Technical Note

Date	March 2014
Subject	Watermark Coal Project – Independent traffic review

Introduction

The NSW Department of Planning and Infrastructure (DoPI) engaged Sinclair Knight Merz (SKM) in February 2014 to undertake a review of the traffic impact assessment of the proposed Watermark Coal Project and consideration of the need to upgrade local and regional roads as a result of the construction and operation of the project.

DoPI is seeking independent advice on traffic impacts and required road upgrades.

References

The following references formed the basis of SKM's review:

- Traffic and Transport Impact Assessment contained in Appendix AB of the Watermark Coal Project Environmental Impact Statement, prepared by DC Traffic Engineering (January 2013)
- Gunnedah Shire Council Submission (May 2013)
- Liverpool Plains Shire Council Submission (April 2013)
- Response to Submissions, prepared by Hansen Bailey (November 2013)
- Gunnedah Shire Council reply to the Response to Submissions (December 2013)
- Liverpool Shire Plains Council reply to the Response to Submissions (December 2013)
- Site inspection of local and regional roads undertaken on 6 and 7 February 2014
- Meeting with Donna Ausling, Greg Tory and Peter Morgan from Liverpool Plains Shire Council on 6 February 2014
- Meeting with Wayne Kerr and Mike Silver from Gunnedah Shire Council on 7 February 2014
- Meeting with James Bailey from Hansen Bailey, Michael Baudinette and Paul Jackson from Shenhua Watermark Coal, and Damien Chee from DC Traffic Engineering on 7 February 2014
- Relevant road design and traffic engineering standards and guidelines

Issues to be reviewed

The following issues were highlighted by Gunnedah Shire Council and Liverpool Plains Shire Council for particular attention:

a) Road safety considerations have been omitted from the traffic analyses

b) Inadequate assessment of intersection capacity

c) Road capacity calculation on Bulunbulun Road does not take into account dust generated by moving vehicles

d) Lack of detail about service vehicles and the potential impact on local roads (particularly Bulunbulun Road)

e) Increase in traffic volumes on Bulunbulun Road would warrant upgrading of the road and ongoing maintenance at Shenhua Watermark Coal's (the applicant's) expense

f) Traffic volumes used in capacity calculations do not take into account seasonal variations

g) Concern regarding the impact of mine-related traffic on local roads in Breeza

h) Impacts of increased road traffic using rail crossings have not been addressed

i) Increase in traffic volumes on Nea Siding Road as a result of local road closures would warrant upgrading of the road and ongoing maintenance with partial contributions from the applicant

j) Requested road upgrades

k) Ongoing road maintenance

Results of review

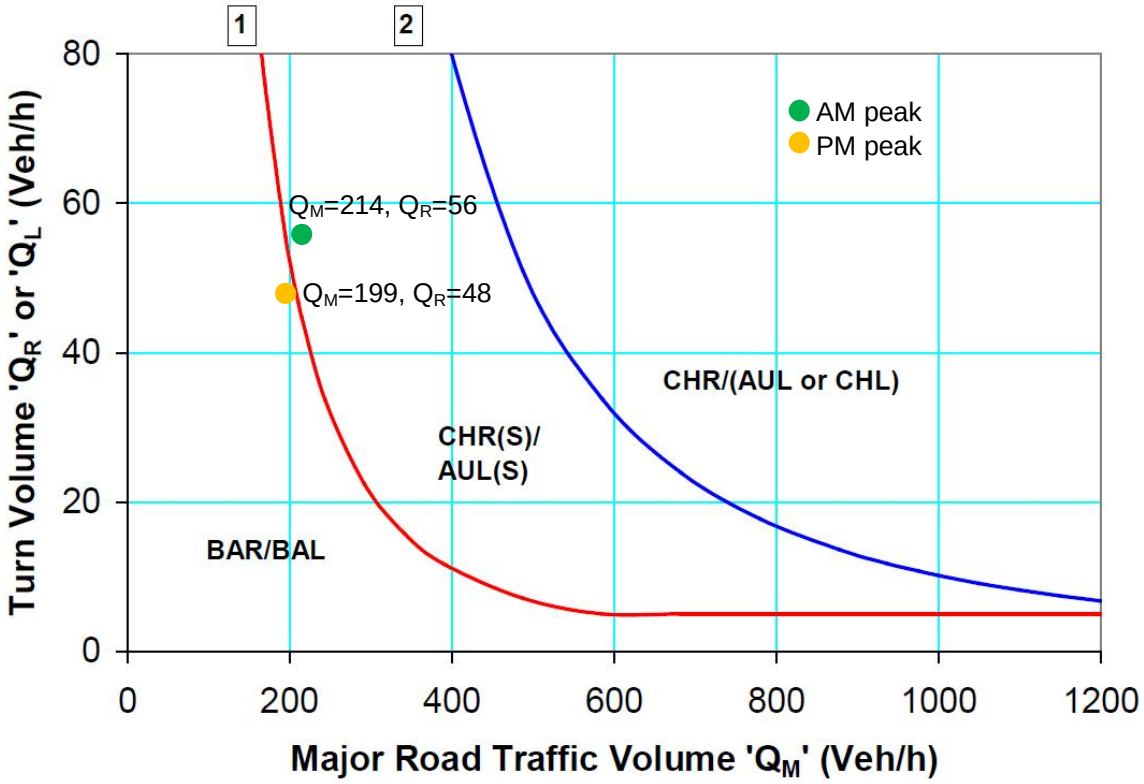
In general SKM considers the assumptions contained within the Traffic and Transport Impact Assessment relating to Project-related traffic generation and traffic distribution are reasonable and sound in the absence of detailed information. The results of the review are detailed below.

a) SKM undertook inspections of key local and regional roads including Werris Creek Road, Bulunbulun Road, Gap Road, Kamilaroi Highway, The Dip Road, Nea Siding Road, Hogarth Street and Maitland Street, as well as key intersections along these roads. Whilst the inspection was not part of a formal road safety audit, observations pertaining to physical features of the roads and intersections that may affect road user safety were made. SKM considers that the predicted volume of traffic generated by the Project will have minimal impact on the level of risk associated with existing hazards on these roads and at these intersections, and considers that the safety performance of these roads and intersections will be maintained with the addition of Project-related traffic.

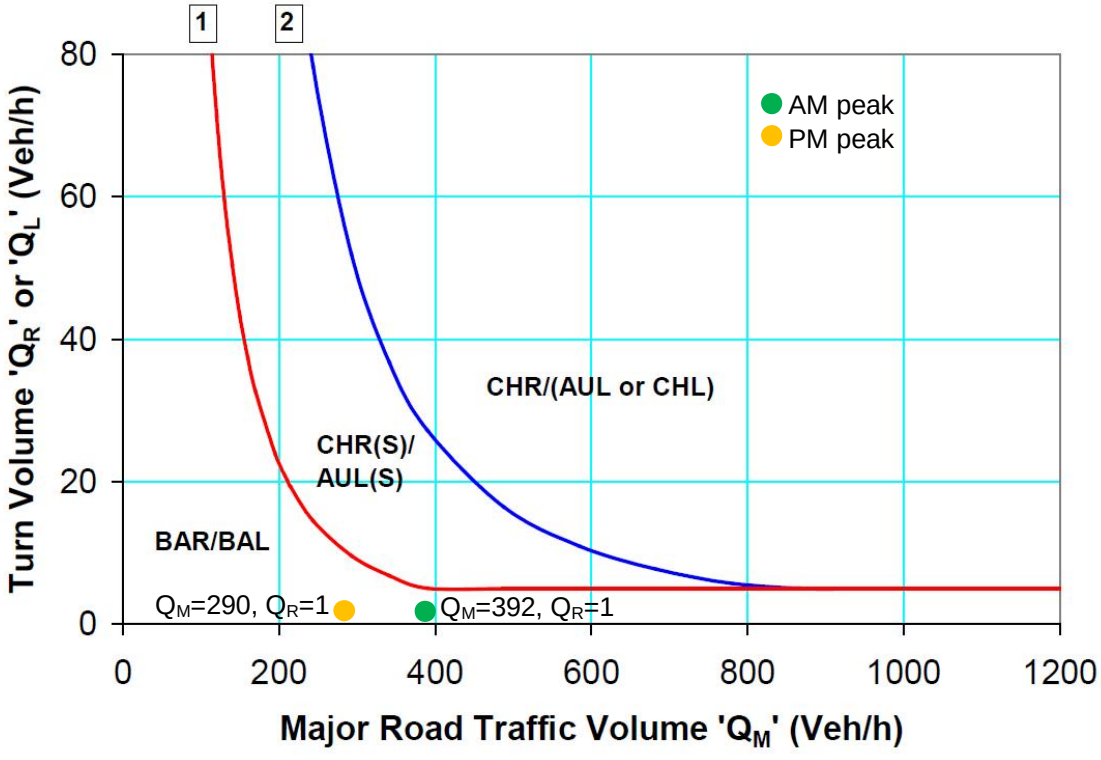
b) SKM considers the methodology used to assess intersection capacity and performance to be satisfactory and in line with standard practice. To confirm intersection requirements, the warrant for intersection treatments contained in the Austroads *Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections* was tested at the following five intersections of interest using predicted peak hour traffic volumes with the Project in operation:

- Werris Creek Road / Bulunbulun Road
- Kamilaroi Highway / Bulunbulun Road
- Kamilaroi Highway / Gap Road
- Kamilaroi Highway / Waverly Road
- Werris Creek Road / Gap Road

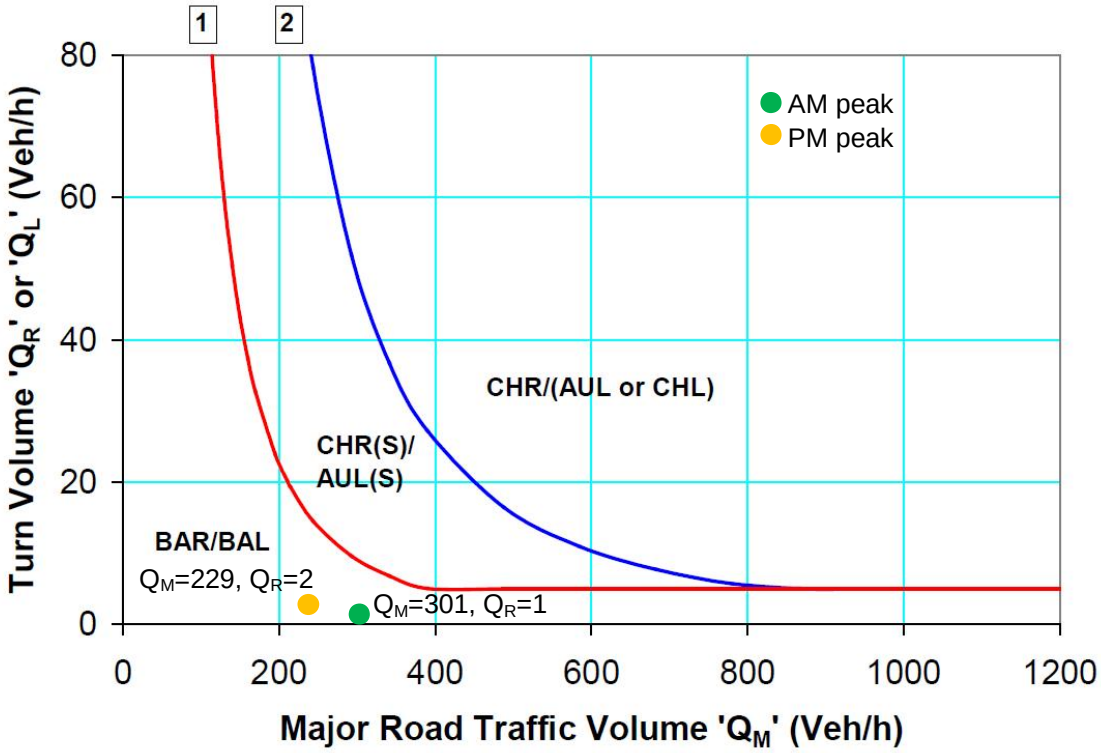
- Werris Creek Road / Bulunbulun Road (design speed < 100 km/h)



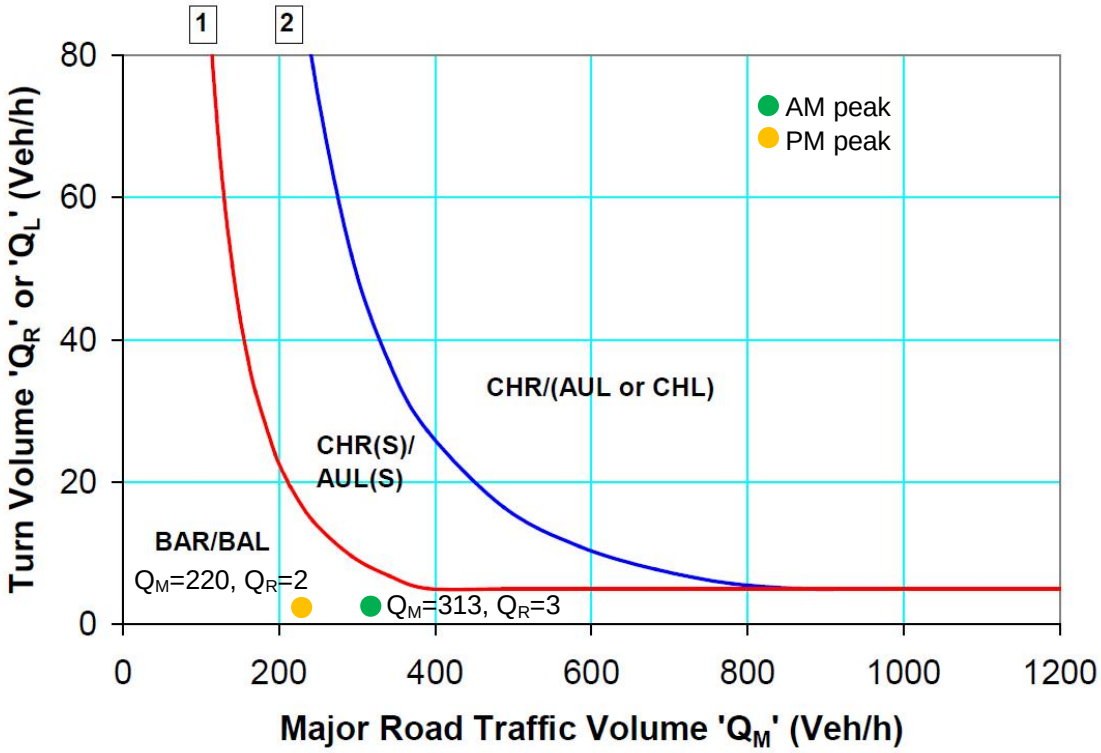
- Kamilaroi Highway / Bulunbulun Road (design speed >= 100 km/h)



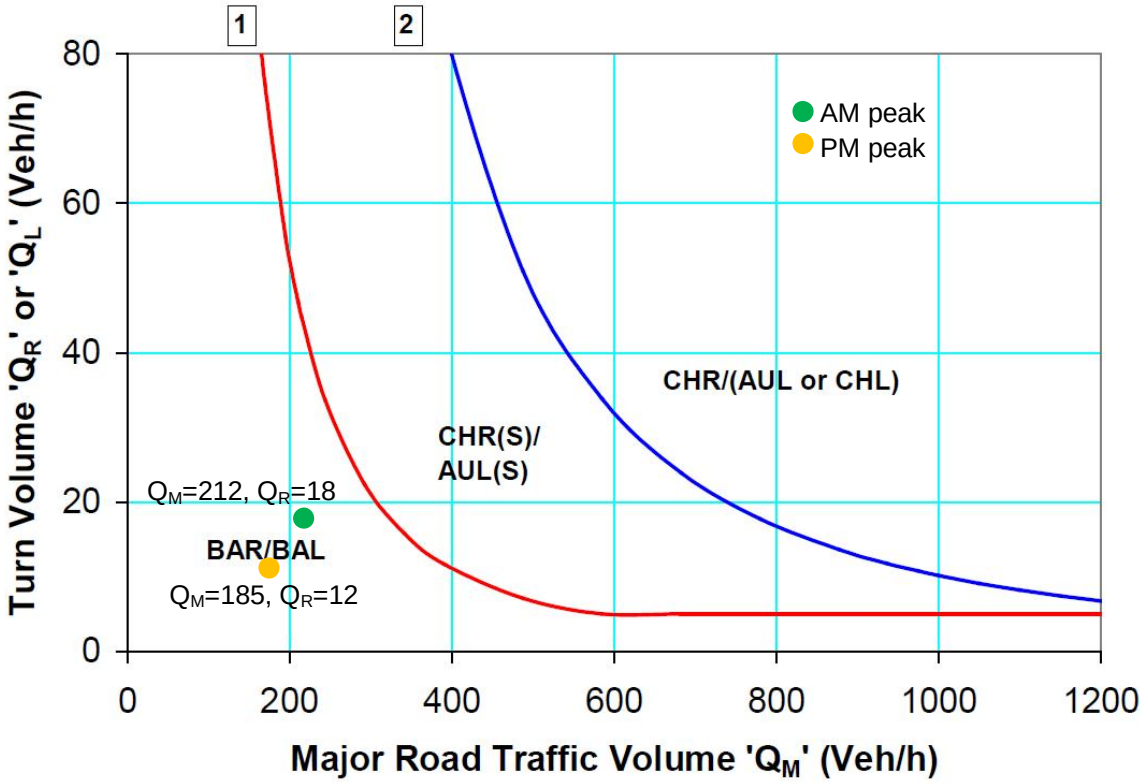
- Kamilaroi Highway / Gap Road (design speed >= 100 km/h)



- Kamilaroi Highway / Waverly Road (design speed >= 100 km/h)

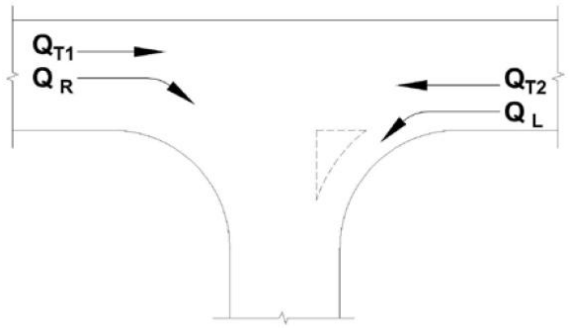


- Werris Creek Road / Gap Road (design speed < 100 km/h)



In applying the warrants it should be noted that:

- Curve 1 represents the boundary between a BAR (basic right turn) and a CHR(S) (channelised right-turn with a short turn bay) turn treatment and between a BAL (basic left turn) and an AUL(S) (auxiliary left-turn with a short turn bay) turn treatment
- Curve 2 represents the boundary between a CHR(S) and a CHR (channelised right-turn) turn treatment and between an AUL(S) and an AUL (auxiliary left-turn) or CHL (channelised left-turn) turn treatment
- The warrants apply to turning movements from the major road only (the road with priority)
- 'Q_R' (right turn volume from the major road) values have been used for this analysis
- The 'Major Road Traffic Volume' 'Q_M' value is obtained from the figure overleaf
- Traffic flows applicable to the warrants are peak hour flows



Turn type	Splitter island	Q_M (veh/h)
Right	No	= Q_{T1} + Q_{T2} + Q_L

Based on this analysis, the Werris Creek Road / Bulunbulun Road intersection should be upgraded to a CHR(S) (channelised right-turn with a short turn bay). Given that the addition of Project-related traffic triggers the warrant for an upgrade of the intersection to a CHR(S), SKM considers the applicant responsible for the upgrade.

c) SKM drove along the unsealed section of Bulunbulun Road at 70-80 km/h and measured the time required for dust generated by the vehicle to clear at approximately 15 seconds. This would be equivalent to a minimum 15-second headway between vehicles, or a maximum of 4 vehicles per minute per lane (maximum 240 vehicles per hour per lane).

The predicted traffic volume in the westbound direction on Bulunbulun Road in the AM peak hour with the Project in operation is 56 vehicles, which equates to approximately one car per minute. Therefore SKM considers that Bulunbulun Road will be able to accommodate the predicted volume of traffic generated by the Project with minimal impact on the level of risk associated with existing hazards.

It is recognised that the dust clearance time recorded during the site inspection would vary with differing weather conditions (it would be less in wet conditions and in periods of regular rainfall as moisture promotes dust suppression). At the time of the site inspection (February 2014), the local area was experiencing an extended period without a significant rainfall event – therefore it would be expected that the dust clearance time of 15 seconds would be at or near the upper limit.

d) Details of service vehicles were discussed at the meeting with Shenhua Watermark Coal:

- The majority of service vehicles will originate from Newcastle, Hexham or Muswellbrook and will therefore use the New England Highway and Kamilaroi Highway to reach the Project site
- Some service vehicles may originate from the WesTrac depot located in Gunnedah
- There is the potential for some service providers to establish depots within the Project site and will therefore not be using public roads

Based on this information, SKM considers that the impact of service vehicles on the road network will be minimal given the available spare capacity. Furthermore, SKM considers that there is a low likelihood of service vehicles using Bulunbulun Road (and Hogarth Street and Maitland Street).

e) The predicted volume of traffic on Bulunbulun Road with the Project in operation is 276 vehicles a day (108 baseline vehicles a day plus 168 Project-related vehicles). As stated in

the Australian Road Research Board's (ARRB) *Research Report ARR 315 – Practical Relationships for the Assessment of Road Feature Treatments* (December 1997), maintenance costs for both sealed and gravel roads increase with increasing traffic volume, with the rate of increase being much greater for gravel roads. At low traffic volumes, the average annual cost of maintaining a sealed road (including periodic reseals) is greater than that for a gravel road, while the reverse applies for high traffic volumes. The ARRB report states that the breakeven traffic volume for maintenance costs is approximately 200 vehicles a day. Other available literature[1] provides an upper limit of breakeven traffic volumes of 400 to 500 vehicles a day. There will be marked regional variations in this breakeven value depending on other factors affecting maintenance costs including weather conditions, the type of road and volume of heavy vehicles using the road.

SKM considers it prudent to consider the following as an alternative to sealing Bulunbulun Road:

- Conduct a road dilapidation survey and traffic count on Bulunbulun Road prior to the Project commencing
- During operation of the Project, conduct regular road dilapidation surveys and traffic counts
- Compare the results of the dilapidation surveys and traffic counts
- Should the condition of the road be worse than that recorded prior to the Project commencing, and should it be directly attributable to Project-related traffic, undertake restoration works at the applicant's expense

f) SKM reviewed historical traffic volume data at the following RMS count station locations:

- Station 92.350 – Kamilaroi Highway at Willow Tree
- Station 92.348 – Kamilaroi Highway at railway crossing north of Turilawa
- Station 92.344 – Werris Creek Road, north of Station Road

Variations in traffic volumes during school holidays, the Tamworth Country Music Festival, AgQuip and grain harvest season were analysed and are detailed below:

RMS count station	Percentage variation from annual average daily traffic (AADT)						
	Term 4 to Term 1 school holidays (Dec-Jan)	Term 1 to Term 2 school holidays (Apr)	Term 2 to Term 3 school holidays (Jul)	Term 3 to Term 4 school holidays (Oct)	Tamworth Country Music Festival (Jan)	AgQuip (Aug)	Grain harvest season (Nov-Dec)
92.350	-11.5%	+5.0%	+3.2%	+5.9%	-9.2%	+34.3%	+4.4%
92.348	-1.3%	+8.9%	+7.3%	+3.9%	+22.3%	+14.7%	+3.8%
92.344	-2.5%	-1.2%	No change	+2.7%	+4.9%	-1.6%	+5.1%

Notwithstanding significant proportional increases (for example +34.3% during AgQuip at station 92.350 and +22.3% during the Tamworth Country Music Festival at station 92.348), SKM considers that there would still be sufficient spare capacity on these roads during peak seasonal periods to accommodate the predicted volumes of traffic generated by the Project

[1] Massachusetts Highway Department (United States); United States Department of Transportation, Federal Highway Administration; Kentucky Transportation Centre, University of Kentucky (United States)

with minimal impact on the level of risk associated with existing hazards, given the relatively low AADTs (less than 4,000 on all roads).

g) Notwithstanding the applicant's assertions that measures will be undertaken to discourage the use of Hogarth Street and Maitland Street by Project-related vehicles, SKM considers that the volume of Project-related traffic that is likely to travel through Breeza rather than bypass it will have minimal impact on the level of risk associated with existing hazards, including the railway crossing and low-level bridge over the Mooki River, for the following reasons:

- Existing low traffic volumes
- Provision of clear zones for the majority of the length of the route with no infrangible objects within those clear zones
- Sufficient stopping sight distance on approach to the railway crossing and the intersection of Hogarth Street and the Kamilaroi Highway (see below)

- There is approximately 40 m of storage space between the stop line and the railway line, which is sufficient for approximately five light vehicles to queue. The likelihood of the queue exceeding five vehicles is low given the minimal delays experienced by vehicles waiting to turn onto the Kamilaroi Highway
- Sufficient stopping sight distance on both approaches to the low-level bridge over the Mooki River

With respect to the railway crossing on Bulunbulun Road near the Kamilaroi Highway, SKM considers that the volume of Project-related traffic will have minimal impact on the level of risk associated with existing hazards for the following reasons:

- Sufficient stopping sight distance on approach to the railway crossing and the intersection of Bulunbulun Road and the Kamilaroi Highway (see below and overleaf)

- There is approximately 110m of storage space between the stop line and the railway line, which is sufficient for approximately 13 light vehicles to queue. The likelihood of the queue exceeding 13 vehicles is low given the minimal delays experienced by vehicles waiting to turn onto the Kamilaroi Highway

Therefore SKM considers that the recommended road and intersection upgrades in Breeza are not required.

h) Section 6 of the *NSW Rail Safety Act 2008* requires that people responsible for railways must take action:

- To eliminate risks to safety so far as is reasonably practicable
- If it is not reasonably practicable to eliminate risks to safety, to reduce those risks so far as is reasonably practicable

Given that the Australian Rail Track Corporation (ARTC) is the rail infrastructure manager for the subject railway line, SKM considers that any potential changes to safety risks, and whether any additional control measures are necessary, should be assessed by ARTC using the Australian Level Crossing Assessment Model.

i) It has been forecast that with the closure of local roads in the vicinity of the Project (namely The Dip Road and Court Lane), the traffic volume on Nea Siding Road will increase to approximately 135 vehicles per day. SKM considers that Nea Siding Road has sufficient spare capacity to accommodate the additional volume of traffic resulting from local road closures with minimal impact on the level of risk associated with existing hazards, and therefore no road upgrade is required.

j) SKM have given consideration to all requested road upgrades which are detailed in the table below.

Road	Recommended upgrade	Reason	SKM consideration
Nea Siding Road	Widen seal to provide 9m formation with 7 m seal	To ensure that road safety and serviceability is not compromised by additional traffic resulting from the closure of Court Lane	See (i)
Cull Road, Werner Road	Upgrade to 9 m formation	Currently in poor condition and not suitable for the alternate route proposed	It is stated in Gunnedah Shire Council's reply to the Response to Submissions (December 2013) that both parties agree that these roads should be reconstructed to a two-lane, two-way all-weather gravel road standard with a 9 m formation. SKM agrees and considers the applicant responsible for the upgrade.
Bulunbulun Road	Reconstruct and bitumen seal from the low level bridge at Mooki River to existing seal at the boundary of Liverpool Plains LGA, with 9m formation with 7m seal Upgrade to 10 m formation and 10 m pavement (including 1 m shoulder), including culverts, causeway and intersection upgrades	Will be used by project-related traffic to and from Tamworth. The TIA is considered by GSC likely to underestimate use of this road, potentially triggering a LoS of D on this route	See (e)

Road	Recommended upgrade	Reason	SKM consideration
Breeza local roads and infrastructure	Consider the need to upgrade: ■ Bulunbulun Road / Maitland Street intersection ■ Bulunbulun Road / Kamilaroi Highway intersection ■ Low-level bridge at Mooki River (Maitland Street) ■ Maitland Street ■ Maitland Street / Hogarth Street intersection ■ Hogarth Street ■ Railway crossing (Hogarth Street) ■ Hogarth Street / kamilaroi Highway intersection	Will be used by project-related traffic to and from Tamworth with resultant road safety implications	See (g)
Werris Creek Gap Road	Widen and seal to 10 m formation, 9m pavement and 1 m shoulder, including culverts (and potential bridge replacement of culverts), and upgrade the intersection with the Kamilaroi Hwy	Road network currently in poor condition	SKM considers that the predicted volume of traffic generated by the Project will have minimal impact on the level of risk associated with existing hazards on this road, and therefore no road upgrade is required. See (b) for the requirement for an intersection upgrade.
Werris Creek Road (MR 130)	Upgrade intersections with Bulunbulun Road (including upgrade to Anstey Creek bridge) and Werris Creek Gap Rd	Road network currently in poor condition	See (b) for the requirement for intersection upgrades. With respect to the Anstey Creek bridge, SKM considers that should the bridge require upgrading as part of the intersection upgrade, the applicant should be responsible for the upgrade.

Road	Recommended upgrade	Reason	SKM consideration
Waverly Road	Upgrade intersection with Kamilaroi Hwy	Will be used by project-related with resultant road safety implications	Based on the analysis in (b), SKM considers that the recommended intersection upgrade is not warranted.

k)

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