Appendix 14 Traffic Impact Assessment

Ashton Coal Mine
Bowmans Creek Diversion

TRAFFIC IMPACT ASSESSMENT

- Final
- 28 September 2009

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SINCLAIR KNIGHT MERZ

1. Introduction

Sinclair Knight Merz (SKM) was appointed by Ashton Coal Operations Limited (ACOL) to undertake a traffic impact assessment of the proposed construction access points from the New England Highway to facilitate diversion of Bowmans Creek. Two access points are required on the southern side of the Highway, to accommodate the movement of trucks to and from the worksite. The findings of the assessment are contained in this report.

The report is structured as follows:

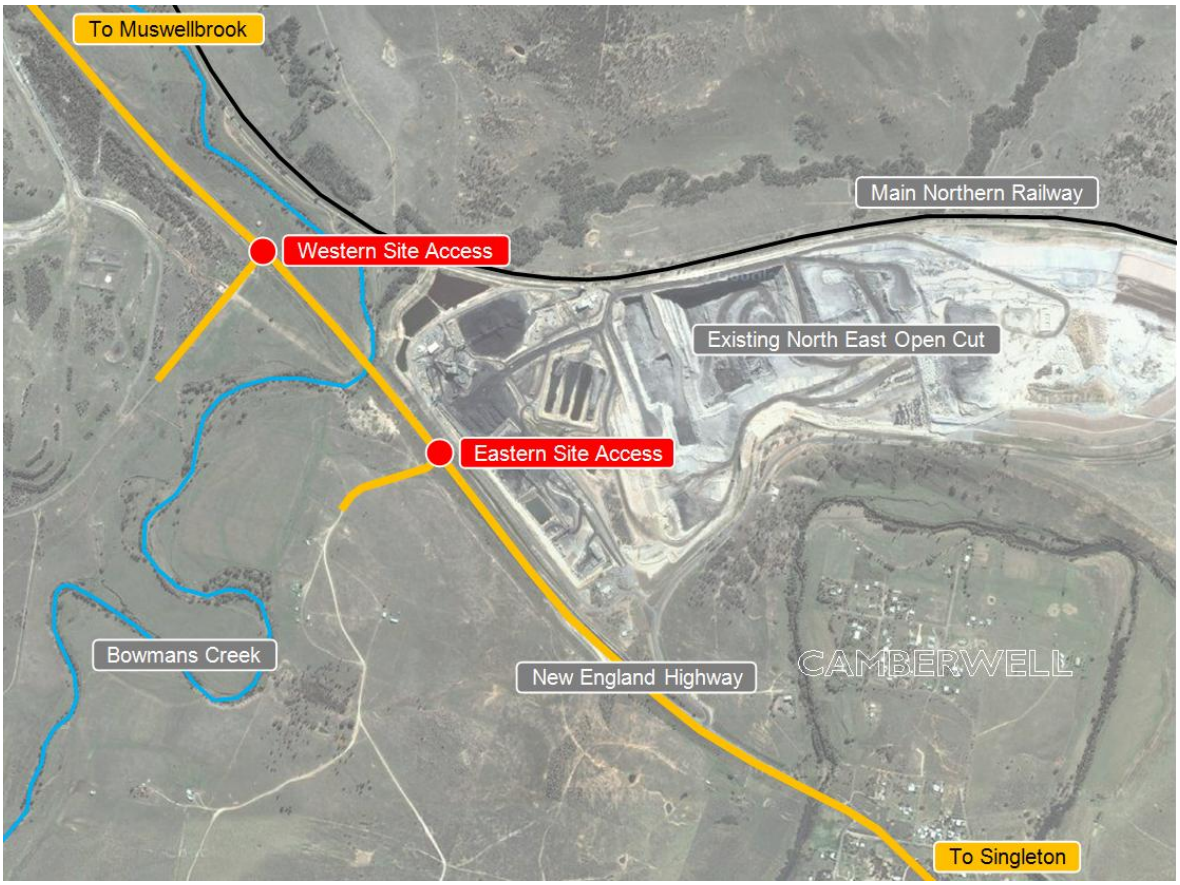
- **Section 2** describes the existing conditions in the vicinity of the proposed construction access points, with reference to traffic counts, historical growth and road safety records;
- **Section 3** provides details of the diversion of Bowmans Creek;
- **Section 4** discusses the potential impacts of the proposed construction access points, including traffic generation and the intersection arrangements at the New England Highway; and
- **Section 5** contains the conclusions of the assessment.

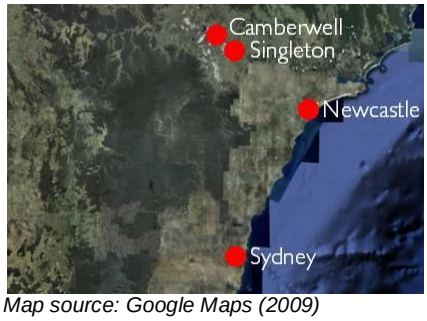
2. Existing conditions

The Ashton Coal Project (ACP) is located near the village of Camberwell, 14 kilometres north-west of Singleton on the New England Highway. The New England Highway is part of the National Highway network, and forms the main inland route between Sydney and Brisbane.

The location of the mine is shown in **Figure 2-1**.

- **Figure 2-1 Site location**





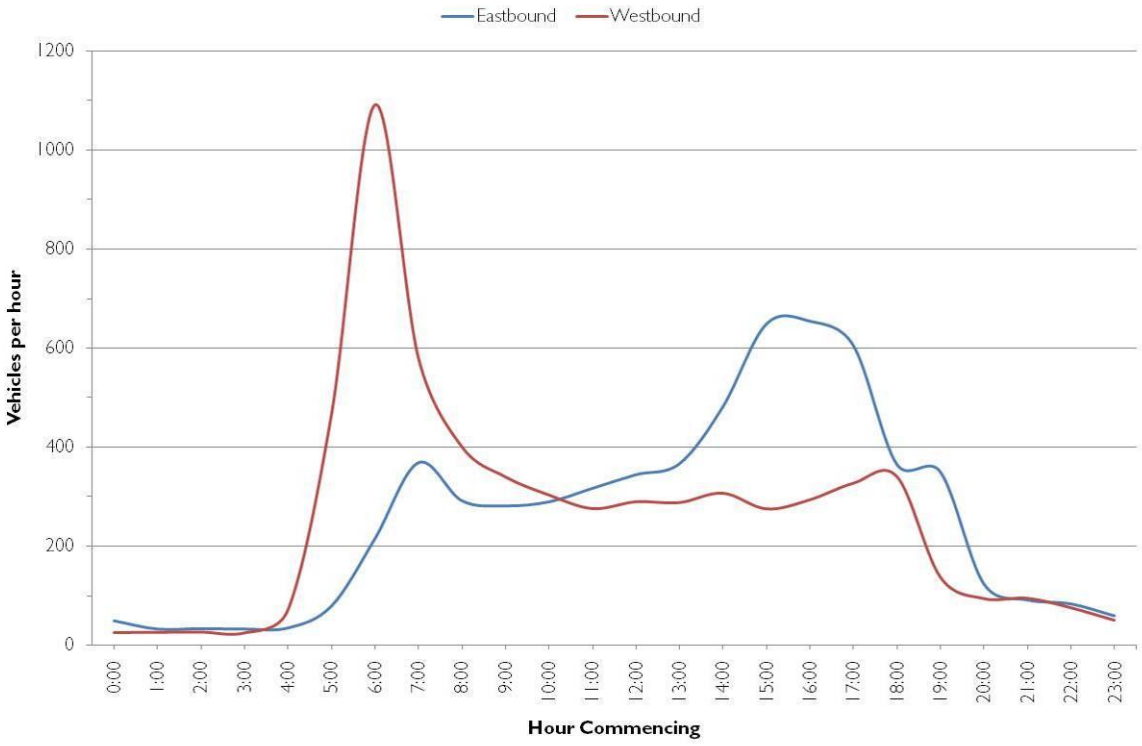
Map source: Google Maps (2009)

2.1. Traffic volumes

A 7-day classified count of traffic on the New England Highway east of Camberwell was undertaken from 23 to 29 October 2008. The average daily traffic volume during that week was 11,109 vehicles, including 17% heavy vehicles. The average weekday volume was slightly higher at 12,391 vehicles, including 18% heavy vehicles.

The average weekday hourly profile of traffic activity is shown in **Figure 2-2**.

- **Figure 2-2 New England Highway weekday average hourly profile**



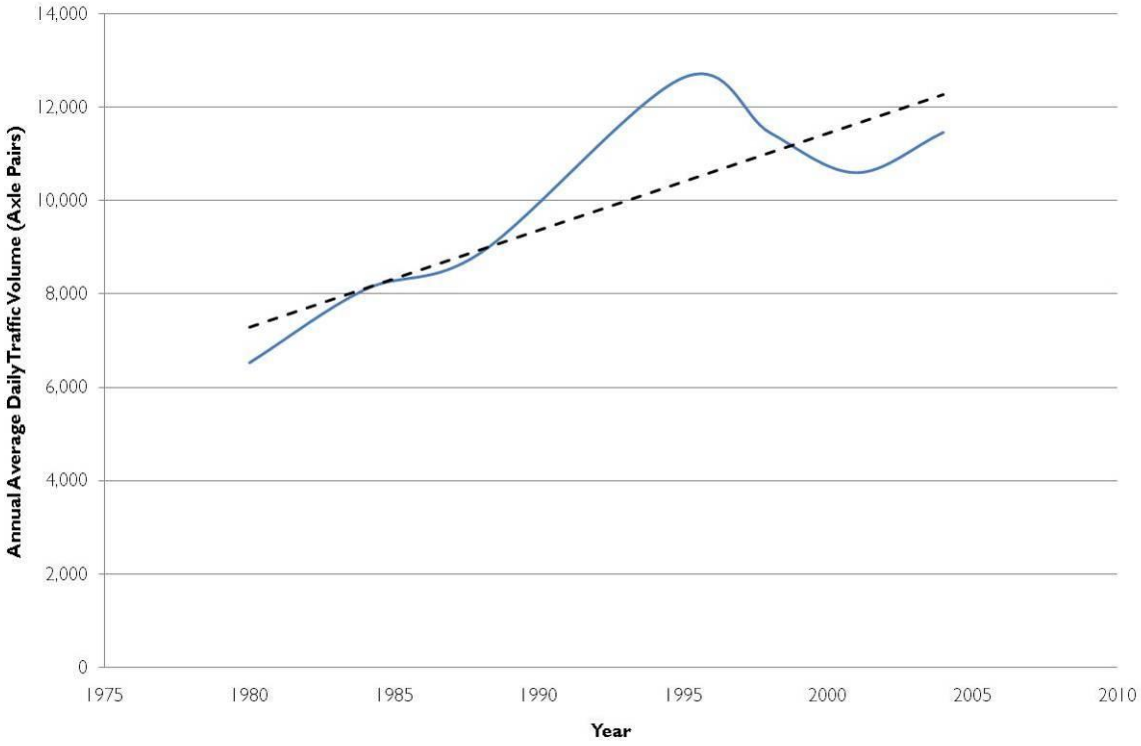
The peak hour on a weekday is between 6:00 and 7:00AM, with an average weekday volume of 1,306 vehicles per hour, the majority of which are heading westbound. The PM peak is between 4:00 and 5:00PM, with an average of 947 vehicles per hour. The peak direction in the afternoon is eastbound. Peak hour volumes on the New England Highway are presented in **Table 2-1**.

- **Table 2-1 Peak hour volumes on the New England Highway**

	October 2008	
	Eastbound	Westbound
AM	370	1,090
PM	650	340

The NSW Roads and Traffic Authority (RTA) also collect and publish traffic volume data for the New England Highway. The nearest RTA data point is located at Foy Brook Bridge (over Bowmans Creek) in Camberwell (station number 05.037). **Figure 2-3** shows growth in traffic[1] on the New England Highway at this RTA data point since 1980. Traffic has generally risen steadily, with a peak in the late 1990s and an overall linear trend growth rate of 1.7% per annum (base year 2004).

- **Figure 2-3 Growth in Annual Average Daily Traffic on the New England Highway at Foy Brook Bridge, Camberwell (Station number 05.037)**



2.2. Road safety

Data was obtained from the RTA about the recent road crash history of the New England Highway between Singleton and Muswellbrook. In the five years from September 2003 to August 2008, there were 88 crashes recorded, including four fatal crashes and 32 injury crashes. The most common types of crashes involved the vehicle leaving the carriageway, accounting for 52% of all

[1] Volume at this location is measured in axle pairs, rather than vehicles. A 2-axle car is one axle pair. A 3-axle truck is 1.5 axle pairs. The number of vehicles is less than the number of axle pairs.

crashes. The number of crashes was highest in the year September 2003 to August 2004, when 24 crashes were recorded. There were 13 crashes recorded in the year September 2007 to August 2008.

A crash rate, where the number of crashes is compared to the volume of passing traffic, has been calculated at approximately 10 crashes per 100 Million Vehicle Kilometres Travelled (MVKT). This is significantly below the NSW state average crash rate of approximately 75 crashes per 100MVKT.

Immediately east of Bowmans Creek, in the general vicinity of the proposed construction access points, there were three crashes recorded in the past five years, including one injury crash. There were two off-path type crashes and one where a temporary object on the roadway was hit.

3. Project background and overview

The ACP was granted development consent under Part 4 of the *Environmental Planning and Assessment Act 1979* by the Minister for Planning on 11 October 2002. The ACP comprises an open cut coal mine, a four-seam descending underground coal mine, coal preparation plant and associated surface facilities.

The ACP underground mine is located south of the New England Highway and is bounded by Glennies Creek to the east, Bowmans Creek to the west and the Hunter River to the south. The underground mine is a descending longwall operation targeting the Pikes Gully Seam, Upper Liddell Seam and the Lower Barrett Seam. The mine is anticipated to have an operational life of approximately 18 years, with mining of the Lower Barrett Seam expected to be completed by 2023.

The ACP underground mine has been operating since December 2005 in the Pikes Gully Seam and is transitioning into a mining area underneath Bowmans Creek and alluvium. ACOL originally proposed to divert Bowmans Creek as part of its Development Application, although this was replaced with a conditional Development Consent Approval to longwall mine directly underneath the Bowmans Creek area. ACOL believe that subsequent investigations warrant revisiting the diversion of Bowmans Creek.

The submission to Department of Planning relates to:

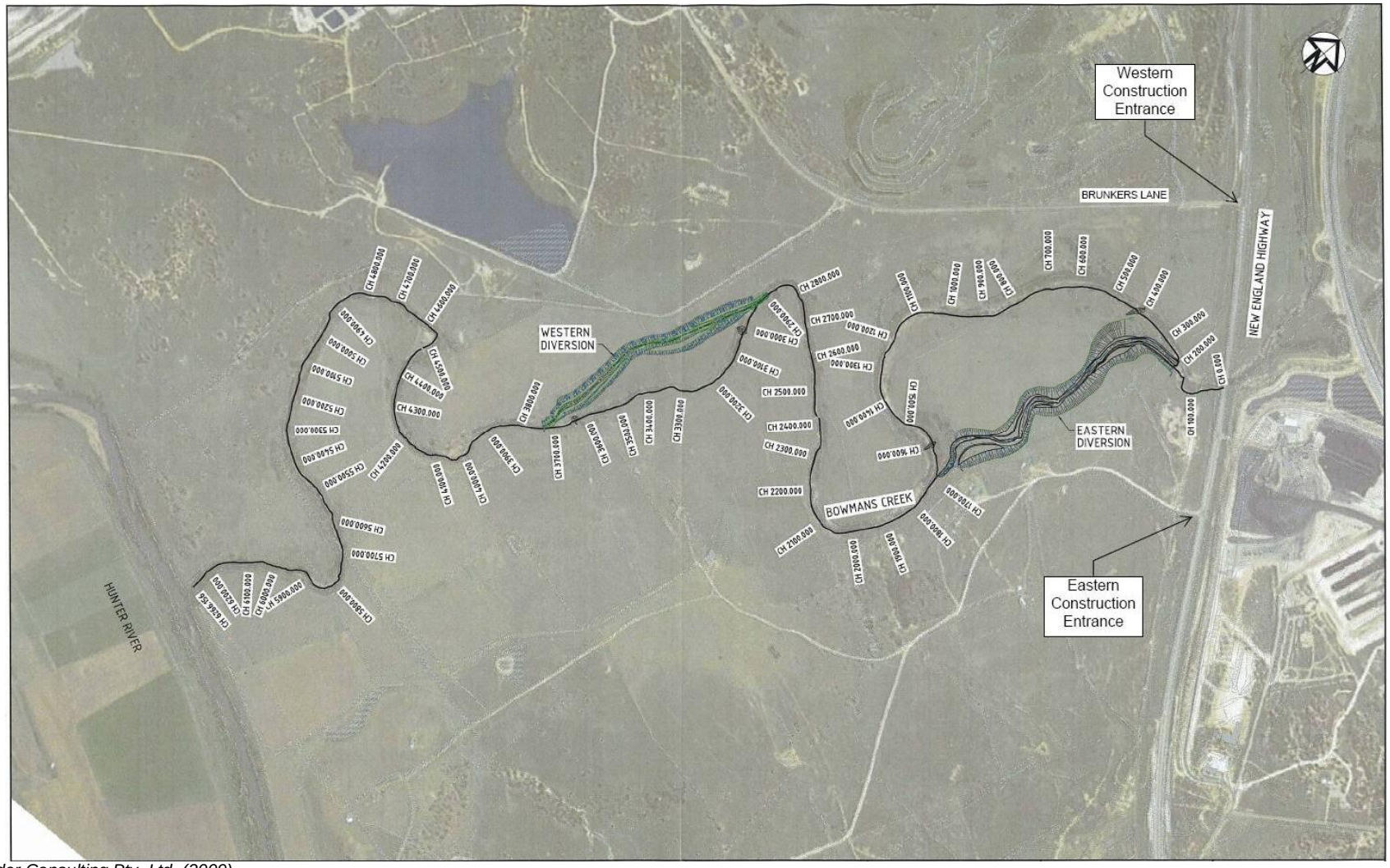
- The eastern diversion of Bowmans Creek (approximately 850 metres);
- The western diversion of Bowmans Creek (approximately 780 metres); and
- Amendment to Condition 3.9 of the Development Consent regarding connective cracking.

Construction of the diversion channels will occur over a period of approximately six months. Bulk earthworks construction will be undertaken using scrapers that will place the extracted alluvial material in stockpiles for subsequent filling of depressions in the landscape that result from subsidence. Following the bulk earthworks, excavators and trucks will be used to excavate the base of the channel, install a layer of geosynthetic clay liner beneath the base of the proposed low flow channel and recreate a complex topography of cobble bars, pools and riffles that replicate the geomorphic characteristics of the existing creek.

Materials imported to the site will include the geosynthetic clay liner, erosion protection matting, boulders for scour protection at strategic locations and timber for engineered log jams. Truck movements associated with the construction activity will be predominantly for the delivery of plant and engineering/bulk materials to the site.

The proposed diversion of Bowmans Creek is shown in **Figure 3-1** overleaf.

- **Figure 3-1 Proposed layout of Bowmans Creek diversion**



Plan source: Hyder Consulting Pty. Ltd. (2009)

4. Impact assessment

4.1. Traffic generation

The likely vehicle activity associated with the creek diversion works is as follows:

- An average of five truck movements per day over a three-month period, peaking at approximately ten per day between the two site access points;
- Trucks will originate from east and west of the site, based on the location of the equipment and material origins;
- Trucks will be in operation during daylight hours only, seven days a week; and
- Various truck types will be in operation, including:
  - Small tippers;
  - Table tops;
  - 27 tonne and 33 tonne semi trailers; and
  - Truck and trailers in a "truck and dog" configuration.

4.2. Proposed access arrangements and features

Two access points to the site are proposed. The eastern construction entrance is proposed to be at an unnamed dairy farm driveway, located approximately 380 metres east of the Foy Brook Bridge. The western construction entrance is proposed to be at the existing private road known as Brunkers Lane, approximately 520 metres west of the bridge (shown in **Figure 2-1**). Both proposed construction access points are existing accesses to the New England Highway.

The current layout of the intersection at the eastern dairy farm entrance of the New England Highway is of Type BA[2] (Basic), featuring two eastbound lanes. The two eastbound lanes are in the form of an eastbound overtaking lane, and would allow through traffic to pass a right-turning vehicle, which would be turning from the fast lane (shown in **Figure 4-1**).

The existing highway is a two-way, three lane road with a straight horizontal alignment on slightly sloping terrain in the vicinity of the proposed eastern entrance. It has a 17 metre wide sealed road surface that is comprised approximately of three 3.3 metre wide lanes, a 1 metre wide painted median island and 3 metre wide shoulders on each side.

[2] Intersection classification according to *Austroads Guide to Traffic Engineering Practice – Part 5: Intersections at Grade (2005).*

Sight distance from the intersection of the proposed eastern dairy farm entrance along the New England Highway is very good in both directions and provides ample opportunity to sight vehicles coming from both directions.

- **Figure 4-1 Intersection of the proposed eastern dairy farm entrance and the New England Highway**

The current intersection of the proposed western entrance at the intersection of Brunkers Lane and the New England Highway is more formally established, with a Type CHR[3] (Channelised Right Turn) layout featuring an additional Auxiliary Left Turn (AUL) lane (shown in **Figure 4-2** and **Figure 4-3**). The CHR lane is approximately 180 metres in length, and the AUL lane is approximately 160 metres in length.

[3] Intersection classification according to *Austroads Guide to Traffic Engineering Practice – Part 5: Intersections at Grade (2005).*

The existing highway is a two-way, two-lane road with a slight curved horizontal alignment on flat terrain in the vicinity of the proposed western entrance. On the eastern approach, it has a 16 metre wide sealed road surface that is comprised of two 3.5 metre wide through lanes, a 3 metre wide painted median island, a 3 metre wide auxiliary left turn lane and 1.5 metre wide sealed shoulders on each side. On the western approach, it also has a 16 metre wide sealed road surface that is comprised of two 3.5 metre wide through lanes, a 3 metre wide channelised right turn lane, a 3 metre wide acceleration lane and 1.5 metre wide sealed shoulders on each side.

Sight distance from the Brunkers Lane intersection along the New England Highway is very good in both directions and provides ample opportunity to identify vehicles travelling in both directions.

- **Figure 4-2 CHR lane at the intersection of the proposed western Brunkers Lane entrance and the New England Highway**

- **Figure 4-3 AUL lane at the intersection of the proposed western Brunkers Lane entrance and the New England Highway**

Due to the expected low numbers of additional vehicle movements (maximum of approximately ten per day distributed over both construction access points) and sufficient sight distance at both intersections, it is proposed that the existing intersection layouts be maintained. It is considered that the impact on through traffic on the New England Highway due to the additional vehicle movements will be minimal. This is assessed further in **Section 4.3**.

4.3. Traffic implications

To assess the traffic implications of the additional vehicle movements on the road network, the operation of the two intersections has been analysed using the *SIDRA Intersection* modelling software. The analysis results refer to various performance measures for intersection operation.

The performance measure that is commonly quoted is the Level of Service (LoS), determined by the average delays experienced by vehicles using the intersection. The LoS criteria set by the RTA is shown in **Table 4-1**. For unsignalised intersections, LoS is based on the worst-performing movement. It is generally accepted that in the long term (15 years +), when future conditions have

been taken into account, Level of Service should be D or better. In the short term, intersections should be operating at Level of Service C or better.

- **Table 4-1 Level of Service (LoS) Criteria**

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

Source: RTA Guide to Traffic Generating Developments (2002)

The following traffic volumes were used in the intersection analysis:

- Peak hour traffic volumes on the New England Highway presented in **Table 2-1** (factored to the year 2009); and
- The worst-case scenario for vehicle movements into and out of the proposed entrances, i.e. ten movements in and ten movements out in the AM and PM peak hours, split between the eastern and western approaches.

The traffic volumes used in the assessment represent what is considered to be the absolute worst case scenario of traffic generation, which is the expected full day worth of truck movements, arriving and departing in one hour, and that hour corresponding to the respective peak hour. No account for the apportionment of construction vehicle movements between the eastern and western entrance has been made, and peak (maximum) construction vehicle volumes rather than average generation volumes have been used, making the results additionally conservative.

The results are shown in **Table 4-2**, **Table 4-3**, **Table** 4-4 and **Table 4-5**.

- **Table 4-2 Performance of the intersection at the proposed eastern dairy farm entrance and the New England Highway (AM peak)**

Movement	Average Delay per Vehicle (seconds)	Level of Service	95% Back of Queue (metres)
Proposed eastern entrance (left)	>70	F	122
Proposed eastern entrance (right)	>70	F	122
Approach	>70	**F**	**122**
New England Highway eastern approach (left)	21.8	B	0
New England Highway eastern approach (through)	0	A	0
Approach	**0.1**	**A**	
New England Highway western approach (through)	0	A	0
New England Highway western approach (right)	>70	F	44
Approach	**18.2**	**B**	**44**
All Vehicles	**38.2**	**NA**	**122**

- **Table 4-3 Performance of the intersection of the proposed eastern dairy farm entrance and the New England Highway (PM peak)**

Movement	Average Delay per Vehicle (seconds)	Level of Service	95% Back of Queue (metres)
Proposed eastern entrance (left)	>70	F	36
Proposed eastern entrance (right)	>70	F	36
Approach	>70	**F**	**36**
New England Highway eastern approach (left)	21.8	B	0
New England Highway eastern approach (through)	0	A	0
Approach	**0.3**	**A**	
New England Highway western approach (through)	5.5	A	45
New England Highway western approach (right)	33.9	C	45
Approach	**5.7**	**A**	**45**
All Vehicles	**8.8**	**NA**	**45**

- **Table 4-4 Performance of the intersection of the proposed western Brunkers Lane entrance and the New England Highway (AM peak)**

Movement	Average Delay per Vehicle (seconds)	Level of Service	95% Back of Queue (metres)
Proposed western entrance (left)	>70	F	100
Proposed western entrance (right)	>70	F	100
Approach	**>70**	**F**	**100**
New England Highway eastern approach (left)	21.8	B	0
New England Highway eastern approach (through)	0	A	0
Approach	**0.1**	**A**	
New England Highway western approach (through)	0	A	0
New England Highway western approach (right)	>70	F	8
Approach	**2.1**	**A**	**8**
All Vehicles	**30.7**	**NA**	**100**

- **Table 4-5 Performance of the intersection of the proposed western Brunkers Lane entrance and the New England Highway (PM peak)**

Movement	Average Delay per Vehicle (seconds)	Level of Service	95% Back of Queue (metres)
Proposed western entrance (left)	>70	F	36
Proposed western entrance (right)	>70	F	36
Approach	**>70**	**F**	**36**
New England Highway eastern approach (left)	21.8	B	0
New England Highway eastern approach (through)	0	A	0
Approach	**0.3**	**A**	
New England Highway western approach (through)	0	A	0
New England Highway western approach (right)	29.7	C	1
Approach	**0.2**	**A**	**1**
All Vehicles	**5.2**	**NA**	**36**

The highest average delays are experienced by vehicles turning into and out of the proposed construction site entrances. No delays are experienced by through traffic on the New England Highway. Therefore, it is considered that the impact of the additional vehicle movements on the road network will be negligible, with the delays and queuing quarantined to the side roads, which are private roads.

4.4. Road safety

As the number of additional vehicles generated as a result of the creek diversion works is expected to be very low (maximum of approximately ten movements per day arriving from both directions and distributed over both intersections), no significant reduction in road safety is expected.

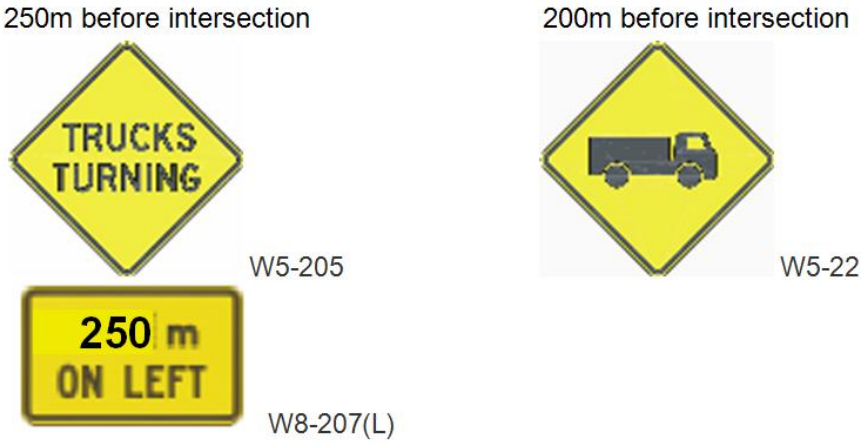
The intersection of Brunkers Lane and New England Highway offers protected turn lanes to reduce the impact of slowing or accelerating vehicles from highway flows.

The straight alignment, good sight distance and second eastbound lane at the eastern dairy farm entrance contribute to a satisfactory traffic arrangement, given the low volume of construction vehicles being generated by the site, as well as the short term program of the construction activity.

4.5. Traffic management measures

As the heavy vehicles are proposed to use the two existing intersections with the New England Highway, it is recommended to provide advance warning signage such as those shown in **Figure 4-4** for the duration of the creek diversion works. This signage installation would highlight to other motorists the possibility of a truck braking or turning, and allow them to be forewarned of the need for heightened awareness or to slow down.

- **Figure 4-4 Proposed warning signs on the New England Highway approaches to the intersections**



5. Summary

This report has reviewed the traffic impact of the proposed Bowmans Creek diversion, to be located on the southern side of the New England Highway, north of the village of Camberwell. Truck movements are estimated to average five per day over a three-month period, peaking at approximately ten per day.

The New England Highway currently carries over 11,000 vehicles per day, including 17% heavy vehicles. Traffic has been growing, and is expected to continue growing, at approximately 1.7% per annum. The peak hourly volume is approximately 1,100 vehicles, travelling westbound between 6am and 7am.

In the five years to 2008, there were 88 crashes recorded on the New England Highway between Singleton and Muswellbrook, although only three occurred immediately east of Bowmans Creek, in the vicinity of the proposed South East Open Cut. The crash rate on this section of the highway is relatively low when compared to other roads in NSW. This is not expected to change during the creek diversion works, as there will be a very minimal increase in traffic volumes and turning movements resulting from construction activity.

Due to the expected low numbers of additional construction vehicle movements (maximum of approximately ten per day) and sufficient sight distance at both intersections, it is proposed that the existing intersection layouts be maintained. Modelling results show that the delays attributable to turning vehicles are experienced by vehicles turning out of the proposed construction entrances, which are private access roads. No delays are experienced by through traffic on the New England Highway. Therefore, it is considered that the impact of the additional vehicle movements on the capacity of the road network is negligible.

As the heavy vehicles are proposed to use the two existing intersections with the New England Highway on a short term construction basis, it is recommended to install for the duration of the creek diversion works, advance warning signage to warn of trucks turning.