY 403	PULLING OUT 503	ACCIDENT OR BROKEN DOWN 603	LEFT OFF CARRIAGEWAY INTO OBJECT 703	OFF CARRIAGEWAY ON RIGHT BEND INTO OBJECT 803	STRUCK TRAIN/ AEROPLANE 903
04	PLAYING, WORKING LYING, STANDING ON CARRIAGEWAY 004	RIGHT-THRU FROM RIGHT 104	RIGHT-RIGHT 204	U-TURN 304	REVERSING 404	CUTTING IN 504	VEHICLE DOOR 604	RIGHT OFF CARRIAGEWAY INTO OBJECT 704	OFF CARRIAGEWAY ON LEFT BEND INTO OBJECT 804	
05	WALKING WITH TRAFFIC 005	TWO RIGHT TURNING 105	LEFT-THRU 205	Vehicles in parallel lanes LANE SIDE SWIPE 305	REVERSING INTO FIXED OBJECT 405	PULLING OUT REAR END 505	PERMANENT OBSTRUCTION ON CARRIAGEWAY 605	OUT OF CONTROL ON CARRIAGEWAY 705	OUT OF CONTROL ON CARRIAGEWAY 805	
06	FACING TRAFFIC 006	RIGHT-LEFT FROM RIGHT 106	LEFT-LEFT 206	LANE CHANGE RIGHT 306	EMERGING FROM DRIVEWAY 406	OVERTAKING RIGHT TURN 506	TEMPORARY ROADWORKS 606	LEFT TURN 706		PARKED VEHICLE RAN AWAY 906
07	DRIVEWAY 007	LEFT-THRU FROM RIGHT 107	U-TURN 207	LANE CHANGE LEFT 307	EMERGING FROM LOADING BAY 407		STRUCK OBJECT ON CARRIAGEWAY 607	RIGHT TURN 707		UNKNOWN 907
08	ON FOOTWAY MEDIAN 008	RIGHT-LEFT FROM LEFT 108		RIGHT TURN SIDE SWIPE 308	FROM FOOTWAY 408			MOUNTS TRAFFIC ISLAND 708	MOUNTS TRAFFIC ISLAND 808	
09		TWO LEFT TURNING 109		LEFT TURN SIDE SWIPE 309	U-TURN INTO FIXED OBJECT 409		ANIMAL (not ridden) 609	OFF END OF ROAD/ T INTERSECTION 709		
10				PULLING OUT (LANE CHANGE) 310			LOAD OR MISSILE STRUCK VEHICLE 610			

Manoeuvres Of This Traffic Unit [M]

<< tuMAN >> Length 2

The manoeuvre of this traffic unit immediately prior to its involvement in the accident.

Stationary

01 Stationary in traffic
02 Parked at kerbside / roadside
03 Parked at kerbside / roadside loading or depositing goods / passengers
04 Double parked
05 Broken down in traffic / previous accident
06 Parked or stationary on footpath
07 Parked elsewhere (off road)

Moving along carriageway

10 Proceeding along lane (on either straight or curved carriageway)
11 Parking (forward) or pulling out from kerb
12 Veering to right to change to a lane moving in the same direction
13 Veering to left to change to a lane moving in the same direction
14 Merging with traffic in same direction
15 Pulling out into opposite stream of traffic
16 Travelling on incorrect side of carriageway (including wrong way on one-way street)
17 Cutting back after overtaking

Turning or reversing

20 Turning right out of own lane
21 Turning left out of own lane
22 Waiting to turn right
23 Waiting to turn left
24 Performing U-turn
25 Entering carriageway from driveway (forward or unspecified)
26 Entering carriageway from driveway (reversing)
27 Moving along footpath
29 Performing other / unspecified **forward** manoeuvre
30 Reversing in lane (other than parking)
31 Parking (reversing)
39 Performing other / unspecified **reversing** manoeuvre

Pedestrians

40 Pedestrian walking across carriageway
41 Pedestrian running across carriageway (*see also* **54**)
42 Pedestrian standing still on carriageway
43 Pedestrian lying / sitting on carriageway
44 Pedestrian working on carriageway
45 Pedestrian working on vehicle on carriageway
46 Pedestrian playing on carriageway
47 Pedestrian in / on toy vehicle on carriageway
48 Pedestrian moving along edge of c'way **with** traffic (*see also* **55**)
49 Pedestrian moving along edge of c'way **against** traffic (*see also* **56**)
50 Pedestrian stepping off / onto kerb
51 Pedestrian stepping off / onto traffic island or median strip
52 Pedestrian on footpath or elsewhere completely off carriageway
53 Pedestrian on skateboard / roller skates or blades
54 Pedestrian jogging (*see also* **41**)
55 Pedestrian moving **with** traffic but not along edge of carriageway (*see also* **48**)
56 Pedestrian moving **against** traffic but **not** along edge of c'way (*see also* **49**)
59 Pedestrian performing other / unspecified manoeuvre
60 Train or aeroplane manoeuvre (tram excluded)

NOTE: The manoeuvre *immediately prior* to involvement in the accident is the manoeuvre coded. Code **05** 'Broken down in traffic' includes vehicles which were involved in a previous accident. Code **11** 'Pulling out from kerb or parking (forward)' and code **31** 'Parking (reversing)' include vehicles either entering or leaving parking.