

MOOLARBEN COAL PROJECT

A P P E N D I X 15

*Traffic Impact, Road Safety
and Railway Level
Crossing Assessment*

Moolarben Coal Project



TRAFFIC IMPACT, ROAD SAFETY AND RAILWAY LEVEL CROSSING ASSESSMENT

- Final
- August 2006



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1. Introduction

1.1 Background

This report presents an assessment of the traffic and transport implications of the proposed Moolarben Coal Project, which would be located north of Mudgee near the town of Ulan.

The proposed project will comprise a series of open cut and underground mines together with a coal preparation plant, coal handling and storage facilities, rail loop and train loading system and associated mine infrastructure and services. The development of the mines will be staged and open cut and underground mines will operate concurrently.

This assessment makes reference to a number of technical and policy guidelines, including:

- NSW Roads and Traffic Authority Guide to Traffic Generating Developments;
- NSW Roads and Traffic Authority Road Design Guide;
- Austroads Guide to Traffic Engineering Practice; and
- Hunter Regional Environmental Plan

1.2 Document Outline

This document is structured as follows:

- **Section 2** describes the existing road situation in the local area;
- **Section 3** details the proposed development in terms of traffic generating activities;
- **Section 4** assesses the impact of the proposed development on the local road network;
- **Section 5** outlines how construction traffic would be managed;
- **Section 6** presents a discussion of road safety issues, including the outcomes of the road safety audits undertaken for this project;
- **Section 7** contains the assessment of railway level crossings on the Ulan-Wallerawang and Ulan-Musswellbrook lines; and
- **Section 8** summarises the findings of the study.



2. Existing Situation

2.1 Site Location

The Moolarben Coal Mine site is located near the town of Ulan in the western coalfields of NSW. It is 42km north of Mudgee, 24km east of Gulgong, 320km by road north-west of Sydney and 290km by road west of Newcastle. **Figure 2-1** shows the regional context of the site location.

2.2 Local Road Network

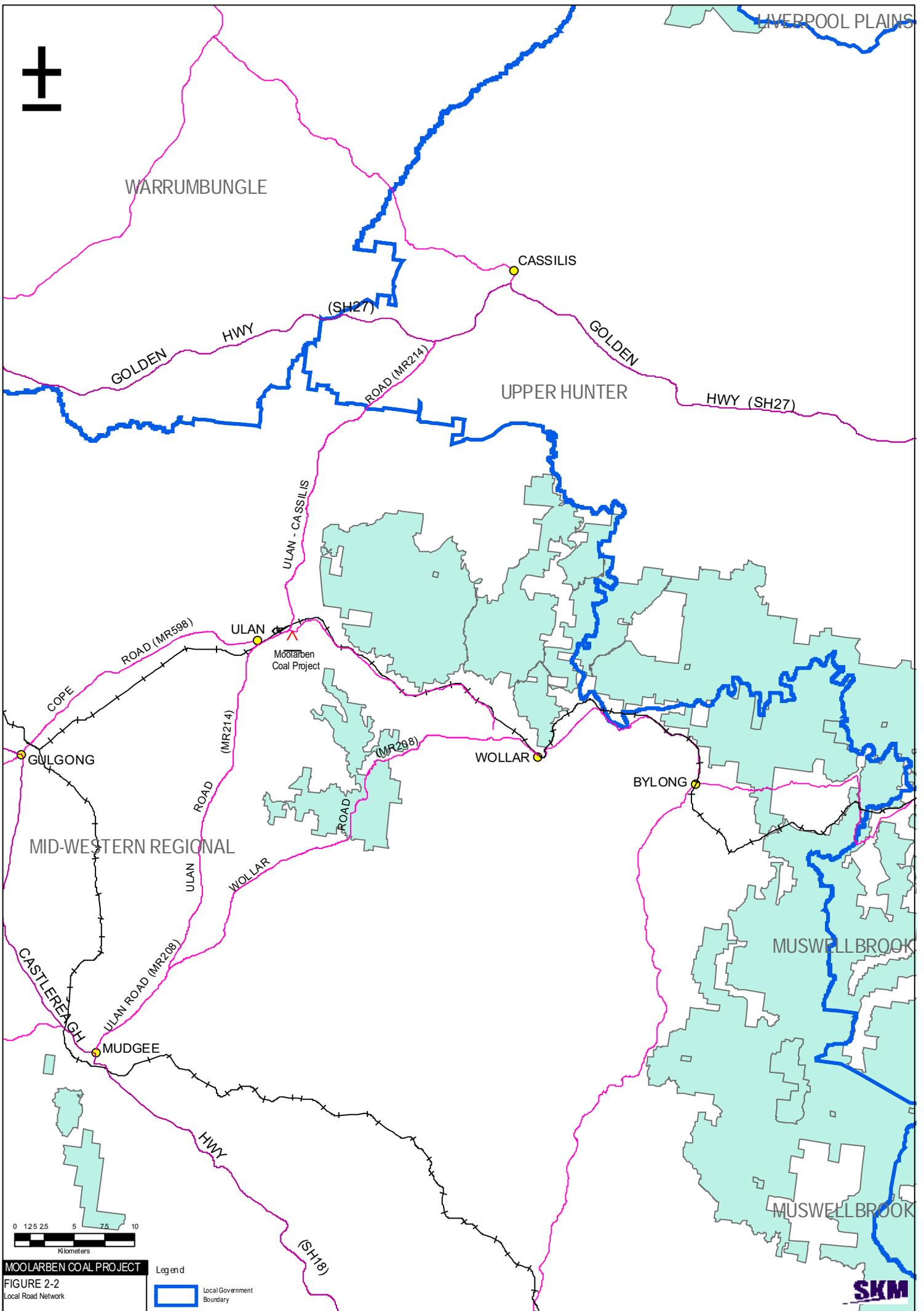
The Moolarben Coal Mine is located near the intersection of two designated main roads: Main Road (MR) 214, which connects Mudgee with Cassillis, and MR598 which links Gulgong and Ulan. These roads, along with other Main Roads in the area, are under the care and control of the Mid-Western Regional Council with funding assistance provided by the NSW Roads and Traffic Authority. MR214 connects with MR208 (linking Mudgee and Sandy Hollow) just north of Mudgee. The mine site straddles the Ulan-Wollar Road where it meets with MR214.

The main inter-regional road links are provided by two State Highways. The Castlereagh Highway (SH18) connects the Great Western Highway near Lithgow with Queensland via Gilgandra, Coonamble and Walgett. The Golden Highway (SH27) links the New England Highway near Singleton with Dubbo and the Newell and Mitchell Highways. State Highways are the responsibility of the NSW RTA. The local road network is shown in **Figure 2-2**.

The Castlereagh Highway (SH18) is predominantly a 2-lane road, with sealed shoulders and occasional auxiliary lanes provided for overtaking. The speed limit is generally 100km/hour, with lower speed limits in place in built up areas. Between Mudgee and Gulgong, the 2002 Annual Average Daily Traffic volume (AADT) was around 3,000 axle pairs¹. Growth since 1980 has been at around 2% per year.

MR214 (Mudgee-Ulan and Ulan-Cassilis) is a 2-lane road with a speed limit of 100km/hour. There are some sections of the road with sealed 1m-wide shoulders, but for much of its length there is either no shoulder or a shoulder of rough gravel. Between Mudgee and Ulan, the 2002 AADT was approximately 1,300 axle pairs, although north of Ulan this drops to about 600 axle pairs per day. Growth in traffic is around 2.3% per year.

¹ A passenger car is the equivalent of 1 axle pair. A 3-axle truck is 1.5 axle pairs.



MOOLARBEN COAL PROJECT
FIGURE 2-2
 Local Road Network

Legend
 Local Government Boundary





MR598 (Gulgong-Ulan) is of similar standard to MR214. The 2002 AADT at the level crossing east of Gulgong was approximately 1,600 axle pairs, but this volume halves further east of the town. Growth in traffic is around 1.5% per year.

The Ulan-Wollar Road roughly follows the Gulgong to Sandy Hollow railway between MR214 at Ulan and MR208 at Wollar. East of MR214, it is sealed for only the first 4km. No traffic volume data is available for this road, but observation indicates that it is only lightly trafficked.

2.3 Local Public Transport Network

School bus services operate along several routes to/from and within Mudgee, Ulan and Gulgong, including along MR214 and MR598. Routes that pass near the proposed mine site include:

- Cooks Gap – Mudgee;
- Ulan – Mudgee;
- Ulan – Wollar;
- Turil – Gulgong;
- Yarrawanga – Gulgong; and
- Winchester Cr and Ridge Road – Ulan.

These buses are on the road generally between 07:30 and 09:00, and 15:00 and 17:00.

Countrylink runs coach services in the region, connecting with Cityrail and Countrylink rail services at Lithgow. These coach services are operated by Ogdens Coaches and stop at Countylink coach stops in each of the towns and villages that it passes through. On weekdays, there are two daily services (one morning, one afternoon/evening) in each direction between Gulgong and Lithgow. One service each day continues north to Coonabarabran, with one per week extending to Baradine. On Saturdays there is a morning service in each direction between Lithgow and Gulgong, and Sundays have two afternoon / evening services in each direction, with one from Coonabarabran and one from Gulgong. Travel time from Gulgong to Lithgow is around 3-4 hours, depending on the number and location of intermediate stops.

Ogdens Coaches also runs bus services in and around Mudgee, although these routes do not extend as far as the mine site.

2.4 Rail Network

There are several rail lines in the region including the Wallerawang to Gwabegar Railway which passes through Mudgee and Gulgong, and the Gulgong to Sandy Hollow which connects with the Main Northern Railway. This latter railway is used currently for the transport of coal from the



Ulan Coal Mine, adjacent to the proposed Moolarben mine site, as well as grain and general freight. There are no regular passenger services in operation in the area.



3. Proposed Development

The proposed mine would involve three open cut areas and one underground mine, producing 10 million-tonnes per annum (Mtpa) of product coal. All coal would be transported from the mine site by rail as a way of minimising the impact of coal transport in line with the Hunter Regional Environmental Plan (Part 6). The proposed site layout is shown in **Figure 3-1** (overleaf).

3.1 Operation and Internal Traffic Movements

Coal extracted from the three open cut mines would be initially transported by trucks from the mine to a dump station and crusher, situated in the north-west corner of Open Cut 1, south of the Ulan-Wollar Road. From there it would be moved to the Coal Handling and Processing Plant (CHPP), located north of the railway and Ulan-Wollar Road, by conveyor. Coal would be brought directly out of the underground mine to the CHPP by conveyor.

The mine would operate 24 hours per day.

3.1.1 Movements Between the Open Cut and Underground Mine Areas

There would be some internal staff movement between the CHPP / underground mine and the open cut areas, in the order of around 10 vehicles per day. This movement would roughly parallel the conveyor between the open cut mines and the CHPP, and use both internal roads and a short section of the relocated Ulan-Wollar Road.

3.2 External Road Access

Access to the Coal Handling and Processing Plant is proposed to be off the Ulan-Cassilis Road (MR214), approximately 400m north of the railway bridge. This access point was approved in 1985 as part of the consent for Underground Mine 4, which has yet to be developed.

Although this location is close to a curve in the road and a crest over the railway, there is sufficient sight distance in both directions. To the south, the sight distance is approximately 380m, almost to the crest of the railway bridge. To the north, there is at least 350m sight distance. Assuming a speed of 100km/hour for through traffic, these sight distances allow vehicles turning out of the proposed entry over 13 seconds to the south and up to 12.6 seconds to the north to complete their manoeuvre once a through vehicle enters their line of sight. Furthermore, these sight distances are in excess of the requirements of the RTA's Road Design Guide, which takes into account the reaction time of the approaching driver and the time required to decelerate and stop if required. The sight distance in each direction is shown in the following pictures.



■ **Figure 3-2 Sight Distance North from Proposed Intersection**





■ **Figure 3-3 Sight Distance South from Proposed Intersection**



The type of intersection proposed would be similar to that provided as the access to the Ulan Coal Mine underground facilities off MR214 (see **Figure 3-4**), just north of the subject site. This intersection has an auxiliary lane provided to allow right turning traffic from the main road to be overtaken if required. Lighting is also provided.



■ **Figure 3-4 Access Intersection for Ulan Coal Mine**



A separate access point is proposed for the open cut areas. It is proposed to realign the Ulan-Wollar Road to facilitate the inclusion of some of the area north of the existing road alignment in Open Cut 1. The Ulan-Wollar Road would divert north from its existing alignment about 200m east of MR214. At the point where the road alignment would divert, a new intersection would be constructed to provide access to the open cut areas. This intersection would be located so as to provide sufficient sight distances². Therefore access between the open cut areas and MR214 would be via the Ulan-Wollar Road.

The realigned Ulan-Wollar Road would have a 60km/hr design speed. Eastbound traffic would have turned onto the Ulan-Wollar Road from MR214 and so would be travelling at a low speed. Westbound traffic would be slowed down by a reduction in the speed limit and additional advisory and regulatory signs as appropriate.

² Sight distance requirements for intersections are specified in the Austroads Guide to Traffic Engineering Practice Part 5 (Intersections at Grade).



3.3 Staffing

The Moolarben Coal Project would employ about 317 people during operation. The various shifts are listed in **Table 3-1**. The open cut mine and CHPP would operate with 2 shifts per day, while the underground mine would have 3 shifts per day during the week and 2 shifts on weekends.

■ **Table 3-1 Proposed Staffing Arrangements**

Open Cut Operations						
	Mon to Friday			Sat & Sun		
Shift	Admin Staff (Day)	Day	Night	Day	Night	
Times	07:00-17:00	06:30-19:00	18:30-07:00	06:30-19:00	18:30-07:00	
Personnel	21	30	30	20	19	
Total allowing for rosters, absentees etc						120
Underground No.4						
	Mon to Friday			Fri Sat & Sun		
Shift	Admin Staff (Day)	Day	Afternoon	Night	Day	Night
Times	07:00-17:00	06:30-15:00	14:30-23:00	22:30-07:00	06:30-19:00	18:30-07:00
Personnel	29	30	29	29	23	22
Total allowing for rosters, absentees etc						162
CHPP						
	Mon to Friday			Sat & Sun		
Shift	Admin Staff (Day)	Day	Night	Day	Night	
Times	07:00-17:00	06:30-19:00	18:30-07:00	06:30-19:00	18:30-07:00	
Personnel	5	10	5	5	5	
Total allowing for rosters, absentees etc						30

3.4 Traffic Generation

For the purposes of assessing traffic generation from the proposal, it has been assumed that the average car occupancy of staff driving to the site would be 1, that is, everyone drives their own car. Furthermore, there would be no use of public transport by staff. So the number of staff would equal the number of vehicles.

The peak number of vehicle movements would occur on a weekday between 06:00 and 07:00, when 125 people would arrive at the site for the day shifts. In the following hour, there would be 64 staff leaving after night shift. The maximum hourly load could be as high as 190 vehicles,

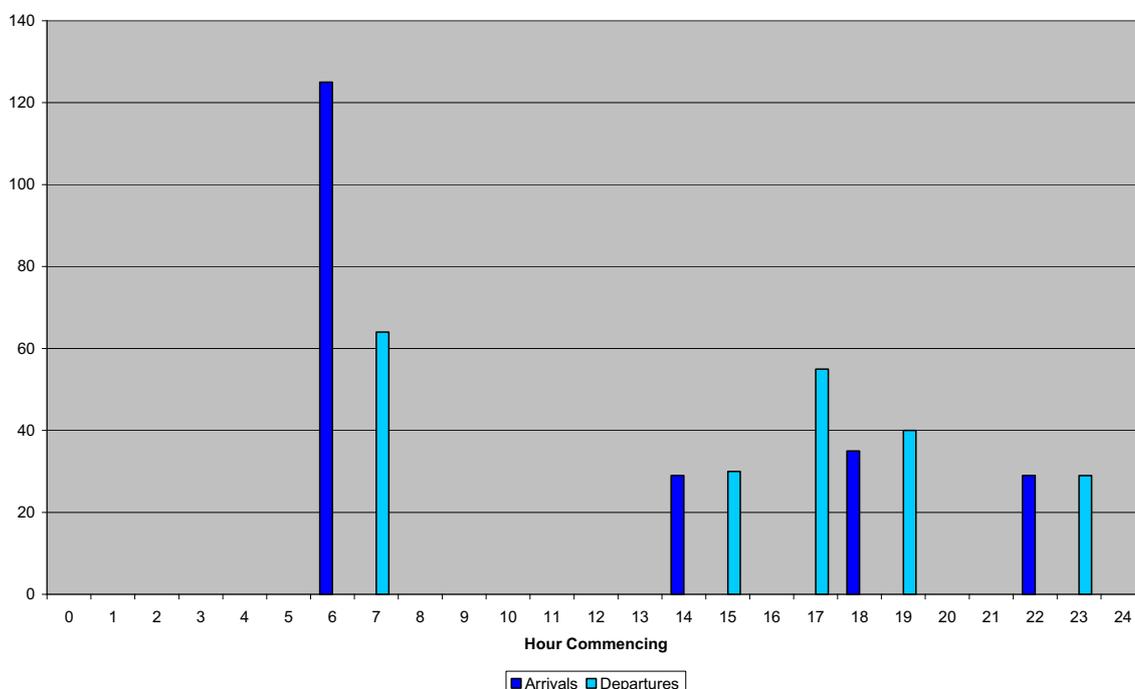


although this is likely to be spread over close to 2 hours. Due to the staggered finishing times of the day shifts, the evening peak hour would be between 19:00 and 20:00, when 40 people would leave the site. The preceding hour would see 35 staff arrive for night shift.

On weekends, the peak traffic generation would be 48 vehicles arriving and 46 vehicles leaving between 06:00 and 08:00, and the same number between 18:00 and 20:00.

Figure 3-5 shows the spread of arrivals and departures across the day.

■ **Figure 3-5 Movement of Staff To/From the Site (Weekdays)**



The majority of the mine staff is assumed to reside in the Mudgee and Gulgong areas, and use MR214 and MR598 to travel between their home and the mine. The use of other roads by mine staff is expected to be minimal.

All coal would be transported from the site by rail. However, in the event of failure of the rail system, some coal may be moved by truck. The main route used by trucks would be along MR214 towards the Golden Highway (SH27), and then on to Singleton, the New England Highway and Newcastle. Trucks would not be inappropriate traffic on these roads. However, the movement of coal by trucks would be an exceptional occurrence only.



3.4.1 Traffic Generation from the Wilpinjong Coal Project

The Wilpinjong Coal Project is located east of the Moolarben Coal Project, between the Ulan-Wollar Road and the Wollar Road (MR208). Although not assessed in the EIS³, access to the Wilpinjong site is to be via the Ulan-Wollar Road and MR214 (the EIS assumed access would be via the Wollar Road (MR208). Additional information prepared for the Wilpinjong Coal Project assessing the impact of this change in access arrangements is not available to inform this present study. As such, a worst case has been assumed, with all Wilpinjong traffic using the Ulan-Wollar Road and MR214. The peak traffic generation from the Wilpinjong Coal Project would be from the movement of staff. The Wilpinjong EIS states that there would be 2 shifts per day of 71 people (06:30 to 19:00 and 18:30 to 07:00) as well as 20 administration staff working from 07:00 to 17:00.

The peak hour in terms of traffic generation would be between 06:00 and 07:00, with 91 movements (all arrivals). The following hour would see a further 71 vehicles leave after the night shift. So it is conceivable that there could be up to 162 vehicle movements in a one-hour period.

³ Wilpinjong Coal Project Environmental Impact Statement, May 2005. Appendix K Road Transport Assessment.



4. Operational Traffic Impact Assessment

4.1.1 Road and Intersection Operation

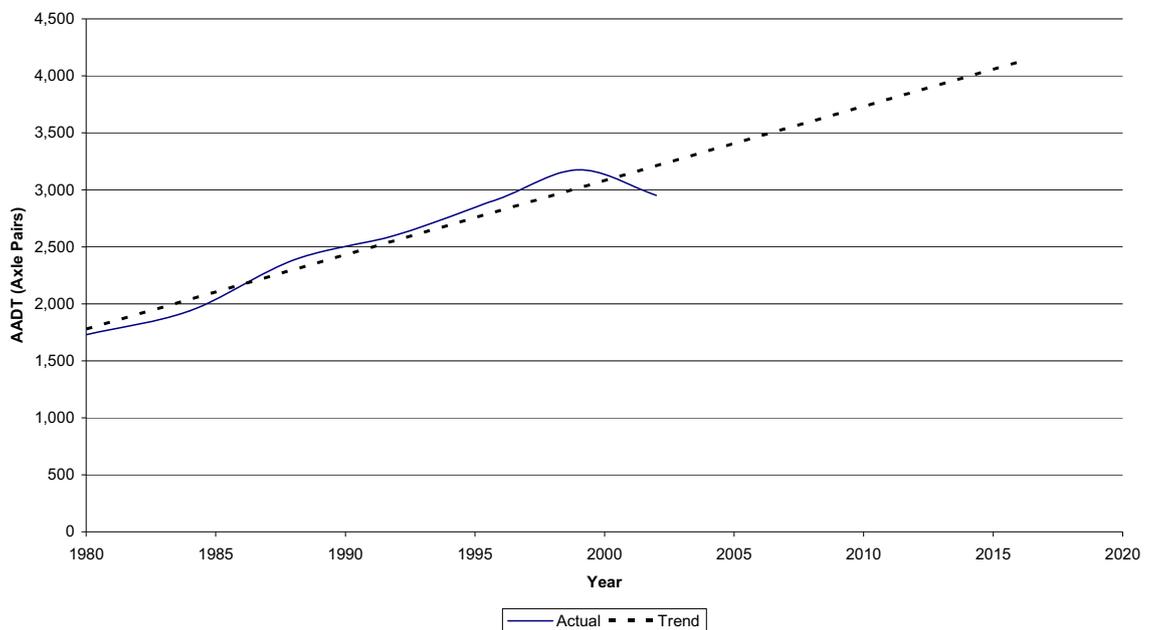
Forecasts of traffic volumes on key roads have been made based on historic traffic volume data from the RTA. A linear trend has been drawn from data from 1980 to 2002, and extrapolated to 2006 and 2016. This has been done for SH18, MR214 and MR598, as shown below in **Figure 4-1**, **Figure 4-2** and **Figure 4-3** respectively.

Despite a small reduction in traffic between 1999 and 2002, the general trend since 1980 on SH18 North of Mudgee is for steady growth.

■ **Figure 4-1 SH18 Traffic Volume Growth**

RTA Count Station	Location	AADT (Axle pairs)	1980	1984	1988	1992	1996	1999	2002	2006	2016
99.165	Between Mudgee & Gulgong	Actual	1,730	1,940	2,384	2,607	2,930	3,177	2,951	n.a.	n.a.
		Trend	1,778	2,038	2,299	2,559	2,820	3,015	3,210	3,471	4,122

SH18 North of Mudgee



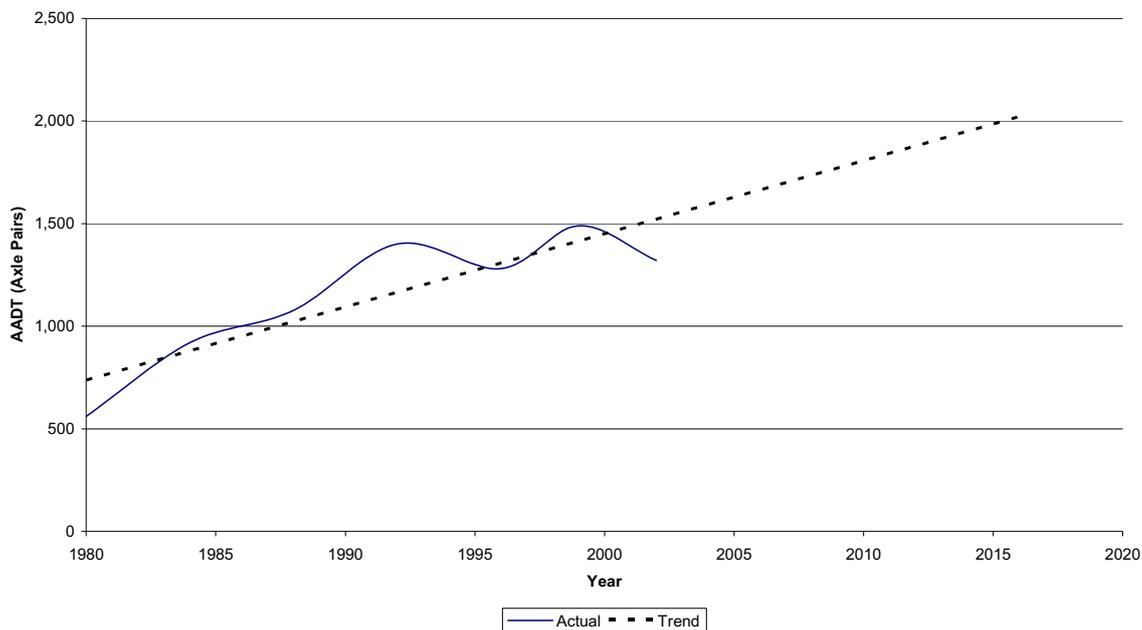
Traffic volumes on MR214 also decreased slightly from 1999 to 2002, with an additional dip in 1996. However, the fluctuation in volumes has generally mirrored a rising linear trend.



■ **Figure 4-2 MR214 Traffic Volume Growth**

RTA Count Station	Location	AAADT (Axle pairs)	1980	1984	1988	1992	1996	1999	2002	2006	2016
99.221	North of Budgee Budgee	Actual	560	920	1,078	1,401	1,281	1,490	1,321	n.a.	n.a.
		Trend	738	880	1,023	1,165	1,308	1,415	1,522	1,665	2,021

MR214 North of Budgee Budgee



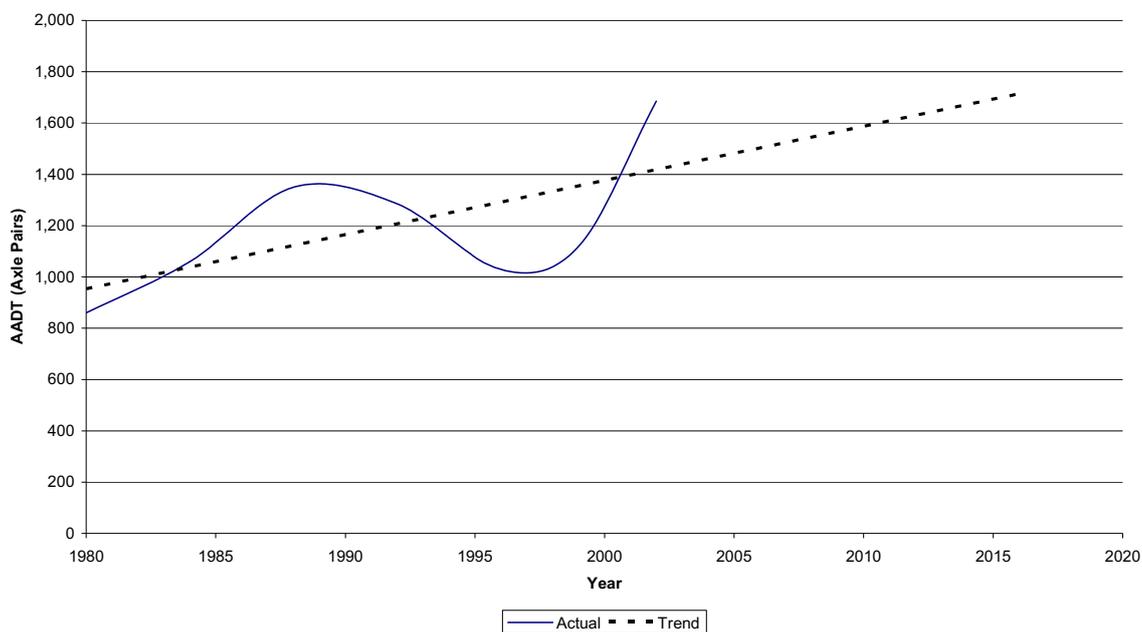
On MR598, there has been a very wide fluctuation in traffic volumes, with a peak in 1988 and a trough in 1996 and 1999. The 2002 data suggests another peak. The linear trend is the best approximation available for the purpose of estimating future traffic volumes.



■ **Figure 4-3 MR598 Traffic Volume Growth**

RTA Count Station	Location	AADT (Axle pairs)	1980	1984	1988	1992	1996	1999	2002	2006	2016
99.510	East of Gulgong	Actual	860	1,060	1,350	1,285	1,029	1,119	1,685	n.a.	n.a.
		Trend	954	1,038	1,123	1,207	1,292	1,355	1,419	1,503	1,715

MR598 East of Gulgong



The capacity of rural two-lane roads can be estimated using the Austroads Guide to Traffic Engineering Practice Part 2 (Roadway Capacity), which takes into account the effect of factors such as pavement width and terrain. The capacity refers to the peak one-hour period. There is no data available on the distribution of traffic on these roads across the day, although a peak hour factor can be estimated based on peak hour counts undertaken for the Wilpinjong Coal Project Road Transport Assessment. This study counted 73 vehicles on MR214 north of MR208 between 06:00 and 07:00. This is approximately 10% of the measured daily volume at the same time.

For SH18, the acceptable capacity would be around 1,260 vehicles (axle pairs) per hour (two-way volume). Even using the 2016 forecast volume, the peak hour volume would be around 410, which is well within the theoretical capacity of the road. For the other roads, with minimal shoulder provisions and narrow lanes, the acceptable capacity would be about 820 vehicles (axle pairs) per hour. In 2016, the peak hour volumes would be 200 and 170 vehicles per hour on MR214 and MR598 respectively. These are similarly well within the theoretical capacity of the road. Even



adding the worst-case traffic generation from the Moolarben Coal Project (190 vehicles per hour between 06:30 and 07:30) and from the Wilpinjong Coal Project (162 vehicles) the theoretical capacity of the roads would not be exceeded.

An assessment of intersection operation was undertaken as part of the assessment for the Wilpinjong Coal Project. The intersections assessed for that project were Church Street / Short Street (Mudgee), Henry Lawson Road / Mudgee-Ulan Road (MR214), and Mudgee-Ulan Road (MR214) / Wollar Road (MR208). The Wilpinjong report concluded that all of these intersections would operate at Level of Service A, both with and without the Wilpinjong project, with significant spare capacity. The expected volume of traffic that would be generated by the Moolarben project would not alter these intersection operation characteristics, and no further intersection capacity assessment is considered necessary. The changed access arrangements for the Wilpinjong Coal Mine would now see potentially all traffic from that site using the intersection of Ulan-Wollar Road with MR214. This intersection is not constrained in terms of capacity. During the peak hour in 2016, 40% of gaps between vehicles from both directions would be greater than 5 seconds. This is the minimum time required to make a right hand turn onto MR214. For left turns out of the Ulan-Wollar Road and right-hand turns off MR214 (where a gap is required in one direction only), the required gaps of 5 seconds and 4 seconds would occur 92% and 97% of the time respectively.

Despite the intersection having sufficient capacity, some modifications would be required to the intersection of MR214 with the Ulan-Wollar Road to improve safety. These modifications would include linemarking at the intersection to provide formal auxiliary lanes on MR214 for turning traffic, and improvement of sight distance to the south by the removal of some trees (see **Figure 4-4**).



■ **Figure 4-4 Sight Distance South from Ulan-Wollar Road Intersection with MR214**



It is proposed as part of the project to realign a portion of the Ulan-Wollar Road. The new road alignment could be constructed with minimal impact on existing road users, with a smooth transition from the old to new alignments once opened. Full access between Ulan and Wollar would be maintained throughout the construction and operation of the proposal.

As the open cut areas are progressively mined, it will be necessary to divert Carrs Gap Road (for Open Cut 2) and Moolarben Road (for Open Cut 3). Access along these roads would be maintained, but details of the diversions will be considered in the future in consultation with Council and other stakeholders.

4.1.2 Public Transport

The proposal would have no impact on the operation of public transport services. School bus services would pass by the mine site between 08:00 and 09:00, and between 15:30 and 17:00. The movement of staff during these times would be minimal.



5. Construction Traffic Impact Assessment

5.1 Development and Construction Details

Moolarben Coal Mine Pty Ltd estimates that the construction period would run for about 12-14 months, and employ some 200 workers. The construction period would start in about January 2007.

The components of construction would include:

- Infrastructure;
- CHPP Construction;
- Open Cut 1 Surface Facilities; and
- Underground Access Drifts.

5.2 Traffic Generation and Impact Assessment

There would be up to 200 workers employed per day during the construction phase. Hours of construction would be 07:00 to 18:00. As a worst case, assuming a car occupancy of 1 person per vehicle, this would result in 200 cars arriving at the site between 06:00 and 07:00, and the same number leaving between 18:00 and 19:00. This would be a noticeable increase on the base load, but would not adversely impact on road or intersection capacity, due to the low traffic volumes currently on these roads.

In terms of truck movements associated with the transport of materials to the site, the following are assumed based on advice from Moolarben Coal Mine Pty Ltd:

- Up to 20 concrete trucks per day during major pours;
- Up to 6 trucks per day carrying equipment for the CHPP and other facilities; and
- A total of 100 wide loads carrying mining excavators and dump trucks.

Aside from the wide loads, the truck movements to and from the site are not expected to have a significant impact on traffic flow and intersection operation in the area. The type of trucks to be used are not inconsistent with current usage of the roads around the mine site. The wide loads would be subject to the granting of permits from the RTA, and would require a separate traffic management plan, which would depend on the origin of each load. The movement of the wide loads would be timed to minimise obstruction to other road users.

There would be some short-term disruptions to traffic associated with the construction of intersections.



5.3 Preliminary Construction Traffic Management Plan

During the construction period, the following general principles will apply in regard to traffic management:

- Access along all public roads will be maintained at all times;
- Where temporary road closures are required, detours will be constructed around the worksite. Where it is not possible to provide a 2-way detour, portable traffic signals will be used to regulate traffic flow in each direction. This approach has been used where roadworks have been in place along MR214 between Mudgee and Ulan;
- The movement of heavy vehicles, and in particular over-size loads, would be arranged so as to minimise disruption to traffic during the before and after school periods; and
- Separate traffic management plans would be in place for the movement of over-size vehicles.



6. Road Safety Issues

Both the NSW RTA and Mid Western Regional Council specified to the Director General of the Department of Planning that a road safety assessment of the key routes that would be used by staff to access the proposed mine should be undertaken. The main issue is safety for staff travelling to and from work.

6.1 Road Safety Audits

Road Safety Audits were undertaken on two roads:

- Main Road 214 between Mudgee (corner Church Street and Short Street) and Ulan (MR214 bridge over railway line, which was the most readily identifiable landmark in the vicinity of the proposed site access point⁴)
- Main Road 598 between Gulgong (corner Station Street and Nandoura Street) and Main Road 214 at Ulan

The audits were carried out on 20th-22nd February, 2006. The audits looked at conditions during daylight hours, in the early morning (05:30 – 06:30) and at night. The audits were carried out by Tim Bickerstaff (Level 2 Road Safety Auditor, IPWEA) and Sally Manahan, both of Sinclair Knight Merz.

While every care has been taken to identify safety issues on the two routes, no guarantee can be made that every safety issue has been identified. Furthermore, even if all the recommendations of this audit were to be adopted, this would not guarantee that the roads would be made “safe”. Rather, the safety performance of the two roads should be improved. It should be noted that the improvement in safety on these roads would benefit not only mine staff, but also the wider community in Mudgee, Gulgong and Ulan.

6.1.1 Key Findings

There were two significant areas of concern associated with both routes.

- Delineation; and
- Road edge formation and shoulder provision.

⁴ Inspection of MR214 between the railway bridge and the proposed site entry indicates no identifiable safety issues.



Delineation is a particular issue at night. The provision of guideposts to mark the edge of the roadway is sporadic along both routes, and where high-beam headlights cannot be used (due to the presence of either oncoming or preceding vehicles) there are many instances where the driver is unable to discern the oncoming road alignment at any distance while travelling at speed. In some instances where guide posts have been provided, they have been knocked over, have lost their reflectivity or are obscured by vegetation. Delineation becomes a distinct safety issue on bends and where there is a drop away from the road formation adjacent to the road.

The width of sealed road varies along both routes. Where recent upgrades have occurred, the pavement is up to 8m wide, with 1m shoulders on either side of two 3m lanes. However, in other locations, the pavement is less than 6m wide, with no shoulders and poor delineation of the road edge. There appear to have been attempts to repair the edge of the pavement in many locations, but often there is cracking that extends towards the centre of the road. The narrowness of the lanes and the absence of a shoulder is a particular safety issue when drivers are faced with oncoming traffic, especially trucks, as they are left with very little margin for error in staying within their lane.

6.1.2 Recommendations

A detailed examination of specific safety issues identified on each route, and recommendations for each, are provided in **Appendix A**. However, a general addressing of the issues of delineation and edge treatments would likely improve safety along both routes. Guide posts should be placed along the full length of each route, in order to improve delineation of the roadway at times of darkness. They should be regularly checked for reflectivity, and non-functioning guide posts replaced as part of an ongoing maintenance program. The roadside should also be regularly checked for vegetation that is obstructing guide posts and other road signs. Australian Standard 1742.2 (Manual of Uniform Traffic Control Devices, Section 3.2) details the placement and design of guideposts.

The road pavement edges should be checked regularly and repaired where necessary to maintain a sufficiently wide road pavement (at least 6m to provide a safe clearance from oncoming traffic) and to provide a smooth transition between the road pavement and gravel shoulder area.

6.2 Speed and Fatigue Management

Speed and fatigue are common factors leading to road crashes in NSW.

The safety of mine employees is of paramount concern to the mine operators. Therefore, it will be in the interest of the mine operators that their employees are safe on their travel to and from work. Employees would be given adequate breaks during their shifts, to reduce the possibility of fatigue affecting workers driving to and from the mine. Similarly, the rostering of staff on to night and day shifts would be arranged to manage fatigue.



Vehicle speed is the responsibility of the individual driver, and is most often influenced by prevailing traffic and road conditions. The lightly-trafficked nature of many roads surrounding the mine site is such that motorists may feel that they can speed without fear of being caught by police or even coming across another vehicle. However, the roads are generally not of the appropriate geometric standard to allow travelling at more than the stated speed limit, and speeding is likely to significantly increase the chance of a crash.

The mine operators would educate their staff about the dangers of speeding. It may be appropriate to institute a zero-tolerance approach to speeding to and from work, whereby if a staff member is caught speeding they are suspended or fined by their employer, in addition to any penalties imposed by police.

6.3 Crash Records

Crash data for these roads was supplied by Mid Western Regional Council. In order to maintain the independence of the road safety audit process and avoid any bias, it was not reviewed until after the audit was completed.

On MR214, there were 29 accidents in the 5 years from 2000 to 2004. This included 4 fatal crashes and 11 injury crashes. On MR598, there were 13 accidents over the same period, with no fatalities but 9 injury crashes.

The 4 fatal crashes on MR214 included:

- A car running into the back of another car which was turning right into Frog Rock Road;
- A head-on crash on a curved section of road 1km south of Ridge Road. The car was described as travelling at excessive speed;
- A car turning right out of the Ulan Coal Mine entry without giving way, and hitting a car travelling from the south; and
- A light truck driven by a learner-driver rolling over on a straight section of road at Ulan.

Six of the injury crashes on MR214 involved the vehicle leaving the carriageway, and there were 3 crashes that occurred while overtaking. Six of the non-casualty crashes involved the vehicle leaving the carriageway and another 6 involved the vehicle hitting an animal.

Eight of the 13 crashes on MR598 involved a vehicle leaving the carriageway, including more than half of the injury crashes.

The predominance of off-path type crashes on both these roads (45% on MR214 and 62% on MR598) reinforces the findings and recommendations of the road safety audit.



7. Railway Level Crossing Assessment

As part of the assessment process for the Moolarben Coal Project, a visual inspection and report on the condition and operation of all public road level crossings on the lines between Ulan and Muswellbrook and Ulan and Wallerawang /Mt Piper is required. An inspection was carried out in February 2006 and the findings are included within this report (see **Appendix D**).

The Moolarben Coal Project is situated near Ulan, 40km north-east of Mudgee and 25km east of Gulgong. It is possible to transport coal by rail over the lines between Wallerawang / Mt Piper and Muswellbrook. The supply of coal from Ulan to Wallerawang / Mt Piper will be to supply coal fired power stations in that area. The movement of coal in the opposing direction from Ulan towards Muswellbrook for domestic power stations and ultimately Newcastle for the export market.

The progressive increase in coal haulage, with potential for coal being transported towards Wallerawang/Mt Piper and towards Muswellbrook/Newcastle, and its impact on the interface between road and rail traffic is the primary concern of this report.

This assessment aims to provide:

- An outline assessment of the existing condition and operation of the road crossings;
- Photographic record of each crossing;
- An assessment of the impact of increased coal traffic on crossing operations; and
- Recommended improvements to crossings to accommodate increased rail traffic.

In general, train loading and locomotive characteristics have little bearing on the maintained condition and operating standards for level crossings. The type and speed of road user combined with train speed has a more substantial impact on the required standards for condition and for determination of protection arrangements.

The physical condition of the crossings inspected as part of this study appeared to be within ARTC maintenance standards. It must be noted however that continuance of the maintenance regime must be ensured to prevent degradation of condition.

The additional volume of rail traffic generated by the new mine is considered to be minor and as such the existing protection arrangements are adequate and will remain as such even taking into consideration the likely increase coal haulage.

In terms of potential delays likely to be caused by the increase in the number of trains it is judged that the calculated level crossing waiting times are within the industry accepted tolerances. It



should however be noted that local speed restrictions imposed on the line in the vicinity of the crossings may well extend the waiting times and efforts should be made to reduce these to a minimum.

It is also recommended that should coal trains be required to travel from the Ulan line towards Wallerawang / Mt Piper on a regular basis then the 'Y' link at Gulgong be completed. Without this facility the shunting movements in the Gulgong area will cause significant delays to local traffic.

7.1 Existing Conditions and Operation

7.1.1 Introduction

The line from Muswellbrook to Ulan is connected to the west beyond Ulan at Gulgong. Gulgong is a junction where the line is connected to the west of the state through Dubbo and to Sydney via Mudgee, Kandos and Wallerawang / Mt Piper

Note: There are currently no trains operating between Gulgong and Mudgee.

Information from a previous study completed by SKM in October 2005 on the condition of track and infrastructure on the rail line between Gulgong and Kandos has been used in this report. Additional information was gathered during site visits carried out in February 2006.

The track condition and operating restrictions can be determined by:

- The classification of lines as listed in **Table 7-1**;
- The track condition indices from the track recording car;
- The speed restrictions in force; and
- The allowable loads and speeds as listed in the TOC manual for that section of line.

7.1.2 Classification of Lines

The current allowable operating and infrastructure restrictions for various class of track is contained within the ARTC TOC manual as shown below in **Table 7-1**.



■ **Table 7-1 Allowable Train Operation**

Track Class*	Axle Load** (tonnes)	Maximum Wagon Speed (Freight)** (km/h)
1XC	25 ^(note 1)	80
1C	25	80
1	25	80
2	21	80
3	19	70

* The track class shown in **Table 7-1** refers to the ARTC Engineering Standard TDS 11: Standard Classification of Lines.

** The definitive speed and axle load conditions for all rolling stock on any given line (which may be higher than the nominal maximums indicated above) is given in the Train Operating Conditions Manual or Working Timetable.

Note 1: 30 tonne axle loads where approved.

7.1.3 Track Condition Indices

The TCI is a measurement of the track geometry. The TCI measures individual geometry parameters such as twist and gauge, and collates these into a track index. The higher the number (in general) the more the track is deteriorating. The track class indices (maintenance) shown below in **Table 7-2** are the allowable maintenance levels.

■ **Table 7-2 Track Indices**

Track Classification	TCI Tangent	TCI Curve
Class 1XC	35	38
Class 1	43	47
Class 2	47	52
Class 3	52	58

The latest track recording car runs were undertaken in October 2003. However due to technology changes the latest recording indices may not be comparable with the numbers shown in **Table 7-2**. Investigating the issue we resolved that the recording run of April 2002 would give a good indication and the numbers are on the same basis as **Table 7-2**.

Table 7-3 indicates the track condition. The maintenance target TCI is from Rail Infrastructure Corporation guidelines. Care should be used in comparison as each index that goes to make up the overall TCI has to be examined for exceedance levels. The numbers in **Table 7-3** coupled with the amount of speed restrictions suggest that the Gulgong to Kandos section requires some work to bring the line up to its track classification.



■ **Table 7-3 Track Indices 2002 Comparison**

Track Section - Class	TCI Maintenance Target	TCI April 2002 All Track
Class 1XC Ulan - Gulgong	38	28 (2001)
Class 1 Wallerawang / Mt Piper - Kandos	45	53
Class2 Kandos - Mudgee	48	57
Class 3 Mudgee - Gulgong	54	55

7.1.4 Speed Restrictions

In September 2005, prior to the track closure the two sections Gulgong –Mudgee- Kandos had a blanket 20 kph speed restriction in force. It is understood this blanket restriction was mainly for expediency for the Track Maintenance Manager managing the number of speed restrictions, speed boards, the inspection frequency and the low frequency and type of trains using the line. An earlier speed restriction list for August 2005 shows:

- Wallerawang / Mt Piper to Kandos had 2 speed restrictions totalling 0.61 kilometres, 0.5 kilometres due to track condition and 0.11 kilometres due to poor sight distance at a level crossing at Kandos (note: this appears to have been removed); and
- Kandos to Gulgong had a blanket 40kph speed restriction due to track condition except at the two timber bridges at the Cudgegong River where the speed was reduced to 20 kph.

7.1.5 Existing Train Operation

The Existing Train Operation restrictions are as detailed in **Table 7-4** below. This is based on condition at September 2005.

■ **Table 7-4 Existing Train Operation**

From	To	Distance Km	Track Class	Axle Load	Maximum Wagon Speed
Muswellbrook	Ulan	146	1XC *	30	60
Ulan	Gulgong	26	1C *	30	60
Gulgong	Mudgee	33	3	19	35
Mudgee	Kandos	59	2	21	80
Kandos	Wallerawang / Mt Piper	77	1	25	80

Ulan Line

The Ulan Line from Muswellbrook to Ulan was opened in about 1982. The connection with the west of the state from Ulan to Gulgong was completed in the late 1980s. This track has no



constraints in regard to types of locomotives and rolling stock. 1.6 kilometre coal trains at 30 tonne axle load are permitted.

Gulgong Junction

The junction at Gulgong is designed to take trains from the west onto the Ulan Line. There is no direct Ulan to Mudgee connection without some form of shunting or a push pull train operation.

There is a proposal to increase the length of the crossing loop at Gulgong to cater for 1,500 metre long trains. There are no current plans to provide a direct Mudgee connection via a 'Y Link'.

Gulgong to Mudgee

There are no trains running in this section at present. The Australian Rail Track Corporation (ARTC) maintainers of the rail infrastructure on behalf of the Country Rail Infrastructure Corporation closed this section of track to all traffic on 21/09/05 due to the absence of trains and the inspection requirements.

This section is classified as Class 3 main line mainly due to the rail size and weight (80lb). The class 3 main line classification allows Classes A - E freight wagons at 35km/hr, hauled by locomotive classes S8 to S13. This would restrict the coal haulage options in the section to maximum 19 tonne axle load at 35km/hr.

The maximum weight locomotives allowed on this line section are the Pacific National 48 class locomotives or similar.

The ruling grade is 1:75 in the up direction.

Mudgee to Kandos

There are no trains running in this section at present. The Australian Rail Track Corporation (ARTC) maintainers of the rail infrastructure on behalf of the Country Rail Infrastructure Corporation also closed this section of track to all traffic on 21/09/05 due to the absence of trains and the inspection requirements.

This section is classified as Class 2 main line, it is of similar standard to the Gulgong - Mudgee section but has heavier rail (94lb). The Class 2 classification allows classes A-E freight wagons at 60 -100km/hr hauled by locomotive classes S3 to S13. This would restrict the coal haulage options in the section to maximum 21 tonne axle load at 70 km/hr reducing to 20 kph over the timber bridges in the section.

The maximum weight locomotives allowed on this line section are the Pacific National C class locomotives or similar, the Pacific National S5 rated 82 class locomotive is in this category.



The ruling grade in this section of 1:40 further restricts the available payload per locomotive.

Kandos to Wallerawang / Mt Piper

The Kandos to Wallerawang / Mt Piper section is classified as Class 1 main line which allows all but the heaviest locomotives and rolling stock. This section currently has coal trains ex Charbon and Baal Bone operating at 25tonne axle load.

The ruling grade is 1:40 to Baal Bone junction and 1:50 Baal Bone to Wallerawang / Mt Piper.

The current train consists are 45 long 100 tonne wagons hauled by 4/3000 HP (82 class) locomotives.

7.1.6 Potential Train Operation

Loaded coal working trains are generally restricted to a maximum of 60kph for Class G 120 tonne wagons and 80kph for Class E 100 tonne wagons unless the TOC manual indicates otherwise.

These restrictions have been factored into the calculations included in this report.

The Potential Train Operating Conditions for the Class of track, Type of loco and wagon on the lines in question are indicated in **Table 7-5** below.

■ **Table 7-5 Potential Train Operation (based on TOC manual)**

From	To	Track Class	Definitive Axle Load	Definitive Loco Speed	Definitive Wagon Speed	Definitive Wagon Speed
					Class E 100 tonne	Class G 120 tonne
Muswellbrook	Ulan	1XC	30	115	80	60
Ulan	Gulgong	1C	30	115	80	60
Gulgong	Mudgee	2	21	70	70	N/A ^(b)
Mudgee	Kandos	2	21	70 ^(a)	70	N/A ^(b)
Kandos	Wallerawang / Mt Piper	1	25	115	80	N/A ^(b)

(a) Currently maximum speed 20 km/h over bridges at 278.467km and 279.322km.

(b) Class G 120 tonne wagons have axle's loads of 30 tonnes and can only run on Class 1XC lines

The above table is based on the following factors:

- Re-classification of Gulgong – Mudgee to Class 2 minimum;
- Use of Class 82 PN Locomotives which have a speed category rating S5; and
- Continuance of permission for Class 82 (22 tonne axle load) to run over Class 2 lines.



It has been noted that to provide a direct link to the Wallerawang / Mt Piper line from the Ulan line the formation of a Y junction is required at Gulgong. This will allow trains to proceed from Ulan towards Wallerawang / Mt Piper without having to perform a shunt operation at Gulgong. Extensive delays could be caused at Gulgong level crossings by the existing layout during shunting operations.

The land required to be resumed for the 'Y' link is flat paddock a mixture of private and crown land and there is sufficient straight track on both the Ulan Line and the Mudgee Branch line to accommodate standard turnouts. It is proposed the 'Y' Link will be remote controlled from Broadmeadow.

7.1.7 Level Crossing Condition

The level crossings on the above lines were visually inspected on the 22nd and 23rd September 2005. The inspection was carried out utilising a Hi-Rail truck travelling from Gulgong towards Kandos. A further inspection of the public road level crossings was undertaken as part of this study in February 2006.

All crossings were over single bi-directional tracks.

The protection types for public vehicle crossings were generally passive Level 1A and 1B with a small number of Level 2. The highest active protection level encountered was Level 3A; this was mainly reserved for bitumen surfaced main road crossings.

Appendix B gives the detailed requirements for each level of protection.

The majority of the public road crossings surfaced with bitumen were fitted with automatic warning lights and bells. It was not possible to check the operation of the activation system but it was noted that recent maintenance works have been carried on the crossings. None of the crossings encountered were fitted with boom barriers.

The crossings encountered that had unsealed approach roads had various forms of protection from Give Way to Automatic Warning Lights and Bells.

The crossings are generally in fair condition although some minor surfacing repairs and road marking will be required. A number of the crossings have suffered damage to warning signs and posts with some completely missing. The exact locations are detailed within the site survey sheets.



7.2 Increased Coal Traffic Assessment

7.2.1 Ulan to Muswellbrook

7.2.1.1 Train Consist

The number of current train movements on the line is in the region of 20 per day this consists of 10 out full and 10 in empty. The mines involved are Ulan and Bengalla. It should be noted that Bengalla is situated 4km west of Muswellbrook and will therefore only effect one low use public level crossing. The most significant increase train movements will occur once Wilpinjong and Moolarben are both operational.

From information provided by Moolarben Coal Mine Pty Ltd for the Moolarben Mine it is understood that the train consist is likely to be 2 x 90 class locomotives coupled with 74 x 120 tonne wagons. This train will deliver approx 7104 tonnes of product and will measure 1276 metres in length although trains may reach 1500m. It is envisaged that four trains per day can accommodate the 10Mtpa haulage task. It must be noted that the actual number of train movements will be eight trains per day total to allow for the empty cycle.

Table 7-6 below indicates the number of loaded coal trains likely to use the Ulan to Muswellbrook line.

■ **Table 7-6 Train operation requirements. Ulan - Muswellbrook**

Mine	Train consist	Pay load / train (t)	Mtpa max	Trains / day	Length	Notes
Ulan	3 x 90/82 + 80 x 120	7680	10	3.567 (4)	1397	
Bengalla	3 x 82/90 + 80 x 120	7680	7	2.497 (3)	1397	
Wilpinjong	3 x 90 + 74 x 120	7104	10	5.013 (5)	1298	See assumptions below
Moolarben	3 x 90 + 74 x 120	7104	10	3.965 (4)	1298	
The above number of train movements will be twice the above to allow for the empty cycle						

Assumptions:

- Train operations would be conducted over an average of 355 days per year.
- Tonnages are maximum consented tonnages.
- Wilpinjong is proposing commences of deliveries in 2007 with 3Mtpa, increasing to 7Mtpa by 2011 then onto 13Mtpa.
- Train consist are assumed and may vary due to availability and handling capacities.



7.2.1.2 Traffic delays

The delay caused at a level crossing by a train is calculated by consideration of a number of factors. The first is the warning time required by road users prior to the arrival of a train at the crossing. The industry standard for single line railway lines using flashing lights and warning bells is 25 seconds. The second delay factor is the time taken for the train to traverse the crossing. This time is based on train length and speed. **Table 7-7** below gives figures for various scenarios. The third factor is a small allowance for the train once it clears the crossing to de-activation of the warning systems. For this exercise a nominal 3 seconds have been used.

On the basis that loaded coal working trains are restricted to 60kph for Class G 120 tonne wagons likely to be used and an estimated train length of 1276 metres the average delay at each crossing will be approx 105 seconds. Although there are no definitive rules as regards acceptable delay times it is generally felt that delays up to 180 seconds are acceptable. This calculation is based on the section line speed and does not include for local permanent or temporary speed restrictions. It should be noted that empty coal trains are permitted to run at higher speeds and will thus cause less delays.

■ Table 7-7 Level Crossing Waiting Times

Level Crossing - Waiting Time (single track, lights and bells type)					
Warning time (secs)	Consist length (m)	Train Speed (kph)	Train Passing Time (secs)	Time out (secs)	Total Delay (secs)
25	1,000	60	60.00	3	88.00
	1,250		75.00		103.00
	1,500		90.00		118.00
	1,000	80	45.00		73.00
	1,250		56.25		84.25
	1,500		67.50		95.50

7.2.2 Ulan to Wallerawang / Mt Piper

7.2.2.1 Train Consist

The number of current train movements on the line is in the region of 12 per day this consists of 6 out full and 6 in empty. The mines involved are Baal Bone, Charbon and Clarence.

On the basis of the previous reports to achieve the goal of delivering 2Mtpa the recommended consist was 4 x 82 class locomotives coupled with 51 x 100 tonne wagons short loaded to 84 tonne gross weight giving a 21 tonne axle load and could be used from Gulgong to Wallerawang/Mt Piper. This consist uses the minimum number of wagons to haul the greatest possible load. This



train will deliver 3070 tonnes of product and will measure 943 metres in length. For the purposes of this report it is assumed that 2 trains per day could accommodate up to 2mtpa. It must be noted that the actual number of train movements will be 4 trains per day total to allow for the empty cycle.

Table 7-8 below indicates the number of loaded coal trains likely to use the Ulan to Wallerawang / Mt Piper line.

■ **Table 7-8 Train operation requirements. Ulan - Wallerawang / Mt Piper**

Mine	Train consist	Pay load / train (t)	Mtpa max	Trains / day	Length	Notes
Baal Bone	4 x 82 + 45 x 100	3429	3	2.465 (3)	843	
Charbon	4 x 82 + 45 x 100	3429	1.2	0.986 (1)	843	
Clarence	4 x 82 + 45 x 100	3429	2.25	1.848 (2)	843	
Moolarben	4 x 82 + 51 x 100	3070	2	1.974 (2)	943	
The above number of train movements will be twice the above to allow for the empty cycle						

Assumptions:

- Train operations would be conducted over an average of 355 days per year.
- Tonnages are maximum consented tonnages.
- Train consist are assumed and may vary due to availability and handling capacities.

7.2.2.2 Traffic delays

The delay factors detailed previously (see **Section 7.2.1.2**) apply in the same format for this section of line.

On the basis that coal working trains are restricted to 80kph for the Class E 100 tonne wagons likely to be used and an estimated train length of 943 metres the average delay at each crossing will be approx 73 seconds. Although there are no definitive rules as regards acceptable delay times it is generally felt delays of up to 180 seconds are acceptable. As above this calculation is based on the section line speed and does not include for local permanent or temporary speed restrictions.

7.2.3 Crossing Protection and Operation

The basic standards for the operation of level crossings are dictated by a number of level crossing standards. The following are extracts from the ARTC Standards for Level Crossings contained within XDS 01 - (RIC Standard: TS 27 000 1 01 SP) Issue 1 Rev 2 dated March 05, XDS 02 - (RIC Standard: TS 27 000 3 01 SP) Issue 1 Rev 2 dated March 05 and XDS 03 - (RIC Standard: TS 27



000 3 02 SP) Issue 1 Rev 1 dated March 05. The contents of the RTA Traffic Engineering Manual Section 6 Railway Level Crossings 1994 (Draft Edition) were also considered.

- The principal considerations when identifying type and level of protection relevant to a particular crossing are sighting, type and frequency of user, approach speed and surfacing. The type or weight of the rail traffic over is not considered.
 - The minimum requirement for passive control of Public and Private Level Crossings is a “Give Way” sign.
 - Due to the high percentage of trucks on public roads these vehicles are used to set the minimum acceptable sight distance requirements when assessing passive control measures. The standard categorises sight distances for passive control as either standard or base condition.
 - Where there is a risk of stock entering the rail corridor at public level crossings cattle stops are to be provided.
 - Sighting distance assessment of public level crossings requires the collection of data such as road traffic mix, road vehicle approach speed, rail vehicle approach speed. The crossings should be assessed for the maximum permissible line speed. A copy of the sighting distance assessment flow chart is included in **Appendix C** for information.
 - Sighting distance assessment for public road crossings are based on level sealed surfaces.
- The protection arrangements currently in place for the crossings encountered appear to be in accordance with industry standards and require no additional works.

7.2.4 Crossing Condition / Maintenance

Various forms of bitumen, concrete, steel plate and gravel road surfaces where encountered all were within reasonable maintenance standards. The surface of the approach roads up to the crossings were also within acceptable limits. It should be noted that continuance of maintenance will be required to prevent degradation of the crossing conditions.

As regards other elements of the crossings they were also found to be in fair condition although some minor surfacing repairs and white lining will be required. A number of the crossings have suffered damage to warning signs and posts with some completely missing. It should be noted that continuance of ARTC or Council maintenance will be required to prevent degradation of crossing conditions.

7.3 Conclusions

The physical condition of the crossings inspected as part of this study appeared to be within ARTC maintenance standards. It must be noted however that continuance of the ARTC maintenance regime must be ensured to prevent degradation of condition.



With regards to the protection arrangements for crossings this again is dictated by the volume and speed of both road and rail traffic combined with sighting distances. The additional volume of rail traffic generated by the new mine is considered to be minor and as such the existing protection arrangements are adequate and will remain as such even taking into consideration the likely increase in coal haulage by rail.

In terms of potential delays likely to be caused by the increase in the number of trains on the Ulan – Muswellbrook line it is judged that the additional 8 trains per day will not cause significant delays to motorists although increased disruption will occur once other mines (i.e. Wilpinjong) become fully productive.

As regards the Ulan to Wallerawang/Mt Piper line the number of coal trains running on the operational section between Kandos and Wallerawang/Mt Piper is very low. The relevant mines are Charbon, Ball Bone and Clarence. The increase from 12 train movements to 14 is very unlikely to cause any major delays to road users.

When considering the calculated level crossing waiting times for both lines these are within the industry accepted tolerances. The general rule for active level crossings is that a delay of up to 180 seconds is acceptable. The worst case scenario anticipated as part of this study was 118 seconds. It should however be noted that local speed restrictions imposed on the line in the vicinity of the crossings may well extend the waiting times and efforts should be made to reduce these to a minimum.

It is also recommended that should coal trains be required to travel from the Ulan line towards Wallerawang/Mt Piper on a regular basis then the 'Y' link at Gulgong be completed. Without this facility the shunting movements in the Gulgong area will cause significant delays to road registered traffic.



8. Conclusions

This report has examined the traffic implications of the proposed Moolarben Coal Project. The report has discussed the proposed access arrangements, likely traffic generation, potential road safety issues and the railway crossings that would be crossed by trains going to and from the mine site.

Two vehicle access points are proposed for the mine site: off MR214 north of the Gulgong-Sandy Hollow railway (which was approved as an access point in 1985); and off the Ulan-Wollar Road, which would be re-aligned as part of the project.

The volume of traffic that would be generated by the operation and construction of the mine site would not significantly impact on traffic flow in the area, and the nominal capacity of the roads to Mudgee and Gulgong would not be exceeded.

A road safety audit was undertaken of MR214 between Mudgee and the mine site, and of MR598 between Gulgong and Ulan. A number of potential safety issues were identified. Of particular concern is the lack of delineation of the road, especially at night, and the standard of the road pavement edges. The addressing of these issues would greatly improve safety for mine employees travelling to and from work.

The railway level crossings between the mine site and both Musswellbrook and Wallerawang / Mt Piper are in reasonable condition, and the delays that would be experienced by motorists at these crossings would not be significant.



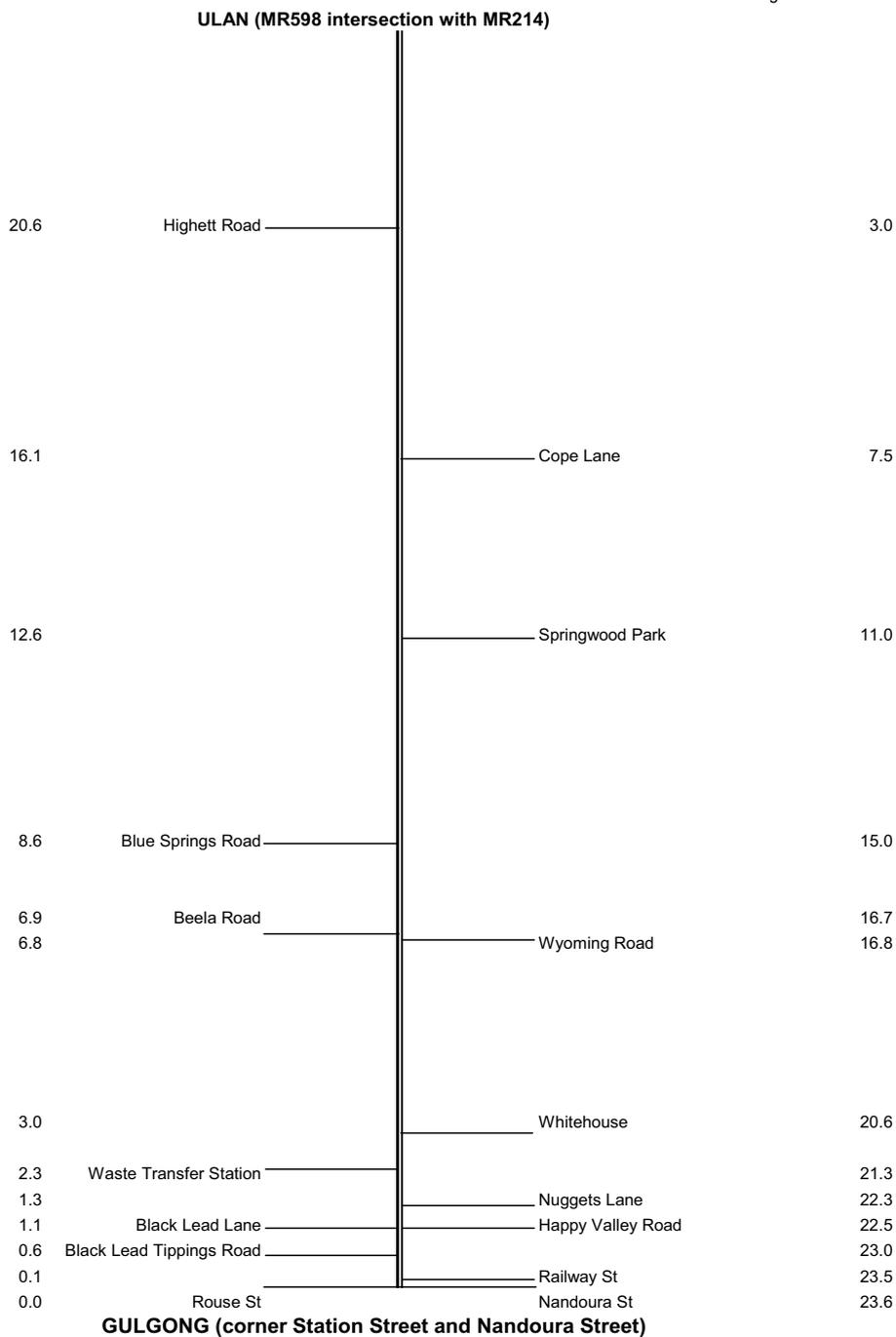
Appendix A Road Safety Audit Findings and Recommendations

MR598: Gulgong - Ulan Road

Chainage Eastbound

Chainage Westbound

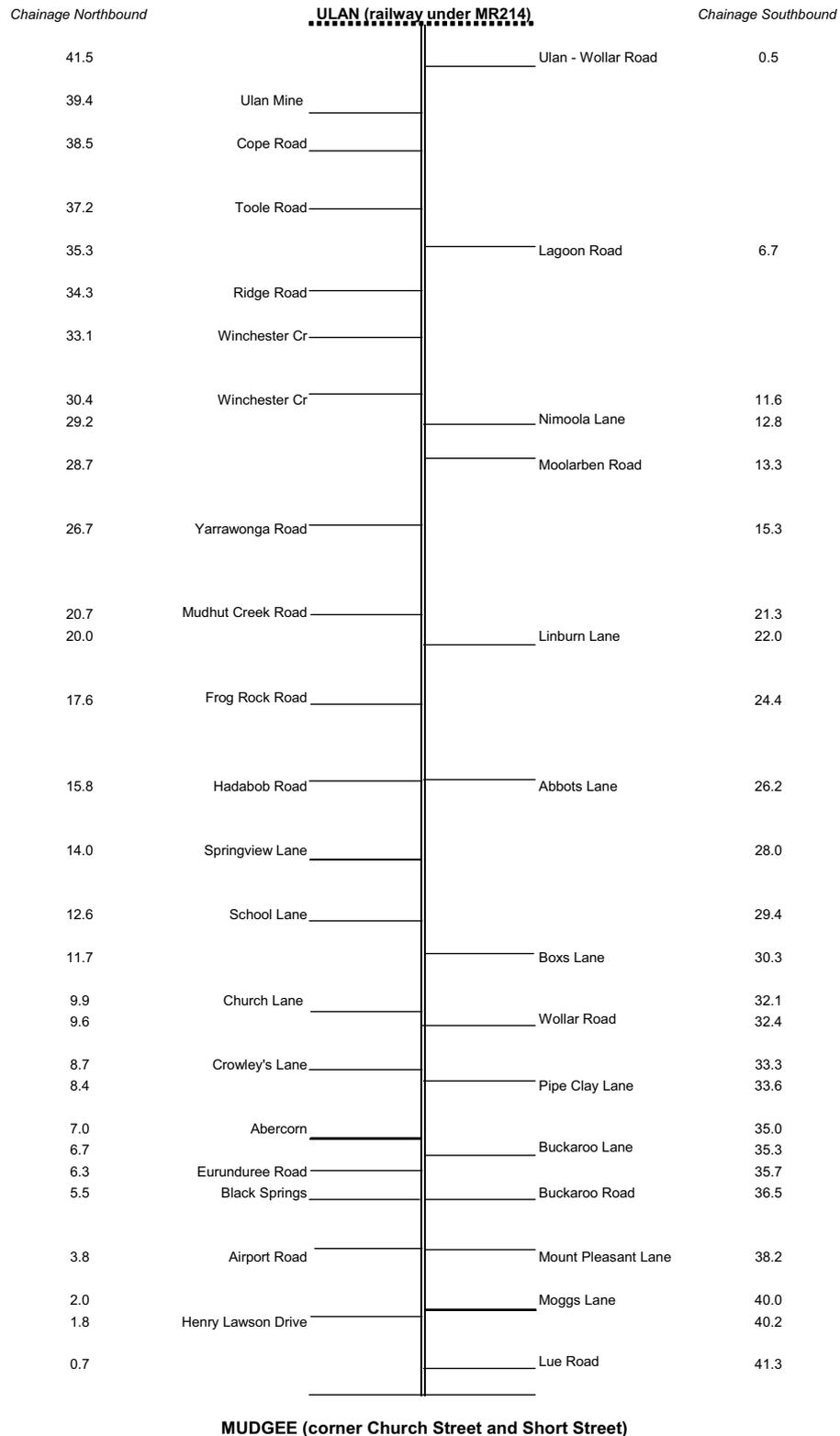
EAST





MR214: Mudgee - Ulan Road

NORTH



MUDGEE (corner Church Street and Short Street)

MR598: Gulgong – Ulan Eastbound

MR598: GULGONG – ULAN ROAD

Direction: EASTBOUND

Distance from Gulgong (km)	Description	Photograph	Recommendation
0.4	Trees obstructing view up the railway line at the level crossing.		Remove trees to improve sight distance.
2.2	Although there is a warning sign on the approaches to the causeway, motorists may be unprepared for the sharp dip in the road surface.		Install "Dip" warning sign (Type W5-9)

MR598: GULGONG – ULAN ROAD Direction: EASTBOUND			
Distance from Gulgong (km)	Description	Photograph	Recommendation
3.2	Cracked edges		Repair
3.6	No warning of the extent of the curve, with sight distance obstructed by trees.		Install chevron alignment markers (Type D4-6) on outside of bend.

MR598: GULGONG – ULAN ROAD Direction: EASTBOUND			
Distance from Gulgong (km)	Description	Photograph	Recommendation
9.1	Poor delineation of curve at night.		Install additional guideposts along outside of curve.
9.2	Guidepost has been knocked over.		Replace guidepost

MR598: GULGONG – ULAN ROAD Direction: EASTBOUND			
Distance from Gulgong (km)	Description	Photograph	Recommendation
11.2	There is a steep drop on both sides of the road over Deadmans Creek.		Install safety barriers on both sides of the road.
22.8	The chevron signs in place (Type D4-1-1) are non-standard for this use. The chevron signs stop before curve is complete.		Install standard chevron alignment markers (Type D4-6) in place of existing signs, and continue around curve.
22.9	There is some confusion when making out the right-hand curve due to the road joining from the left.		Supplement the guideposts with chevron alignment markers (type D4-6).

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MR598: Ulan – Gulgong Westbound

MR598: GULGONG – ULAN ROAD

Direction: WESTBOUND

Distance from Ulan (km)	Description	Photograph	Recommendation
0.5	The school crossing outside Ulan Public School has non-standard pavement markings.		Standardise pavement markings (see AS1742, 10 and RTA Technical Direction 92/43)
9.7	There is a steep drop on both sides of the road over Deadmans Creek.		Install safety barriers on both sides of the road.

MR598: GULGONG – ULAN ROAD Direction: WESTBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
12.8	There is a steep drop from the road to the creek.		Install safety barriers across the creek.
14.5	Cracked edges.		Repair edges.

MR598: GULGONG – ULAN ROAD Direction: WESTBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
14.5	Section of narrow carriageway. The westbound lane is only 2.5m wide (eastbound is 3.0m wide).		Widen carriageway to at least 6.0m.
14.7	Cracked edges. Section of narrow carriageway, where the westbound lane is only 2.7m wide (eastbound is 3.0m wide).		Repair edges. Widen carriageway to at least 6.0m.
21.3	No warning of intersection ahead for road to Waste Transfer Station		Install a warning sign on approach to the intersection (Type W2-4).

MR598: GULGONG – ULAN ROAD Direction: WESTBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
23.5	<p>Although there are a set of railway tracks across Station Street west of the main line (running from the flour mill) they are no longer in use and the tracks do not continue on one side of the road. The existence of a railway crossing warning sign beyond the main line may mislead drivers into thinking that the main line is further west.</p>		<p>Remove signpost (and railway tracks).</p>

MR214: Mudgee – Ulan Northbound

MR214: MUDGEE – ULAN ROAD

Direction: NORTHBOUND

Distance from Mudgee (km)	Description	Photograph	Recommendation
0.3	Unprotected culvert just beyond the end of a safety barrier. A vehicle hitting the safety barrier may be directed into the culvert.		Extend safety barrier across culvert.
1.1	Horse warning sign obscured by tree		Prune vegetation to reveal sign.

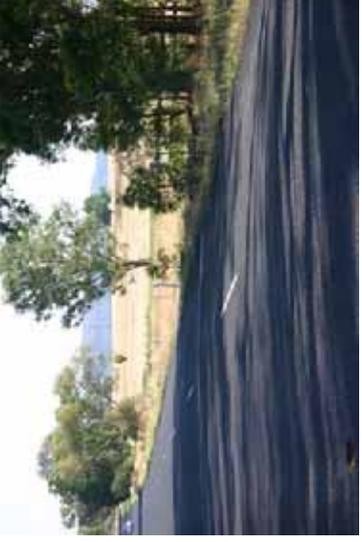
MR214: MUDGEES – ULAN ROAD Direction: NORTHBOUND			
Distance from Mudgee (km)	Description	Photograph	Recommendation
1.7	Conflicting lane markings - painted island and temporary reflective markers show different alignments (although the temporary markers are no longer reflective).		Remove temporary markers
3.0	Damaged pavement surface		Repair

MR214: MUDGEE – ULAN ROAD Direction: NORTHBOUND			
Distance from Mudgee (km)	Description	Photograph	Recommendation
3.1	Faded centreline markings		Re-mark centre line
6.4	Non-standard lettering has been used on the "200m on right" part of this sign.		Use standard lettering on sign.

MR214: MUDGEES – ULAN ROAD Direction: NORTHBOUND			
Distance from Mudgee (km)	Description	Photograph	Recommendation
6.5	The Trucks turning sign (Type W5-22) is obscured by the tree.		Prune tree to reveal sign.
7.8	The connection between the safety barrier and bridge presents a snagging hazard.		Realign safety barrier to remove potential for a vehicle to snag on the barrier.

MR214: MUDGEES – ULAN ROAD Direction: NORTHBOUND			
Distance from Mudgee (km)	Description	Photograph	Recommendation
8.7	Poor delineation of the bend at night. Pavement edge cracking.		Install guide posts along bend. Repair pavement edges.
13.4 and 13.6	Fallen guidepost and tall grass obscuring the culvert.		Replace guidepost. Mow grass to make hazard more visible.

MR214: MUDGEES – ULAN ROAD Direction: NORTHBOUND			
Distance from Mudgee (km)	Description	Photograph	Recommendation
14	Steep drop adjacent to intersection which may be a hazard if a vehicle fails to make the left turn.		Seal first 10m of Spring View Road to reduce possibility of loss of traction when turning.
17.2	Pavement edges cracked		Repair edge surface
19.8	Pavement has subsided and cracked at road edge.		Repair edge surface

MR214: MUDGEES – ULAN ROAD Direction: NORTHBOUND			
Distance from Mudgee (km)	Description	Photograph	Recommendation
20.6	<p>The bend in the road at Mud Hut Creek Rd is on a crest, and is not obvious, particularly at night.</p> <p>A guidepost has been knocked over just south of the intersection.</p>		<p>Install chevron marker on far side of intersection.</p> <p>Relocate fallen guidepost further south to avoid being hit again.</p>
22.3	<p>Although this exposed culvert is on a long straight stretch of road, it is a convenient over-taking opportunity and overtaking vehicles may lose control when passing at speed.</p>		<p>Install safety barriers on either side of driveway</p>

MR214: MUDGEES – ULAN ROAD Direction: NORTHBOUND			
Distance from Mudgee (km)	Description	Photograph	Recommendation
26.2	Northbound lane is wider than southbound lane – total of 4m from pavement edge to centreline on NB lane and 3 m lane width on SB lane.		Widen southbound lane to a similar width as the northbound lane. OR Relocate centre line to more evenly divide the road, taking care to totally remove any obsolete pavement markings.
26.4	There is a steep drop and many tree hazards on both sides of the road.		Improve delineation by installing guideposts. Provide advance warning by installing D4-3 type width marking signs.

MR214: MUDGEES – ULAN ROAD Direction: NORTHBOUND			
Distance from Mudgee (km)	Description	Photograph	Recommendation
			
26.7 to 28.1	<p>NOT AUDITED DUE TO ONGOING ROADWORKS</p>		
28.6	<p>Signs at the Moolarben Road intersection are faded and non reflective, and may lead to vehicles slowing or stopping unnecessarily to read them.</p>		<p>Replace signs.</p>

MR214: MUDGEES – ULAN ROAD Direction: NORTHBOUND			
Distance from Mudgee (km)	Description	Photograph	Recommendation
34.5	Cracked edges.		Repair edge surface.
36.9	Damaged surface.		Repair surface.

MR214: Ulan – Mudgee Southbound

MR214: MUDGEE – ULAN ROAD

Direction: SOUTHBOUND

Distance from Ulan (km)	Description	Photograph	Recommendation
0.1	There is poor night-time delineation of the curve between the railway bridge and the Ulan-Wollar Road.		Install chevron alignment markers (Type D4-6).
5.1	Damaged edges.		Repair edges.

MR214: MUDGEES – ULAN ROAD Direction: SOUTHBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
7.7	Cracked edges along SB lane.		Repair edges.
7.8	Pot hole.		Repair pavement.

MR214: MUDGEES – ULAN ROAD Direction: SOUTHBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
11.1	Steep drop off beside the SB pavement.		Install guideposts along the road edge.
11.3	'Intersection ahead' sign board missing from post on approach to Nimoola Lane.		Replace sign (type W2-4).
11.6	Damaged edges.		Repair
13.3 to 14.9	NOT AUDITED DUE TO ONGOING ROAD CONSTRUCTION		

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MR214: MUDGEES – ULAN ROAD Direction: SOUTHBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
15.3	There is a steep drop and many tree hazards on both sides of the road.		Improve delineation by installing guideposts. Provide advance warning by installing D4-3 type width marking signs.
17.5	The Road Narrows sign (Type W4-3) has been knocked over.		Replace sign and post.

MR214: MUDGEES – ULAN ROAD Direction: SOUTHBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
19. 7	Cracked surface along middle of road		Repair pavement surface
			

MR214: MUDGEES – ULAN ROAD Direction: SOUTHBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
26.0	Road sign obscured by vegetation		Prune vegetation.
34.1	The connection between the safety barrier and bridge presents a snagging hazard.		Realign safety barrier to remove potential for a vehicle to snag on the barrier.

MR214: MUDGEES – ULAN ROAD Direction: SOUTHBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
35.1	Non-standard lettering has been used on the "200m on right" part of this sign.		Use standard lettering on sign.
36.2	Intersection approach sign (Type W2-4) obscured by tree.		Prune tree.

MR214: MUDGEES – ULAN ROAD Direction: SOUTHBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
38.9	Faded centreline alongside airport.		Repaint centreline.
40.7 to 40.9	No centre line marked where the road narrows through an avenue of trees.		Mark centreline.

MR214: MUDGEES – ULAN ROAD Direction: SOUTHBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
41.5	No protection for deep culvert		Extend safety barrier back from bridge to protect from culvert.
41.7	No separator of pedestrians and vehicles on approach to the bridge.		Install safety barrier to separate pedestrians from vehicles.

MR214: MUDGEES – ULAN ROAD Direction: SOUTHBOUND			
Distance from Ulan (km)	Description	Photograph	Recommendation
42	Markings on the roundabout at Church Street / Short Street are wearing away.		Repair signage at the roundabout.



Appendix B Protection Levels for Level Crossings

Protection Levels in accordance with ARTC XDS 01 (RIC TS 27 000 1 01 SP) Issue 1 Revision 2 (Mar 05)

Public and Private Vehicle Crossings

Level 1A

Control: Passive

Protection: Give Way Signs

Category: Minimum Treatment

This is the minimum treatment to be adopted at road Level Crossings.

Level 1 B

Control: Passive

Protection: Give Way Signs + Approach Warning Signs

Category: Standard Treatment

This is the treatment to be adopted at road Level Crossings when Level 1A is inadequate and a higher level of protection is not warranted.

Level 2

Control: Passive

Protection: Stop Signs

This is the treatment to be adopted at road Level Crossings when there are inadequate sight distances for Level 1 control and active control Level 3 or 4 is not warranted. Vehicles are required to stop. This is the minimum treatment to be adopted at Service Level Crossings, where it is to be used in conjunction with an "Authorised Vehicles Only" sign.

Level 3A

Control: Active

Protection: Flashing Lights + Bells

This is the minimum treatment to be adopted at road Public Level Crossings when passive protection is inadequate.

Level 3B

Control: Active

Protection: Flashing Lights + Bells + Boom Barriers

This is the treatment to be adopted at road Public Level Crossings when Level 3A protection is inadequate. Installation of half-boom barriers in conjunction with flashing lights and bells should particularly be considered at Level Crossings that pass over more than one track.

Level 3C

Control: Active

Protection: Special Warning Lights

This configuration is not approved for Public Level Crossings. It only applies to Private Level Crossings and each installation is subject to approval by ARTC's General Manager ISP or nominated representative.

Level 4

Control: Active

Protection: Level Crossing Gates

These are gates across the railway line that are manually opened for the passage of each train.

Level 5A

Control: Active

Protection: Manual Control

The Level Crossing is manually controlled by a handsignaller with a hand held STOP banner (R6-7 or R6-8) or red flag (e. g. at a Level Crossing with inoperative flashing lights or gates).

Level 5B

Control: Active

Protection: Special Control

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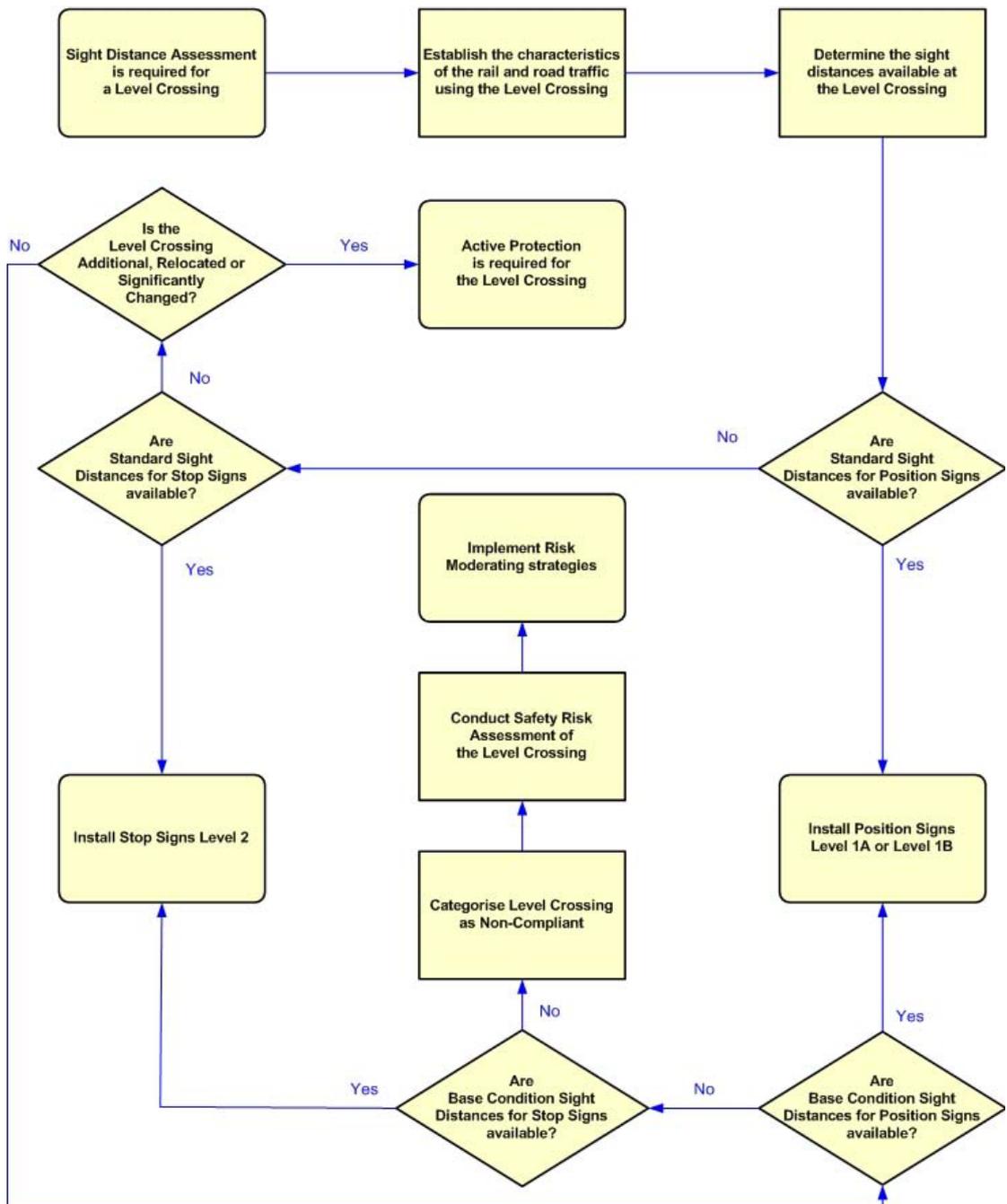
This configuration is not approved for Public or Private Level Crossings. This is a generic level that is applied to Service Level Crossings when Level 2 protection is inadequate. It can include, but is not limited to:

- Temporary speed restrictions
- Signals
- Access to train running information at the crossing
- Direct communication with trains
- Worksite protection



Appendix C Sighting Distance Assessment Flow Chart

Sight Distance Assessment Flow Chart For Public and Private Road Crossings





Appendix D Survey Reports

Muswellbrook to Gulgong

Line Muswellbrook to Gulgong

Crossing Name Wybong Lane Crossing **Km's from Sydney** 291.271

Road Name **Location** Muswellbrook

Approach Surfacing Gravel

Crossing Surfacing Steel Plate

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Farm Vehicles

Usage Low – Medium

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down End



Down Side Approach



Up End



Up Side Approach

Notes

Lightly used access to private properties and Wybong Lane gravel road
“Look for Trains’ sign missing on the Wybong Lane side of the crossing

Line Muswellbrook to Gulgong

Crossing Name Public **Km's from Sydney** 306.491

Road Name **Location**

Approach Surfacing Tarmac

Crossing Surfacing Steel Plate

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles

Usage Low – Medium

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down End



Down Side Approach



Up End



Up Side Approach

Notes

Fairly low use crossing with excellent sighting in all directions
“Look For Trains’ sign missing on Denman side

Line Muswellbrook to Gulgong

Crossing Name Bell's Lane Crossing **Km's from Sydney** 308.744

Road Name **Location**

Approach Surfacing Tarmac

Crossing Surfacing Steel Plate

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles

Usage Medium

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Road runs parallel to railway and turns 90° to cross. Sighting of trains on Downside approach over right hand shoulder is restricted. Other approaches have excellent sighting

Line Muswellbrook to Gulgong

Crossing Name Denman Road Crossing **Km's from Sydney** 310.639

Road Name **Location**

Approach Surfacing Tarmac

Crossing Surfacing Steel Plate

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles

Usage Low – Medium

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down End



Down Side Approach



Up End



Up Side Approach

Notes

Light use village road with excellent sighting on all approaches

Line Muswellbrook to Gulgong

Crossing Name Merriwa Road Crossing **Km's from Sydney** 312.258

Road Name **Location** Marrapana (Denman)

Approach Surfacing Tarmac

Crossing Surfacing Pre Cast Concrete Units in 4 foot

Protection Type Active – Lights and Bells

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles – Main Road

Usage High

Road Speed 80 - 100 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Well maintained crossing with excellent sighting

Line Muswellbrook to Gulgong

Crossing Name Kenilworth Street Crossing **Km's from Sydney** 313.461

Road Name **Location** Denman

Approach Surfacing Gravel

Crossing Surfacing Steel Plate

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Low

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good/Poor

Rail Sighting Up End Medium

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Access to private properties off village road

Line Muswellbrook to Gulgong

Crossing Name Ogilvie Street Crossing **Km's from Sydney** 314.446

Road Name **Location** Denman

Approach Surfacing Tarmac

Crossing Surfacing Steel Plate

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans

Usage Medium - High

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Medium/Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Access to community recreational area inc tennis courts etc.

Separate footpath crossing adjacent inc maze with precast concrete surface

Line Muswellbrook to Gulgong

Crossing Name Rosemount Rd Crossing **Km's from Sydney** 315.240

Road Name **Location** Denman

Approach Surfacing Tarmac

Crossing Surfacing Steel Plate

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles / Coaches

Usage Medium – High (seasonal)

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good/Medium

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Rosemount Estate road. Would be fairly well used at weekends and during holiday periods

Line Muswellbrook to Gulgong

Crossing Name Public **Km's from Sydney** 321.857

Road Name **Location** Rosemount

Approach Surfacing Gravel and Loose Tarmac

Crossing Surfacing Steel Plate

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Low

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Medium

Road Sighting Downside Poor

Rail Sighting Up End Poor

Road Sighting Upside Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

Access to private properties and a small a small vineyard

Line Muswellbrook to Gulgong

Crossing Name Public **Km's from Sydney** 323.389

Road Name **Location** Rosemount

Approach Surfacing Tarmac

Crossing Surfacing Steel Plate

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles

Usage Low – Medium

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Medium

Road Sighting Downside Good

Rail Sighting Up End Medium

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Access to small airstrip and vineyard area
Need stop lines painting

Line Muswellbrook to Gulgong

Crossing Name Public **Km's from Sydney** 325.000

Road Name **Location** Rosemount

Approach Surfacing Gravel over concrete

Crossing Surfacing Gravel over concrete

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Low – Medium

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

This might be a private crossing used by the public.
Gates on both sides but not used.

Line Muswellbrook to Gulgong

Crossing Name Rylstone Road Crossing **Km's from Sydney** 331.252

Road Name **Location** Sandy Hollow

Approach Surfacing Tarmac

Crossing Surfacing Pre Cast Concrete Units

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Coaches

Usage Medium

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Fairly well used xing crossing on the road from Sandy Hollow to Bylong. Access to vineyards and popular picnic area.

Line Muswellbrook to Gulgong

Crossing Name Sandy Hollow (Sth End) **Km's from Sydney** 331.927

Road Name **Location** Sandy Hollow

Approach Surfacing Tarmac

Crossing Surfacing Steel Plate

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Low

Road Speed 60 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Stop signs missing on Sandy Hollow side

Line Muswellbrook to Gulgong

Crossing Name Sandy Hollow (Nth End) **Km's from Sydney** 332.654

Road Name **Location** Sandy Hollow

Approach Surfacing Tarmac

Crossing Surfacing Pre Cast Concrete Units

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Farm Vehicles

Usage Low

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Low use crossing providing access to private homes and a few small farms

Line Muswellbrook to Gulgong

Crossing Name Main Road No 208 **Km's from Sydney** 388.050

Road Name **Location** Bylong

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Passive Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles

Usage Medium

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Good/Poor

Road Sighting Downside Poor/Medium

Rail Sighting Up End Good

Road Sighting Upside Good/Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

Stop lines need repainting.

Fairly well used crossing on road over mountains.

Tarmac surfacing to crossing with dirt roads either side

Line Muswellbrook to Gulgong

Crossing Name Ulan Mines Road **Km's from Sydney** 437.948

Road Name **Location** Ulan

Approach Surfacing Tarmac

Crossing Surfacing Pre Cast Concrete Units

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks

Usage Medium - High

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Fairly well used crossing leading to open cut mines access road.
Stop lines need repainting

Line Muswellbrook to Gulgong

Crossing Name Ulan Road **Km's from Sydney** 438.832

Road Name **Location** Ulan

Approach Surfacing Tarmac

Crossing Surfacing Pre Cast Concrete Units

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles

Usage Medium - High

Road Speed 100 kph

Rail Speed 0 kph

Rail Sighting Down End Poor Medium Good

Road Sighting Downside Good

Rail Sighting Up End Poor Medium Good

Road Sighting Upside Good/Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

Well used and maintained crossing mainly general road and mines traffic.
Stop lines and centre line markings need repainting

Line Muswellbrook to Gulgong

Crossing Name Springwood Park Road **Km's from Sydney** 448.373

Road Name **Location**

Approach Surfacing Gravel

Crossing Surfacing Pre Cast Concrete Units

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Medium

Road Speed 60 kph

Rail Speed 0 kph

Rail Sighting Down End Medium

Road Sighting Downside Poor

Rail Sighting Up End Medium

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Well used crossing on providing access to private residential properties and State forest recreational areas

Line Muswellbrook to Gulgong
 Crossing Name Broadfield Road Crossing Km's from Sydney 456.562
 Road Name Location Gulgong

Approach Surfacing Gravel

Crossing Surfacing Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Low – Medium

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good/Medium

Rail Sighting Up End Medium

Road Sighting Upside Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

Fairly well used gravel road providing access to private residential properties

Line Muswellbrook to Gulgong

Crossing Name Whitehouse Road **Km's from Sydney** 457.862

Road Name **Location** Gulgong

Approach Surfacing Dirt

Crossing Surfacing Steel Plate

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Medium

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Medium

Road Sighting Upside Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

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Line	Muswellbrook to Gulgong		
Crossing Name	Unknown	Km's from Sydney	459.425
Road Name	Spring Valley Road	Location	Gulgong

Approach Surfacing Tarmac

Crossing Surfacing Pre Cast Concrete Units

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles

Usage Medium

Road Speed 100 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Well used crossing on straight road with fast road traffic. Excellent sighting from all approaches.

Wallerawang to Gulgong

Line Wallerawang to Gulgong
 Crossing Name Portland Road Km's from Sydney 172.302
 Road Name Location Wallerawang

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks

Usage Medium

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Poor

Road Sighting Downside Poor

Rail Sighting Up End Poor

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Pedestrian crossing adjacent with very poor tarmac surface and inadequate signage

Line Wallerawang to Gulgong

Crossing Name Unknown(Pipers Flat ?) **Km's from Sydney** 179.900

Road Name **Location** Pipers Flat

Approach Surfacing Gravel

Crossing Surfacing Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Farm Vehicles

Usage Low

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Poor

Road Sighting Downside Medium

Rail Sighting Up End Medium

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

This crossing could be a relocated crossing which was previously at 179.120 which could not be located.

This is an ungated access to farm lands and a recreational area although it appears to be infrequently used

Line	Wallerawang to Gulgong		
Crossing Name	Portland Crossing	Km's from Sydney	181.474
Road Name	Williwa Street	Location	Portland

Approach Surfacing Tarmac

Crossing Surfacing Cast in situ Concrete

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans

Usage Medium

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Poor

Road Sighting Downside Poor/Medium

Rail Sighting Up End Good

Road Sighting Upside Medium/Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Mostly residential traffic.
Centreline and stop line road markings missing

Line Wallerawang to Gulgong
 Crossing Name Cullen Bullen Km's from Sydney 188.233
 Road Name Location Cullen Bullen

Approach Surfacing Tarmac
 Crossing Surfacing Cast in situ concrete
 Protection Type Active
 Signage Stop on Red
 Type of Road Traffic Cars / Vans / Trucks
 Usage Medium
 Road Speed 35 kph
 Rail Speed 0 kph
 Rail Sighting Down End Medium
 Road Sighting Downside Poor
 Rail Sighting Up End Medium
 Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Clearly marked crossing on main road Wallerawang to Mudgee
 Stop lines non existent or very poor

Line Wallerawang to Gulgong

Crossing Name Capertree Road Km's from Sydney 195.300

Road Name Location

Approach Surfacing Gravel

Crossing Surfacing Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Farm Vehicles

Usage Medium

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Very Poor

Road Sighting Downside Very Poor

Rail Sighting Up End Very Poor

Road Sighting Upside Very Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Public gravel road access to private properties and farm land.
Gates on approaches. Only one gate used on the farm side
Deep cuttings on rail approaches severely restricts sighting

Line Wallerawang to Gulgong

Crossing Name Mudgee Road Crossing **Km's from Sydney** 198.171

Road Name **Location** Ben Bullen

Approach Surfacing Tarmac

Crossing Surfacing Cast in situ concrete

Protection Type Passive Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks

Usage High

Road Speed 50 kph

Rail Speed 100 kph

Rail Sighting Down End Good

Road Sighting Downside Medium

Rail Sighting Up End Good

Road Sighting Upside Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

Busy main road with sharp bends on both road approaches.

No stop lines

Delays may be caused by long trains during peak times but line speed reduces impact.

Line Wallerawang to Gulgong

Crossing Name Clandulla **Km's from Sydney** 239.700

Road Name Flat Lands Road **Location** Clandulla

Approach Surfacing Gravel

Crossing Surfacing Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars

Usage Low

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

This crossing may be on a private road as it appears to provide access to a private property only.

Line Wallerawang to Gulgong

Crossing Name Public **Km's from Sydney** 241.250

Road Name Cooper Drive **Location** Candulla

Approach Surfacing Tarmac

Crossing Surfacing Cast in situ concrete

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Medium

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Poor

Road Sighting Downside Poor

Rail Sighting Up End Medium

Road Sighting Upside Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

Used mostly by local residential traffic

Line Wallerawang to Gulgong

Crossing Name Rylstone Road **Km's from Sydney** 242.100

Road Name **Location** Clandulla

Approach Surfacing Tarmac

Crossing Surfacing Cast in situ concrete

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Low – Medium

Road Speed 30 kph

Rail Speed 0 kph

Rail Sighting Down End Medium/Poor

Road Sighting Downside Poor

Rail Sighting Up End Poor

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Low usage village crossing providing access to private residential properties

Line Wallerawang to Gulgong
 Crossing Name Angus Avenue Km's from Sydney 249.425
 Road Name Location Kandos

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks

Usage Very High

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Poor

Road Sighting Downside Poor

Rail Sighting Up End Very Poor

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Very busy town centre crossing with side road on both approaches.
 Longer trains may cause delays during peak times eg School pickup/drop offs.
 This will be exacerbated by low line speed for rail traffic.

Line Wallerawang to Gulgong

Crossing Name Narango road **Km's from Sydney** 256.268

Road Name **Location** Rylstone

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Medium - High

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Fairly busy crossing with good sighting on all approaches

Line Wallerawang to Gulgong

Crossing Name Mudgee Street **Km's from Sydney** 257.535

Road Name **Location** Rylstone

Approach Surfacing Gravel

Crossing Surfacing Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Bicycles

Usage Medium

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Poor

Road Sighting Downside Medium

Rail Sighting Up End Medium

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Cycleway access to picnic areas and vehicle access to a private residential property

Line Wallerawang to Gulgong

Crossing Name Bylong Road **Km's from Sydney** 257.837

Road Name **Location** Rylstone

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Farm Vehicles

Usage Medium - High

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Very Poor

Road Sighting Downside Medium/Poor

Rail Sighting Up End Good

Road Sighting Upside Medium/Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Quite well used crossing on main access to village.

Line	Wallerawang to Gulgong		
Crossing Name	Public	Km's from Sydney	262.125
Road Name	Widles Lane	Location	Kandos

Approach Surfacing	Gravel
Crossing Surfacing	Gravel
Protection Type	Passive
Signage	Stop – Look For Trains
Type of Road Traffic	Cars / Vans / Farm Vehicles
Usage	Medium
Road Speed	20 kph
Rail Speed	0 kph
Rail Sighting Down End	Good
Road Sighting Downside	Medium
Rail Sighting Up End	Good
Road Sighting Upside	Medium



Down



Down Side Approach



Up

Notes

Good quality gravel road access to private properties and also a through rd. Well used

Line Wallerawang to Gulgong
 Crossing Name Public Km's from Sydney 270.600
 Road Name Tongbong Road Location Lue

Approach Surfacing Gravel

Crossing Surfacing Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Low

Road Speed 25 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Poor

Rail Sighting Up End Good

Road Sighting Upside Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

Low use public gravel road. Crossing has a gate on one side but it is not used

Line Wallerawang to Gulgong

Crossing Name Public Km's from Sydney 276.235

Road Name Location Lue

Approach Surfacing Dirt

Crossing Surfacing Gravel

Protection Type Passive Active

Signage Stop – Look For Trains

Type of Road Traffic Farm Vehicles / Occasional car

Usage Low

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Poor/Medium

Rail Sighting Up End Poor

Road Sighting Upside Poor/Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

Crossing mostly for farm vehicles. Very low usage with poor condition approach roads

Line Wallerawang to Gulgong

Crossing Name Cox Street **Km's from Sydney** 280.800

Road Name **Location** Lue

Approach Surfacing Gravel

Crossing Surfacing Dirt / Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars

Usage Medium

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Poor

Rail Sighting Up End Poor

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Access to cemetery, private residential properties and Bara Lue Road

Line Wallerawang to Gulgong
 Crossing Name Lue Km's from Sydney 284.750
 Road Name Mudgee Road Location Lue

Approach Surfacing Tarmac
 Crossing Surfacing Tarmac
 Protection Type Passive
 Signage Stop – Look For Trains
 Type of Road Traffic Cars / Vans / Trucks
 Usage Medium
 Road Speed 60 kph
 Rail Speed 0 kph
 Rail Sighting Down End Poor
 Road Sighting Downside Poor
 Rail Sighting Up End Good
 Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Fairly busy crossing on main road

Line Wallerawang to Gulgong

Crossing Name Rocky Waterhole Road **Km's from Sydney** 301.853

Road Name **Location** Mount Frome

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Buses

Usage Medium - High

Road Speed 60 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Well used access road leading to Deer Park farm.

Line Wallerawang to Gulgong

Crossing Name Sydney road **Km's from Sydney** 306.982

Road Name **Location** Mudgee

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks

Usage Very High

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Medium

Road Sighting Downside Medium

Rail Sighting Up End Medium

Road Sighting Upside Medium



Down



Down Side Approach



Up



Up Side Approach

Notes

Very busy town crossing with high speed road traffic

Line Wallerawang to Gulgong

Crossing Name Douro Street **Km's from Sydney** 308.697

Road Name **Location** Mudgee

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks

Usage High

Road Speed 60 kph

Rail Speed 0 kph

Rail Sighting Down End Poor

Road Sighting Downside Poor

Rail Sighting Up End Medium

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Separate footpath crossing adjacent inc weave, inadequate signage and gravel surface

Line Wallerawang to Gulgong

Crossing Name Fairy Dale Lane **Km's from Sydney** 310.945

Road Name **Location** Mudgee

Approach Surfacing Dirt

Crossing Surfacing Dirt

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Farm Vehicles

Usage Low/Medium

Road Speed 20 kph

Rail Speed 0 kph

Road Sighting Upside Medium

Road Sighting Downside Poor

Rail Sighting Up End Good/Medium

Rail Sighting Down End Good/Medium



Down



Down Side Approach



Aerial View



Up Side Approach

Notes

Good condition fairly well used dirt road crossing providing access to farmland

Line Wallerawang to Gulgong
 Crossing Name Wellington Road Km's from Sydney 312.796
 Road Name Location Mudgee

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks

Usage High

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Medium/Good

Road Sighting Downside Good

Rail Sighting Up End Good/Poor

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Very busy main road Mudgee to Wellington.
 May cause delays at peak times

Line Wallerawang to Gulgong
 Crossing Name Willbertree Road Km's from Sydney 317.762
 Road Name Location Munna, Mudgee

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Passive

Signage Give Way – Look For Trains

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles

Usage Medium

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Crossing signs on Wellington side are missing.
 Signs on Mudgee side have been damaged and need replacing.
 Crossing surfacing is in poor condition and need repairs

Line Wallerawang to Gulgong

Crossing Name Sills Lane **Km's from Sydney** 326.824

Road Name **Location** Homerule

Approach Surfacing Gravel/Dirt

Crossing Surfacing Gravel

Protection Type Passive Active

Signage Give Way – Look For Trains

Type of Road Traffic Farm Vehicles and 4x4 only

Usage Very Low

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Crossing appears to be unused. Access roads are suitable for farm vehicles and 4x4's only

Line Wallerawang to Gulgong

Crossing Name Homerule **Km's from Sydney** 329.810

Road Name **Location** Homerule

Approach Surfacing Gravel/Dirt

Crossing Surfacing Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Trucks

Usage Medium

Road Speed 40 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Fairly well used dirt road crossing

Line Wallerawang to Gulgong

Crossing Name Canadian road Km's from Sydney 330.740

Road Name Location Homerule

Approach Surfacing Gravel/Dirt

Crossing Surfacing Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Farm Vehicles

Usage Low

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Infrequently used crossing mostly cars and farm vehicles

Line	Wallerawang to Gulgong		
Crossing Name	Public	Km's from Sydney	337.000
Road Name	Wonga Lee Lane	Location	Gulgong

Approach Surfacing	Dirt
Crossing Surfacing	Gravel
Protection Type	Passive
Signage	Stop – Look For Trains
Type of Road Traffic	Farm Vehicles / 4x4 only
Usage	Very Low
Road Speed	< 20 kph
Rail Speed	0 kph
Rail Sighting Down End	Good/Poor
Road Sighting Downside	Poor/Good
Rail Sighting Up End	Good
Road Sighting Upside	Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Infrequently used crossing only suitable for farm vehicles and 4x4's

Line Wallerawang to Gulgong

Crossing Name Gulgong Road **Km's from Sydney** 339.308

Road Name **Location** Gulgong

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Trucks

Usage High

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Poor/Good

Road Sighting Downside Medium

Rail Sighting Up End Poor

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Trees obscuring sighting

Fairly busy main road into village

Line	Wallerawang to Gulgong		
Crossing Name	Station Street	Km's from Sydney	340.925
Road Name	Ulan Road	Location	Gulgong

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Active

Signage Stop on Red

Type of Road Traffic Cars / Vans / Trucks/ Farm Vehicles

Usage Medium - High

Road Speed 50 kph

Rail Speed 0 kph

Rail Sighting Down End Good/Poor

Road Sighting Downside Poor/Medium

Rail Sighting Up End Medium/Good

Road Sighting Upside Good/Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Quite well used crossing

Line	Wallerawang to Gulgong		
Crossing Name	Public	Km's from Sydney	341.520
Road Name	Tallawang Street	Location	Gulgong

Approach Surfacing Gravel/Dirt

Crossing Surfacing Gravel

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans

Usage Low

Road Speed 20 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Low use crossing providing access to private residential properties.

Line Wallerawang to Gulgong

Crossing Name Public **Km's from Sydney** 341.945

Road Name **Location** Gulgong

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Trucks

Usage Medium

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Good

Road Sighting Downside Good

Rail Sighting Up End Good

Road Sighting Upside Good



Down



Down Side Approach



Up



Up Side Approach

Notes

Fairly well used crossing

Line Wallerawang to Gulgong

Crossing Name Gulgong Road **Km's from Sydney** 342.480

Road Name **Location** Gulgong

Approach Surfacing Tarmac

Crossing Surfacing Tarmac

Protection Type Passive

Signage Stop – Look For Trains

Type of Road Traffic Cars / Vans / Trucks

Usage Medium

Road Speed 80 kph

Rail Speed 0 kph

Rail Sighting Down End Poor

Road Sighting Downside Poor

Rail Sighting Up End Poor

Road Sighting Upside Poor



Down



Down Side Approach



Up



Up Side Approach

Notes

Recommend upgrade to lights and bells.

Fairly busy road with very poor sighting on severe curve in railway