Appendix I

Traffic and Transport Assessment

CLIENTS | PEOPLE | PERFORMANCE

Australian Rail Track Corporation Report for Minimbah Third Track Environmental Assessment

Traffic and Transport

October 2008

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

Contents

Table Index

Figure Index

1. Introduction

1.1 Background

GHD has been commissioned by the Australian Rail Track Corporation (ARTC) to prepare the Environmental Assessment (EA) for the proposed Minimbah Third Track on the Main Northern Railway (the Project). The Project consists of the construction of a third track adjacent to the existing main line. The major elements of the Project include:

- Approximately 10.8 km of track and earthworks;
- Three (3) new rail under bridges;
- Grade separation of the Range Road level crossing;
- Replacement and realignment of the Golden Highway overbridge;
- Services relocation;
- Signalling works; and
- Property acquisition.

1.2 Purpose of Report

This Traffic Impact Assessment was prepared to address the following:

- The potential traffic impact of closure of a private level crossing at approximate chainage 231.180 km;
- The potential traffic impact of the replacement of the Range Road level crossing with an overbridge and the realignment of its intersection with the New England Highway; and
- The potential impacts of construction traffic on the existing road network traffic.

The report structure is set out as follows:

- Section 1 – Introduction;
- Section 2 – The Project Site;
- Section 3 -- Existing Traffic Conditions;
- Section 4 – Impact Assessment;
- Section 5 – Construction Impact Assessment; and
- Section 6 – Summary.

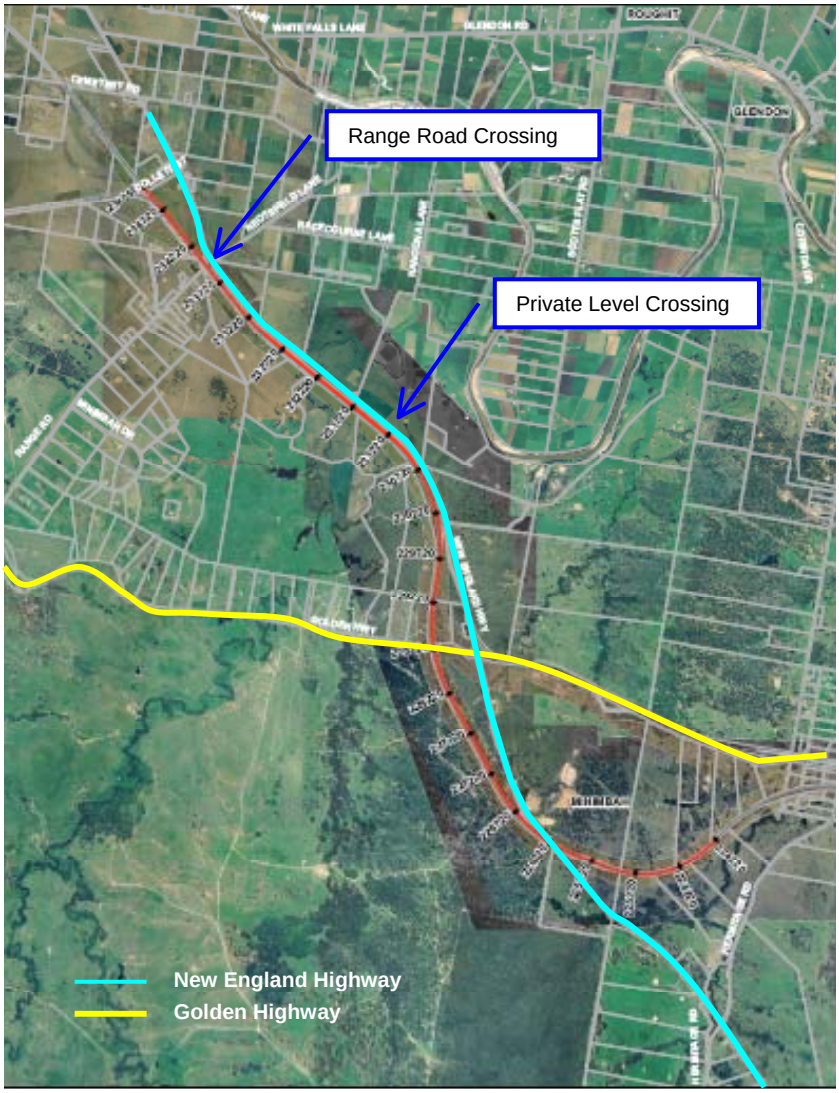
2. Project Site

2.1 Location of the Project

The Project is located within the Singleton Local Government Area (LGA) adjacent to the existing Main Northern Railway. It commences in an area known as Minimbah and continues north for approximately 10.8 km to an area known as Whittingham.

The New England Highway is located to the east of the Main Northern Railway, running parallel or in close proximity to the Project. This is shown in Figure 1.

Figure 1 Location



2.2 Land Use

The land uses adjoining the Project Site are predominantly rural, particularly grazing land, and associated rural residences.

3. Existing Traffic Conditions

3.1 Level Crossings

As part of the Project, it is anticipated that traffic arrangements at level crossings may alter either due to the proposed closure of the level crossing or due to requirements for access for vehicles during construction. Access connections to the affected level crossings on the existing rail alignment are assessed in terms of existing traffic and impact on intersection operations on the main road network.

3.1.1 Private Level Crossing

A private level crossing is located at approximate chainage 231.800 km and serves only one property. It is proposed that this level crossing be closed and the option for alternative access will be provided at the Golden Highway.

The unsealed road that connects to the property forms a T-junction with the New England Highway but no intersection control measures are in place.

Traffic from the private access road is very minimal to nil for most of the day.

3.1.2 Range Road Level Crossing

Range Road level crossing is at approximate chainage 234.00km. Range Road is a collector road that links the New England Highway to the Golden Highway and services the Singleton Military Areas and rural residential properties. The speed limit on Range Road in the vicinity of the level crossing is signposted at 100 km/h.

At the intersection with the New England Highway, traffic from Range Road is controlled via a 'Give Way' sign. The traffic volume on Range Road is around 950 vehicles per day. The proposal to upgrade the level crossing will affect existing traffic and consequently intersection operation at the junction with the New England Highway. Range Road / New England Highway intersection has also been identified as a primary access point for construction vehicles.

3.2 Intersections with the New England Highway

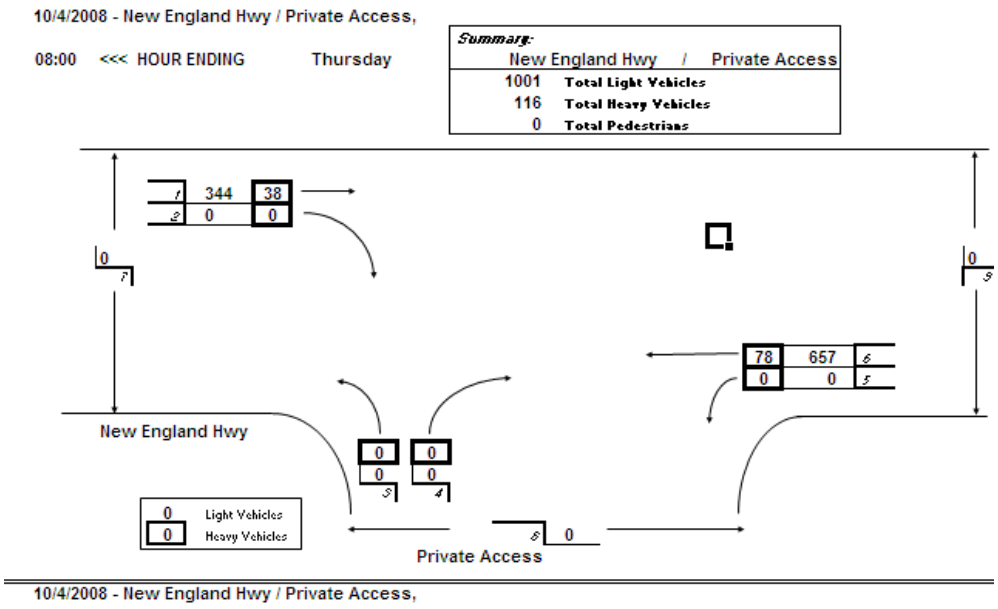
3.2.1 Existing Volumes – Private Access

Peak period turning movement count surveys were undertaken at the Private Access Road – New England Highway intersection on 9-10 April 2008 (Wednesday and Thursday) and were conducted between 6:00am and 10:00am covering the morning peak period, and between 17:00 to 19:00 covering the afternoon peak period. The results of the counts revealed that the morning peak hour was between 08:00 and 09:00, while the afternoon peak hour occurred between 16:30 and 17:30.

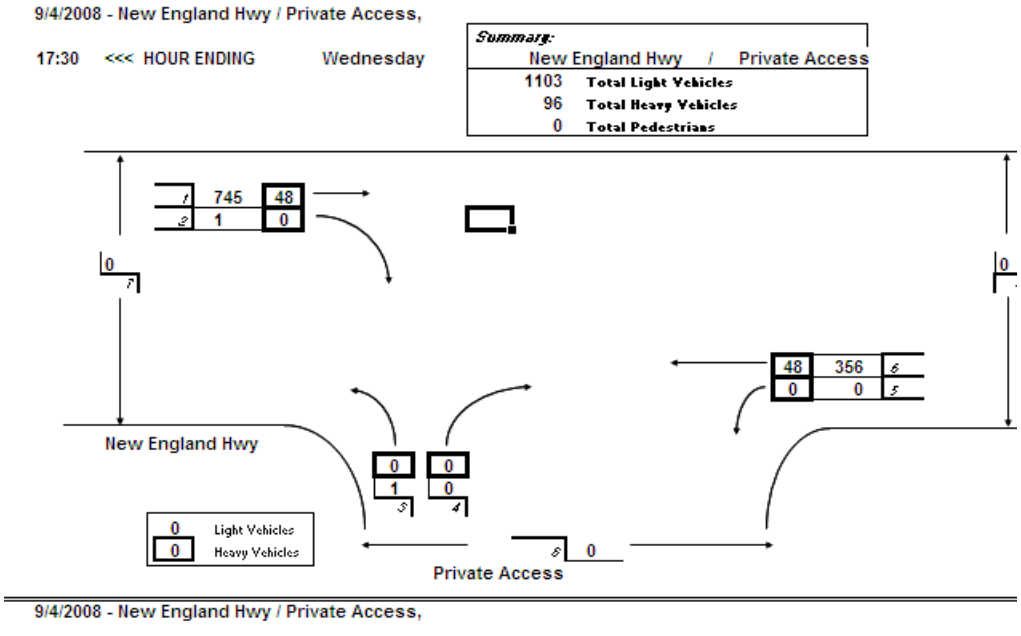
The volumes of the intersection vehicle flows during the morning and afternoon peak hours are shown in Figure 2.

Figure 2 Peak Hour Turning Volumes, Private Access Road – New England Highway Intersection

AM Peak



PM Peak



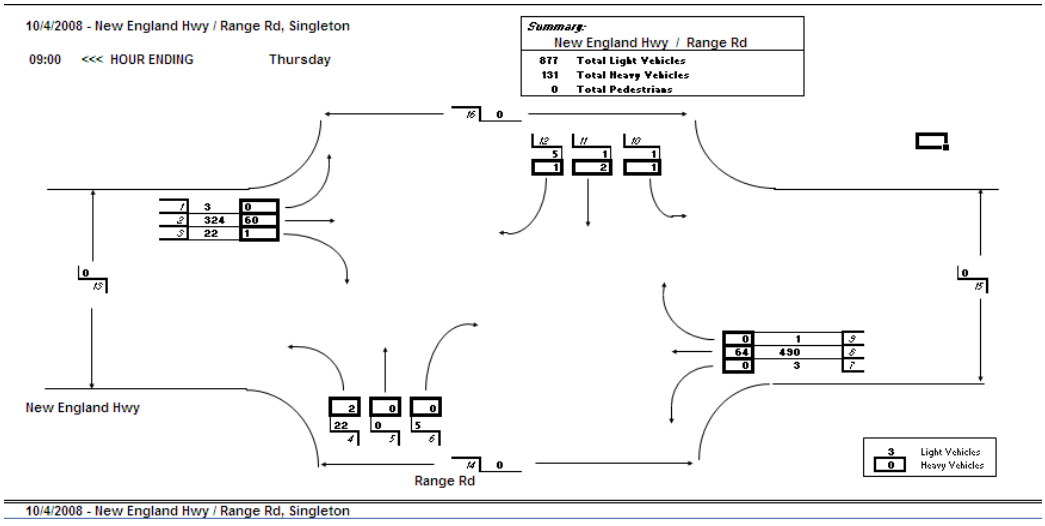
3.2.2 Existing Volumes – Range Road

Peak period turning movement count surveys were undertaken at Range Road – New England Highway intersection on 9-10 April 2008 (Wednesday and Thursday) and were conducted between 6:00am and 10:00am covering the morning peak period, and between 17:00 to 19:00 covering the afternoon peak period. The results of the counts revealed that the morning peak hour was between 08:00 and 09:00, while the afternoon peak hour occurred between 16:30 and 17:30.

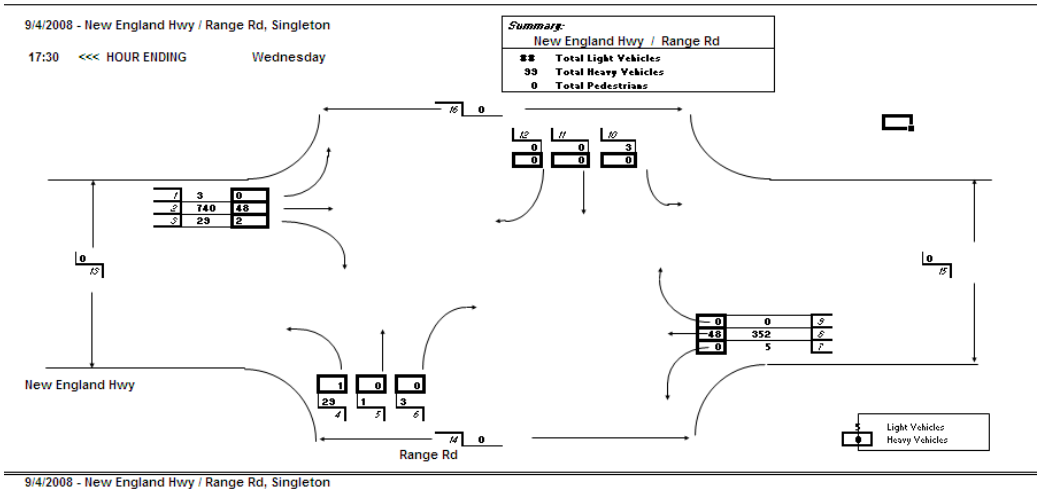
The volumes of the intersection vehicle flows during the morning and afternoon peak hours are shown in Figure 3.

Figure 3 Peak Hour Turning Volumes, Range Road – New England Highway Intersection

AM Peak



PM Peak



3.2.3 Existing Volumes – Cemetery Lane/Haggartys Lane

The Cemetery Lane/Haggartys Lane intersection with the New England Highway is not affected by the new works but will be partially utilised by construction vehicles as secondary access.

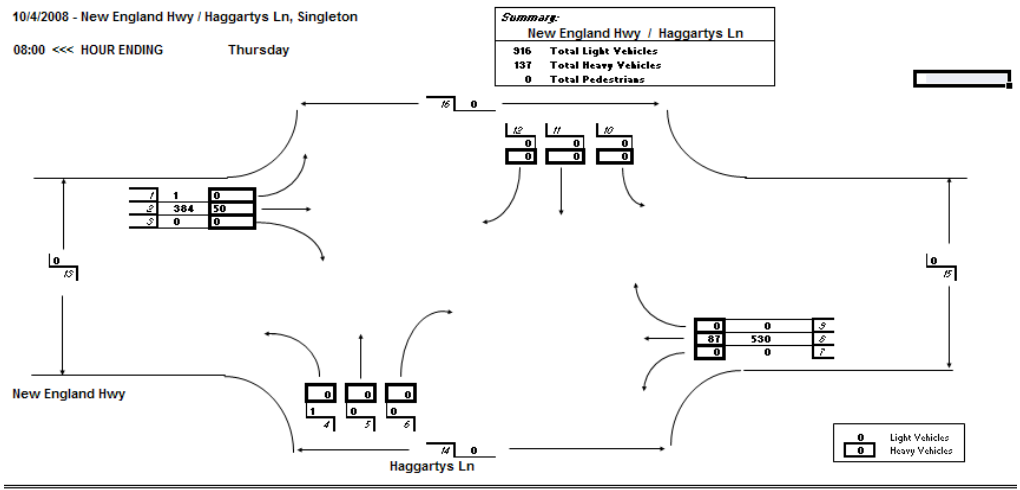
Cemetery Lane connects to the western end of Haggartys Lane and can be accessed from the New England Highway through Haggartys Lane. Cemetery Lane/Haggartys Lane is a narrow unsealed road used mainly for access to the cemetery located west of the intersection of Haggartys Lane with the New England Highway. The existing traffic volume along Haggartys Lane is minimal and control at the intersection with the New England Highway is via a 'Give Way' sign.

Peak period turning movement count surveys were undertaken at Cemetery Lane/Haggartys Lane – New England Highway intersection on 9-10 April 2008 (Wednesday and Thursday) and were conducted between 6:00am and 10:00am covering the morning peak period, and between 17:00 to 19:00 covering the afternoon peak period. The results of the counts revealed that the morning peak hour was between 08:00 and 09:00, while the afternoon peak hour occurred between 16:30 and 17:30.

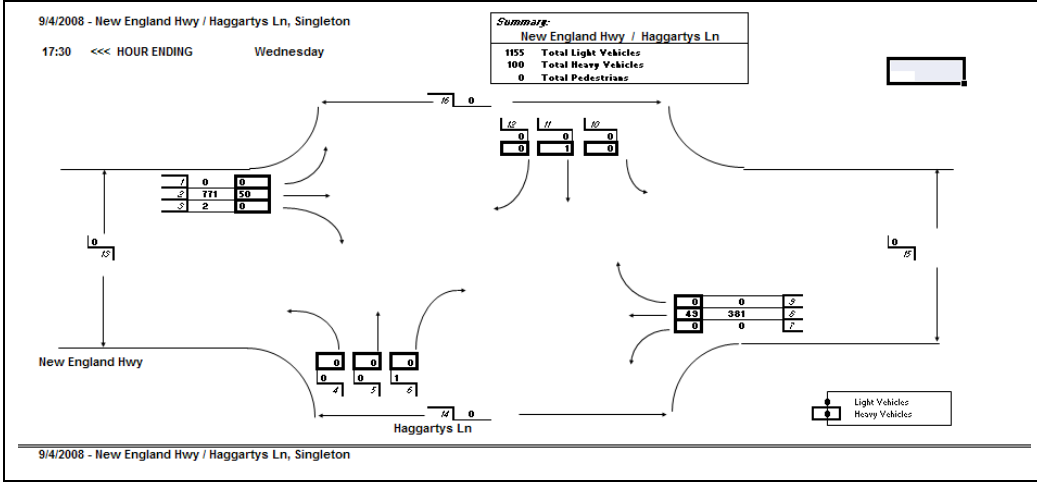
The volumes of the intersection vehicle flows during the morning and afternoon peak hours are shown in Figure 4.

Figure 4 Peak Hour Turning Volumes, Cemetery Lane/Hagerty's Lane – New England Highway Intersection

AM Peak



PM Peak



3.3 New England Highway

Table 1 provides an understanding of historical daily traffic volumes along the New England Highway in the vicinity north of Range Road intersection.

Table 1 Annual Average Daily Traffic (AADT) Volumes, Vehicles

Station	Location	1995[1]	1998[1]	2001[1]	2004[1]	2005[2]	2006[2]
05.003	New England Highway - north of Range Road intersection	10580	10674	11321	11934	12257	12906

Source: [1]Roads and Traffic Authority, Traffic Volumes Data for Hunter and Northern Regions (2004)

[2]Data provided by the RTA (2005-2006)

The above permanent counting station is located along the New England Highway. The observed traffic volumes indicated an increase in traffic volume over the years at an average rate of 1.8% per annum for the past 10 years and 2.7% per annum for the past 5 years. The highest annual increase was manifested in the year 2005 to 2006 where traffic grew by 5.3%.

3.4 Golden Highway

The RTA Permanent Counting Station 05.841 on the Golden Highway is located at Whittingham, just west of the intersection with the New England Highway.

Table 2 Annual Average Daily Traffic (AADT) Volumes, Axle Pairs

Station	Location	1995	1998	2001	2004
05.841	Golden Highway – Whittingham, west of new England Highway	3337	3333	3724	3637

Source: Roads and Traffic Authority, Traffic Volumes Data for Hunter and Northern Regions (2004)

The observed traffic volumes from 1995 to 2004 manifested an average increase of 1% per annum. The highest annual increase was observed during the period from 1998 to 2001 where traffic grew at 3.8% per annum but subsequently decreased by 0.8% per annum toward 2004.

4. Impact Assessment

4.1 Level of Service for Intersections

The 'Level of Service' (or LoS) is the standard used to measure the performance of the intersection operation. This is defined as the qualitative assessment of the quantitative effect of factors such as speed, traffic volume, geometric features, delays and freedom of movement. The level of service concept is applied to intersections through measures of effectiveness, as summarised in Table 3:

Table 3 Measures of Effectiveness for Level of Service Definition for Intersections

Intersection Control	Measure of Effectiveness
Sign or merge control	Average delay (sec/vehicle)
	Delay to critical movements
	Queue length for critical movements
Traffic signals	Average delay (sec/vehicle)
	Delay to critical movements
	Degree of saturation
	Cycle length
	Queue length for critical movements
Roundabout	Average delay (sec/vehicle)
	Delay to critical movements
	Degree of saturation
	Queue length for critical movements

The assessment of intersection operation is based on criteria outlined in Table 4 as defined by the NSW Roads and Traffic Authority (*Guide to Traffic Generating Developments*, RTA 2002).

The criteria in Table 4 are applied to assess operational performance of intersections. The intersections are analysed using the SIDRA Intersection analytical modelling software. SIDRA Intersection calculates the amount of delay experienced by vehicles using an intersection, and gives a Level of Service rating which indicates the relative performance of that intersection with regard to the average delay (in seconds per vehicle) experienced by vehicles at the intersection. The average delay reported for signalised intersections is taken over all movements, while for unsignalised intersections the average delay is reported for the worst movement only. None of the intersections being assessed in this study are signalised.

Table 4 Level of Service Criteria for Intersections (RTA NSW)

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control modes	At capacity, requires other control mode
F	> 70	Over Capacity Unstable operation	Over Capacity Unstable operation

4.2 Traffic Forecast for the New England Highway

Historical data for the RTA's permanent counting station along the New England Highway at Singleton indicated a traffic growth rate of 2.7% per annum for the five years from 2001 to 2006 but recorded a high growth rate of 5.3% for the year 2005 to 2006. For the purpose of this assessment, a 3% per annum growth factor is applied to forecast traffic on the New England Highway for the next 10 years.

The Private Access Road, Range Road and Cemetery Lane all form intersections with the New England Highway. The traffic counts conducted at these locations provide the peak hour count of traffic along the New England Highway. Using these counts, traffic forecasts for the New England Highway at these intersections were calculated. These forecasts are given in Table 5.

The intersections of Range Road and Cemetery Lane/Haggartys Lane with the New England Highway are assessed to determine the impact of the proposal to utilise these intersections as access points for construction vehicles.

Table 5 Traffic Forecast for New England Highway, AM and PM Peak Period

New England Highway	2008		2018	
	AM Peak	PM Peak	AM Peak	PM Peak
Adjacent to Range Road	965	1211	1297	1627
Adjacent to Cemetery Lane/Haggartys Lane	1051	1251	1412	1681

It is assumed that forecasts provided in Table 5 would be the future traffic volumes along the New England Highway at these intersections.

4.3 Closure of Private Level Crossing

The Project includes the closure of the existing private level crossing for Lot 2 DP 1113555. Options are currently being investigated as to the provision of alternative access for the said private property. One option being considered for an alternative access is providing access via the Golden Highway via adjacent properties to the south of the level crossing. The main issues associated with this alternate access are the potential to increase journey distance by 5 km for the private property owner and the need to create new access tracks as there is no adequate access currently present to the south of the level crossing towards the Golden Highway.

In terms of the potential impacts for a new access intersection with the Golden Highway, the traffic associated with the private property is very minimal and from the traffic surveys, nil during the peak periods. The AADT along the Golden Highway (RTA Permanent Counting Station 05.841 at Whittingham) was 3,637 axle pairs in 2004. Assuming an annual growth rate of 3% per annum would result in a forecast AADT of 5,501 axle pairs in year 2018. This gives an estimated volume of 220 vehicles per direction during the peak hour. Hence, it is expected that the level of service of the new access intersection would be satisfactory and there would be no adverse impact. The design of the intersection should consider, however, that sight distances are adequate to ensure safety of vehicles using the private access road at the intersection with the Golden Highway.

4.4 Range Road Crossing Upgrade

It is proposed that the existing Range Road level crossing be closed and replaced with a grade separated crossing to the north of the existing level crossing. A new alignment of Range Road would be required to link the existing alignment to the proposed bridge and then to the New England Highway. A design speed of 50 km/hr has been assumed for Range Road.

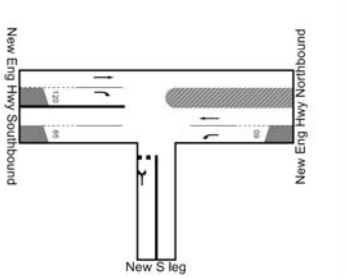
The new intersection of Range Road with the New England Highway would have the same arrangements as what is currently provided at the existing intersection for the approaches from the New England Highway and Range Road. The new intersection would be a T-junction.

Combining the forecast traffic volume on New England Highway and Range Road gives the future intersection volumes for the new intersection. The intersection was assessed for the AM and PM peak hour for 2018.

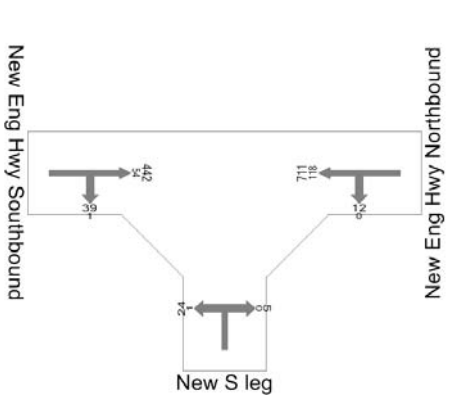
The intersection layout used in the modelling and the future turning volumes are shown in Figure 5.

Figure 5 Range Road / New England Highway Intersection Layout and Future Peak Traffic Volumes

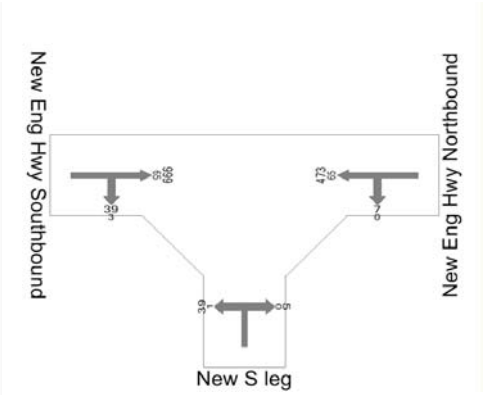
Intersection Layout



2018 AM Peak Hour Volumes



2018 PM Peak Hour Volumes



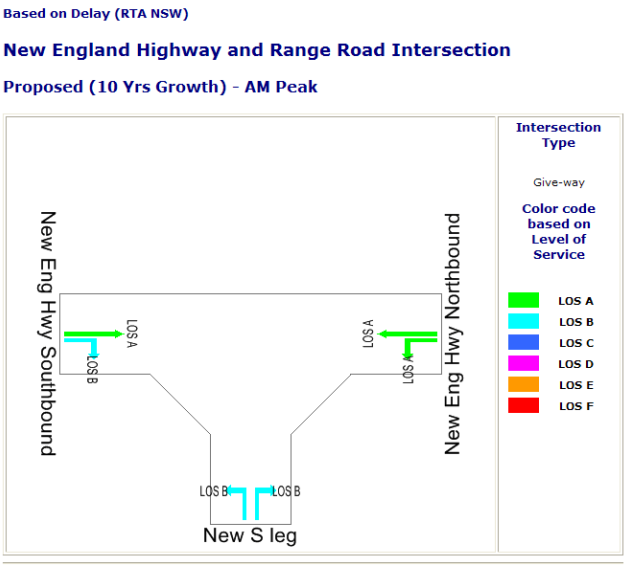
The results of the SIDRA analysis for the Range Road / New England Highway intersection are shown Table 6 and Figure 6.

Table 6 Intersection Analysis – 2018 Future Traffic

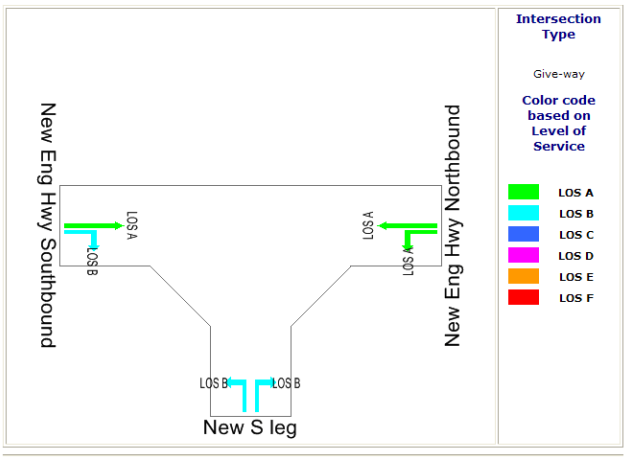
Intersection	AM Peak		PM Peak	
	LoS	Average Delay (Seconds)	LoS	Average Delay (Seconds)
Range Road / New England Highway	B	27.6	B	28.1

Figure 6 Range Road / New England Highway Intersection Operational Performance

2018 AM Peak



2018 PM Peak



The analysis above shows that the new intersection would be operating satisfactorily. A level of service "B" indicates that the delays are acceptable and that there is spare capacity.

4.5 Use of Cemetery Lane/Haggartys Lane as Secondary Access for Construction traffic

Based on the survey results, it can be seen that traffic volumes associated with the Cemetery are negligible to nil during the peak periods. It was observed that only one (1) vehicle used Cemetery Lane in the peak hour.

The Cemetery Lane/Haggartys Lane is referenced as a secondary access point for construction purposes. It is expected that traffic volumes along Cemetery Lane/Haggartys Lane would remain minimal. In the event that a considerable number of construction vehicles need to access the project via Cemetery Lane/Haggartys Lane, a temporary detour through the Army Camp Road can be considered as an alternate route for regular traffic.

5. Construction Traffic Impact

5.1 Construction Activity

It is anticipated that the construction activity would occur over a period of approximately 15 months. Assuming that construction commences in March 2009, it is expected that the project would be completed by the end of May 2010. Traffic volumes generated by the construction employees and by materials delivery would vary depending on the construction timetable.

The indicative timetable is as follows:

- Activity 1 – Site Establishment;
- Activity 2 – Major Earthworks – Section 1 – Cut;
- Activity 3 – Major Earthworks – Section 2 – Fill;
- Activity 4 – Major Earthworks – Section 3 – At Grade;
- Activity 5 – Construction of Down Side Maintenance Access Road;
- Activity 6 – Signalling;
- Activity 7 – Golden Highway Works;
- Activity 8 – Mudies Creek Bridge;
- Activity 9 – Range Road Works;
- Activity 10 – Major Culvert bridge; and
- Activity 11 – Commissioning and Completion.

However, the above methodology is subject to confirmation by the selected Contractor.

5.2 Construction Hours

Standard hours of construction for the duration of the construction program are anticipated to be between 6:30 am and 6:00 pm, seven days per week. However, it is anticipated that throughout the construction program, specific activities would need to be completed outside of these hours to allow for works to occur in track possession periods where trains are not operating. These periods are generally for a period of 36 - 60 hours. These activities may include, but are not limited to:

- Track possession works;
- Extended concrete pours;
- Excavation close to existing rail and road infrastructure;
- Piling of major structures; and
- Crane movements required for major structures.

5.3 Proposed Construction Access Routes

There are primary and secondary access points proposed for entry and exit to the construction site, as described below:

5.3.1 Primary Access

Two primary access points are proposed to serve as the main entry and exit points for site workers, plant, equipment and major material deliveries. The proposed primary access points are located adjacent to the Golden Highway and Range Road.

The Golden Highway access point would provide access to the rail corridor to both the Up and Down sides of the main line. This access would provide access to works south of the Golden Highway (approximate chainage 229.000 km – 224.000 km) and north of the Golden Highway (approximate chainage 229.000 km – 234.000 km). This location would provide access for major earthworks at the top of Minimbah Bank and for the construction of the proposed new Golden Highway overbridge and road realignment.

The Range Road access point would provide access to both the Up and Down sides of the existing line as well as access to works south of Range Road (approximate chainage 234.000 km – 229.000 km) and north of Range Road (approximate chainage 234.000 km – 235.500 km). This location would provide access for the construction of Range Road grade separation as well as major earthworks north of the Golden Highway.

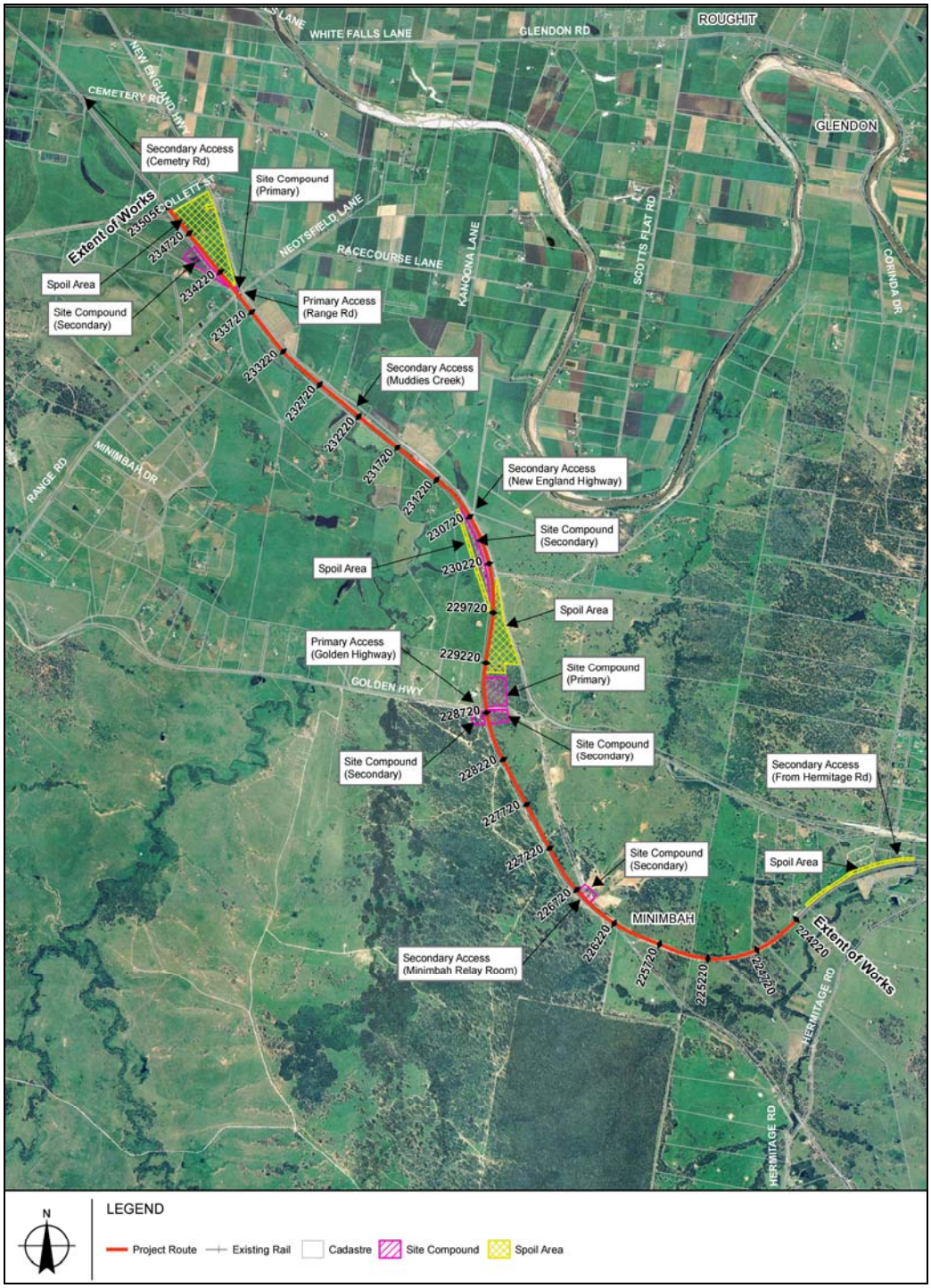
5.3.2 Secondary Access

Secondary access points are proposed to be used for access to localised works, material supply and emergency access/egress to the construction site and rail corridor. The nominated secondary access points for the construction site are as follows.

- Hermitage Road level crossing at Belford approximately 2 km south of the extent of Project works;
- Existing rail maintenance access points adjacent to the Minimbah Relay Room, with right of way access through one private property from the Golden Highway; and
- Existing maintenance access to the rail corridor off the New England Highway approximately 1.7 km west of the Golden Highway.

The proposed access points are shown in Figure 7.

Figure 7 Proposed Primary and Secondary Access Points for Construction Vehicles



5.4 Traffic Generation

The main traffic generated through the construction phase would be from equipment and material deliveries, such as:

- Construction materials;
- Construction equipment and machinery;
- Specific components for the tracks; and,
- Movement of construction personnel, including contractors, site labour force and specialist supervisory personnel.

It is assumed that very limited traffic would be generated from transport of construction waste for off-site disposal, as the objective would be to reuse material (material from the cut to be used for fill) on site as part of the construction.

Traffic generation from construction is estimated based on the construction activities discussed in Section 5.1. The estimated truck movements for each work component is provided in Table 7.

Table 7 Estimated Truck Movements per Work Component

Work component	Traffic Generation, Vehicle movements / Day
Site Establishment	5 trucks
Earthworks:	
◗ Cut; and	138 trucks
◗ Fill.	112 trucks
Civil Works:	
◗ Maintenance access road;	11 trucks
◗ Golden Highway;	3 trucks
◗ Mudies Creek;	1 trucks
◗ Range Road; and	3 trucks
◗ Major Culvert Bridge.	1 truck
Track Works	2 trucks
Commissioning	2 trucks

The distribution of the work over the estimated construction period of 15 months is shown in Table 8.

Table 8 Total number of Trucks per day by Construction Month

	Site Establishment	Earthworks	Civil Works	Track Works	Estimated No of Total Trucks per day
Month 1	5				5
Month 2	5	138			143
Month 3	5	250	3		258
Month 4		250	3		253
Month 5		250	3		253
Month 6		250	3		253
Month 7		250	14		264
Month 8		250	18	2	270
Month 9		250	19	2	271
Month 10		250	19	2	271
Month 11		250	18	2	270
Month 12		250	6	2	258
Month 13		250	3	2	255
Month 14		112	3	2	117
Month 15				2	2

It is expected that a minimum of 2 and a maximum of 271 heavy construction vehicles (heavy) would access the site on a daily basis. Over the full construction period, the peak construction workforce is estimated to be approximately 200 persons (on shift basis). Based on the characteristics of the Project route, it is assumed there would be a typical car driver rate of 100%. Application of this car driver rate to an assumed worse case scenario workforce yields a traffic generation in the order of 200 light vehicles a day.

Table 8 shows that the maximum daily truck generated from the construction would be during Months 9 and 10.

5.5 Impact on Access Points

Based on the worst-case scenario where the heavy vehicle traffic generation during the weekday is in the order of 271 trucks per day, comprising of 271 In and 271 Out. The proportion of these movements occurring during the AM and PM peak periods is conservatively estimated at approximately 25%, with a split between arrivals and departures of 50/50. Therefore, the worst-case scenario that truck movements occur during the AM and PM peak periods is thirty-four (34) vehicles per hour, comprising of 17 In and 17 Out. With two primary access points to the Project site, it is assumed that a 50/50 split can be managed, hence resulting in 9 In and 9 Out for each access point during the peak hour.

For light vehicles, it is likely that the arrival of workers will occur before the AM peak hour and depart before the PM peak hour. Therefore the proportion of these movements occurring during the AM and PM peak periods is conservatively estimated at approximately 20% with the total daily arrivals being 200 In and 200 out. Based on this assumption, the weekday peak period traffic generation is in the order of 40 additional vehicle trips per hour distributed to two access routes: 20 vehicles on the Golden Highway and 20 vehicles on the New England Highway. This additional volume is unlikely to impact on the existing road network operations, which is expected to have spare capacity beyond this additional volume.

In total, the anticipated increase in peak hour traffic at the access points in comparison with existing traffic levels is equivalent to roughly five percent (5%) at the New England Highway and roughly nine percent (9%) at the Golden Highway.

6. Conclusions and Recommendations

6.1 Conclusions

6.1.1 Construction Impact

It is anticipated that the main traffic impacts of the Project would occur for the local roads surrounding the site during the 15-month construction period of the Project. This is mainly due to the additional volume of traffic on the normally light trafficked local roads and the need to use specialized construction vehicles and over-size or over-mass vehicles.

A key part of the traffic assessment relates to the construction phase. The volume and intensity of truck movements would vary during the construction stage. The delivery of materials and equipment would spread over the 15-month construction period and the movement of these vehicles can be arranged to minimise impact on the local community, who would be kept informed of the progress of the construction works, potential impacts and safeguards incorporated.

Although it is assumed that majority of the truck movements would be confined within the boundary of the Project route, it is expected that truck movements would generally have to cross three public access roads to gain entry to the Project site. The key off-site traffic issues would mainly relate to:

- Use of the public roads for access to the site by heavy vehicles for delivery of materials, equipment and machinery;
- Ability of the local access roads to handle the volume of construction traffic particularly in regard to over-size and over-mass vehicles;
- Road safety; and
- Traffic management measures.

However, these issues can be addressed with the preparation of a Comprehensive Traffic Management Plan.

6.1.2 Operational Impact

Once the Project is operational, it is expected that there would be low levels of traffic accessing the Project site, including periodic visits by maintenance staff as required. During operation, maintenance activities would need to be undertaken. Minor maintenance works on associated infrastructure could also potentially be undertaken throughout the operations. Where safety requirements require the closure of the line to rail traffic, maintenance activities would be undertaken during scheduled track possessions that occur every three months.

The existing volumes of traffic using the level crossings are very minimal and are expected to increase marginally. The proposed closure of one private level crossing will affect one private property owner. The current option being considered as alternate access has potential spare capacity above the estimated traffic. Moreover, the replacement of the Range Road level crossing to an overpass will potentially provide sufficient spare capacity to cater to future traffic and diverted traffic.

6.2 Mitigation Measures

A number of mitigating measures can be identified to ensure that transport and traffic impacts arising from the construction and operation are minimised. These measures would be incorporated into a Traffic Management Plan for the Project and shall be developed in consultation with the RTA and Singleton Council's Traffic Management Committee(s).

An important mitigation measure relating to construction traffic impacts would be the implementation of a community information and awareness program. This awareness program should be initiated prior to construction commencing and during the construction period to ensure that the local residents are fully aware of the construction activities with particular regard to construction traffic accessing the site. Some of the initiatives that should be undertaken as part of the Traffic Management Plan would include:

- In consultation with the local authorities, general signposting of the access roads with appropriate heavy vehicle and construction warning signs;
- Installation of specific warning sign at entrances to the construction site to warn existing road users of entering and exiting traffic;
- Distribution of day warning notices to advice local road users of scheduled construction activities;
- Installation of appropriate traffic control and warning signs for areas identified where potential safety risk issues exist;
- The promotion of car pooling and other shared transport initiatives during the construction phase;
- Manage the transportation of construction materials to maximise vehicle loads to therefore minimise vehicle movements;
- Whenever practical vehicles associated with the construction works would use internal and haulage access roads instead of public roads; and
- Inducting truck and vehicle operators on the requirements of the Traffic Management Plan.

GHD

10 Bond Street Sydney NSW 2000

-

T: 2 9239 7100 F: 2 9239 7199 E: sydmail@ghd.com.au

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft	S Manahan	R Manahan		S Pearce		11/08/08
0	S Manahan	R Manahan		S Pearce		08/10/08