

Syerston

MODIFICATION 4 ENVIRONMENTAL ASSESSMENT

Project

Appendix E

Road Transport Assessment



Syerston Project Modification 4 Fifield, NSW Road Transport Assessment

Client //	Clean TeQ Holdings Limited
Office //	NSW
Reference //	N108040
Date //	10/11/17

Syerston Project Modification 4

Fifield, NSW

Road Transport Assessment

Issue: B 10/11/17

Client: Clean TeQ Holdings Limited

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1. Introduction

The Syerston Project (the Project) is situated approximately 350 kilometres (km) west-northwest of Sydney, near the village of Fifield, New South Wales (NSW). Scandium21 Pty Ltd owns the rights to develop the Project. Scandium21 Pty Ltd is a wholly owned subsidiary of Clean TeQ Holdings Limited (Clean TeQ). Development Consent DA 374-11-00 for the Project was issued in 2001.

This report has been prepared on behalf of Clean TeQ to present the findings of an assessment of the road transport implications of the proposed modification to Development Consent DA 374-11-00 (Modification 4 or the Modification).

The approved Project includes the establishment and operation of:

- a mine and processing facility (MPF);
- a limestone quarry;
- a rail siding;
- a natural gas pipeline;
- borefields and water pipeline; and
- associated transport and infrastructure.

Construction of the Project substantially commenced in 2006 with the construction of the borefields, however Project operations are yet to commence.

The approved Project involves an Initial Production Phase focussed on scandium oxide production, transitioning to the Full Production Phase of scandium oxide, nickel and cobalt precipitate production when market conditions are favourable. The Initial Production Phase will be a smaller scale operation, with a significantly lower level of activity, and will not include construction of the limestone quarry and rail siding.

The Modification involves the implementation of a number of opportunities to optimise the Full Production Phase of the Project, with some associated amendments to approved transport sources and methods, and no change to the workforce compared with the approved Project.

This study has considered the implications of the modified Project on the operation of the road network.

2. Existing Road Transport Environment

2.1 Site Location

The Project will be located near Fifield, approximately 80 km northwest of Parkes in Central NSW (Figure 2-1). The approved locations of the limestone quarry, rail siding, natural gas pipeline, borefields, water pipeline and associated infrastructure are shown on Figure 2-1.

2.2 Road Network

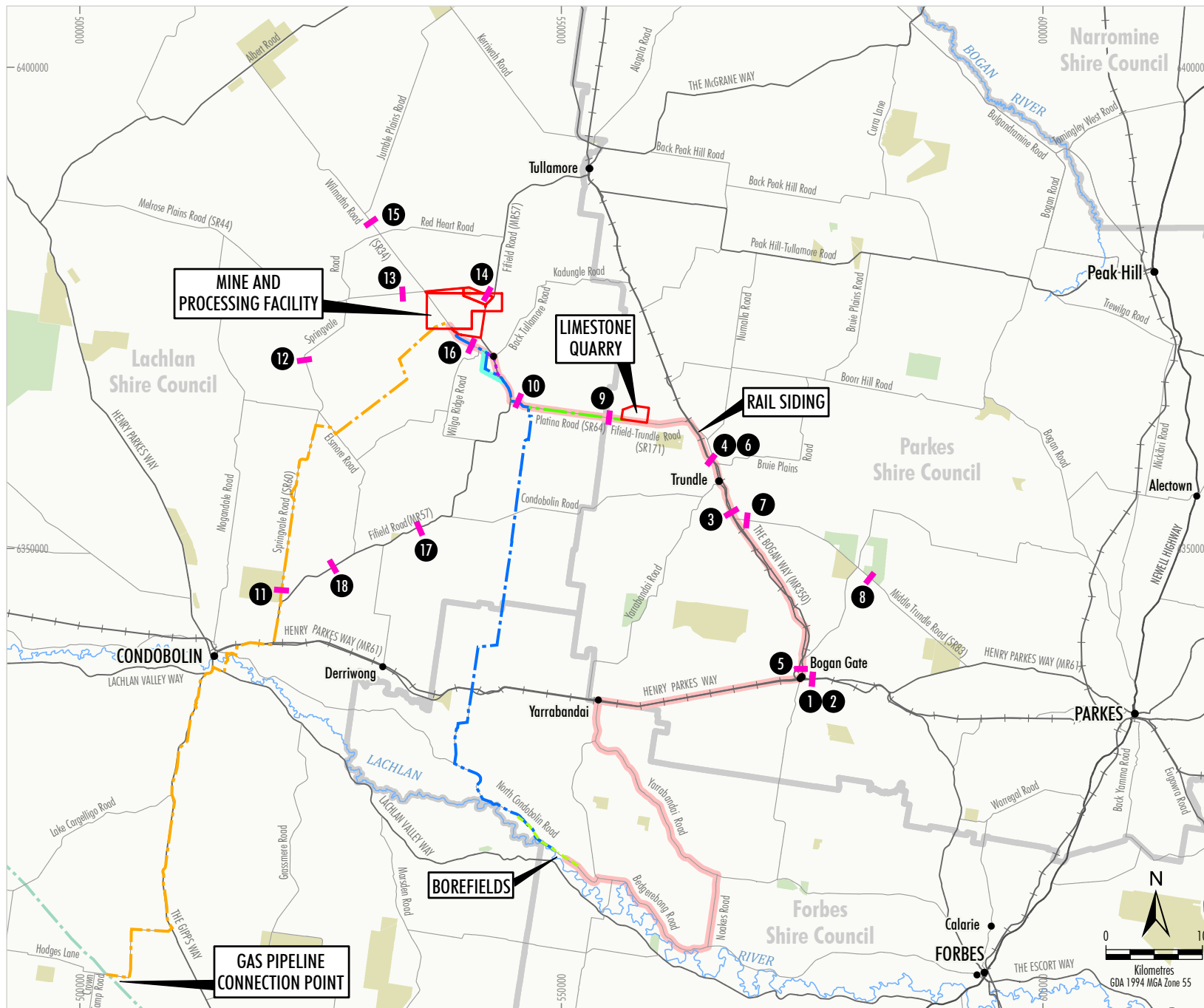
The road system in the region is presented in Figure 2-1 and briefly described below.

Henry Parkes Way (MR61E) forms part of Main Road 61 East, which provides an east-west link between Orange and Condoblin. It connects Parkes and Condobolin through Bogan Gate and Ootha, and is also known as Parkes-Condobolin Road. Henry Parkes Way typically has a single travel lane in each direction with gravel or grassed shoulders, and a speed limit of 100 kilometres per hour (km/h). Through Bogan Gate, the speed limit is reduced to 50 km/h. It has centre and edge line marking and guidance posts. It is crossed by the Bogan Gate Tottenham Railway at a passive level crossing at Bogan Gate, and by the Parkes Narromine Railway at an active level crossing approximately 5 km west of Parkes.

The Bogan Way (MR350) is a Regional Road and forms part of Main Road 350, which extends from the Newell Highway at Forbes to Henry Parkes Way near Bogan Gate thence via Trundle and Kadungla to the Peak Hill-Tullamore Road (MR348) near Tullamore. The Bogan Way has a two lane sealed carriageway, with centre line marking and guidance posts. The road shoulder is unpaved and varies in width from 0 to 2 metres (m), with no edge line marking. The speed limit is generally 100 km/h, and 50 km/h through Trundle and at the southern end in Bogan Gate. There is a 40 km/h school zone at the southern end of Trundle. The Bogan Way is crossed by the Bogan Gate Tottenham Railway at three passive control level crossings between Trundle and Bogan Gate. As a Regional Road, the NSW Roads and Maritime Services (RMS) provides financial assistance to the Parkes Shire Council for its management.

Middle Trundle Road (SR83) runs northwest from Henry Parkes Way approximately midway between Parkes and Bogan Gate to The Bogan Way approximately 4 km south of Trundle. It is also known as Shire Road 83. The route between Parkes and Trundle along Middle Trundle Road is some 10 km shorter than via Bogan Gate. The intersections at each end of Middle Trundle Road are basic rural road T-intersections, without auxiliary lane treatments or channelisation. Condition 43, Schedule 3 of Development Consent DA 374-11-00 requires Clean TeQ to upgrade the intersection of Henry Parkes Way and Middle Trundle Road prior to commissioning of the MPF. The intersection of Middle Trundle Road with The Bogan Way was constructed in 2013 and has some turning path deficiencies relating to B-doubles and B-triples, but is deemed suitable due to low volumes (Crossroads Civil Design, 2014). A central portion of Middle Trundle Road approximately 16 km long remains unsealed.

The McGrane Way (MR354) is a Regional road which extends from the Nyngan-Condobolin Road (MR57) at Tullamore to the Tomingley-Narromine Road (MR89) at Narromine. It is typically a sealed road with a speed limit of 100 km/h, a single travel lane in each direction and centre and edge line marking.



- LEGEND**
- NSW National Parks and Wildlife Service
 - State Forest
 - Local Government Boundary
 - Railway
 - Existing Gas Pipeline
 - Mining Lease Application Boundary
 - Approved Gas Pipeline
 - Approved Water Pipeline
 - Approved Limestone Quarry Water Pipeline
 - Approved Borefield Infrastructure Corridor
 - Modified Water Pipeline Alignment Option
 - Approved Ffield Bypass
 - Short-term Water Transport Route
 - Traffic Survey Location

Source: Black Range Minerals (2000); NSW Department of Industry (2017); NSW Land and Property Information (2017); Office of Environment and Heritage NSW (2017)



SYERSTON PROJECT MODIFICATION 4

Regional Location and
2010 - 2015 Traffic Survey Locations

Figure 2-1

Fifield Road (MR57N) is a Regional Road also known as Main Road 57 North, which runs northwards from Henry Parkes Way approximately 6 km east of Condobolin, through Fifield to Tullamore. In Fifield, it is known as **Slee Street**. It is crossed by the Parkes Narromine Railway just to the north of its intersection with Henry Parkes Way at an active level crossing, and by the Bogan Gate Tottenham Railway at a passive level crossing at Tullamore. It is a two lane sealed road with centre line marking. The speed limit on Fifield Road is typically 100 km/h, and reduced to 50 km/h at Fifield. This portion of MR57 is a Regional Road, thus RMS provides financial assistance to the Lachlan Shire Council for its management.

Fifield-Trundle Road (SR171)/Platina Road (SR64) is also known as Shire Road 171/Shire Road 64, and extends west from The Bogan Way approximately 6 km north of Trundle to Fifield Road approximately 5 km south of Fifield. The section of road in the Parkes Shire is Fifield-Trundle Road and the section of road in the Lachlan Shire is Platina Road. Fifield-Trundle Road typically has a 6.5 m wide formation with 6.0 m wide seal. Platina Road typically has a sealed surface approximately 4 m wide, with 1 m gravel shoulders. There is limited line marking. The intersections at the ends of Fifield-Trundle Road and Platina Road are basic rural T-intersections, without auxiliary lane treatments or channelisation.

Wilmatha Road (SR34), also known as Shire Road 34, runs northwest from Fifield past the MPF site, and crosses Melrose Plains Road at the northwestern boundary of the MPF. It has an unsealed surface approximately 8 to 12 m wide and a speed limit of 100 km/h. The MPF access road will intersect with Wilmatha Road at an Austroads Type C intersection.

Melrose Plains Road (SR44) runs east-west along the northern boundary of the MPF and is also known as Shire Road 44. It intersects with Fifield Road northeast of the MPF at a four way intersection. At the northwestern boundary of the MPF, Melrose Plains Road intersects with Wilmatha Road (Shire Road 34) at a four way intersection, and farther to the west, it intersects with Springvale Road (Shire Road 60) at two offset T-intersections, at which Melrose Plains Road traffic has priority. Melrose Plains Road is unsealed, and approximately 8 to 12 m wide, through flat terrain and has a speed limit of 100 km/h.

Springvale Road (SR60), or Shire Road 60, extends in a northerly direction from Fifield Road north of Henry Parkes Way, crossing Melrose Plains Road some 8 km west of the MPF. It has a speed limit of 100 km/h, and follows a generally straight alignment through flat terrain. It is a sealed road approximately 6 m wide with limited line marking.

Yarrabandai Road provides a link between The Bogan Way northwest of Forbes and The Bogan Way at Trundle, crossing Henry Parkes Way at staggered T-intersections approximately 22 km west of Bogan Gate. Approximately 24 km south of Henry Parkes Way, Yarrabandai Road intersects with **Noakes Road** which provides a 7 km long link to **Bedgerabong Road** at Bedgerabong. Approximately 15 km west of Bedgerabong, Bedgerabong intersects with **North Condobolin Road**, which is the access road for the Project borefields. South of Henry Parkes Way, this route is typically constructed with a narrow sealed surface.



2.3 Heavy Vehicle Routes

The RMS website provides information on the enforceable network for all Restricted Access Vehicles (RAV) operating at General Mass Limits and Concessional Mass Limits. An interactive map provides the following information about use of the roads in the vicinity of the Project by heavy vehicles:

- Lachlan Shire is an approved area for road trains and B-doubles.
- Lachlan Shire, Parkes Shire and Forbes Shire are approved areas for travel by vehicles up to 4.6 m high.
- Road trains and B-doubles up to 25 m long are permitted without specific conditions on Henry Parkes Way and Fifield Road.
- B-doubles up to 25 m long are permitted on The Bogan Way, and road trains are permitted at a maximum speed of 80 km/h.
- Road trains and B-doubles up to 25 m long are permitted on Middle Trundle Road at a maximum of 80 km/h, with some additional conditions as follows:
 - No road train access between sunset and sunrise.
 - No road train travel permitted between 7.30am and 9.00am, and between 3.00pm and 4.30pm on school days.
 - No B-double travel permitted between Henry Parkes Way and Five Chain Lane between 7.30am and 9.00am, and between 3.00pm and 4.30pm on school days.
 - During periods of wet weather, Parkes Shire Council is to be consulted regarding possible road closures.
 - Road trains and B-doubles are permitted on The McGrane Way at a maximum of 80 km/h within Parkes Shire.

2.4 Historic Traffic Conditions

Traffic survey data has been collated from data available from Lachlan Shire Council and Parkes Shire Council, covering data collected since 2010 on roads of relevance to the Project. It is noted that Parkes Shire Council provided GTA Consultants with additional data from early 2016 on Middle Trundle Road and The Bogan Way (Sites 3, 7 and 8 in Figure 2-1). Due to inconsistencies between the counting methods used for these and earlier surveys, the possible impacts of road works during the surveys, and in consultation with Parkes Shire Council, the results of these later surveys have not been relied upon for this assessment.

Table 2.4 summarises average daily traffic volumes on routes in the Project region, which includes the average over all surveyed days at each location. The locations of the traffic count sites are shown on Figure 2-1.

Table 2.1: Daily Traffic Volumes 2010 to 2015 (vehicles per day)

Site ^A	Road	Location	Date	Average Daily Traffic
1	Henry Parkes Way	East of Bogan Gate	Dec 2014	986
2	Henry Parkes Way	East of Bogan Gate	Nov 2014	1,024
3	The Bogan Way	North of Middle Trundle Road	Aug 2015	376
4	The Bogan Way	North of Trundle (South of Numulla Road)	Dec 2014	506
5	The Bogan Way	North of Henry Parkes Way	Nov 2014	467
6	The Bogan Way	North of Trundle	Oct 2014	479
7	Middle Trundle Road	East of The Bogan Way	Oct 2014	98
8	Middle Trundle Road	13 km Northwest of Henry Parkes Way	Sep 2014	93
9	Fifield-Trundle Road	At Parkes Shire Boundary	Sep-Nov 2015	85
10	Platina Road	East of Fifield Road	Jul 2010	54
11	Springvale Road	300 m North of Fifield Road	Jul 2010	26
12	Springvale Road	27 km North of Fifield Road	Feb-Mar 2014	21
13	Melrose Plains Road	2 km West of Wilmatha Road	Dec 2010-Jan 2011	21
14	Melrose Plains Road	West of Fifield Road	May-Jun 2010	8
15	Wilmatha Road	North of Red Heart Road	Dec 2010-Jan 2011	17
16	Wilmatha Road	West of Wilga Ridge Road	Nov 2010	26
17	Fifield Road	22 km North of Henry Parkes Way	May-Jun 2013	123
18	Fifield Road	North of Raynella Road	Feb-Apr 2014	234

Data source: Lachlan Shire Council and Parkes Shire Council.

^A Refer to Figure 2-1.

Table 2.5 summarises the peak volumes recorded in any one hour over the average weekdays, noting that the data indicates that weekdays are typically busier than weekend days.

Table 2.2: Average Weekday Peak Hourly Traffic Volumes 2010 to 2015 (vehicles per hour)

Site ^A	Road	Location	Date	Peak Hour Start	Peak Hour Volume
1	Henry Parkes Way	East of Bogan Gate	Dec 2014	15:00	88
2	Henry Parkes Way	East of Bogan Gate	Nov 2014	14:00	90
3	The Bogan Way	North of Middle Trundle Road	Aug 2015	15:00	35
4	The Bogan Way	North of Trundle (South of Numulla Road)	Dec 2014	16:00	47
5	The Bogan Way	North of Henry Parkes Way	Nov 2014	14:00	44
6	The Bogan Way	North of Trundle	Oct 2014	9:00	48
7	Middle Trundle Road	East of The Bogan Way	Oct 2014	15:00	11
8	Middle Trundle Road	13 km Northwest of Henry Parkes Way	Sep 2014	16:00	8
9	Fifield-Trundle Road	At Parkes Shire Boundary	Sep-Nov 2015	16:00	7
10	Platina Road	East of Fifield Road	Jul 2010	17:00	6
11	Springvale Road	300 m North of Fifield Road	Jul 2010	17:00	3
12	Springvale Road	27 km North of Fifield Road	Feb-Mar 2014	8:00	3
13	Melrose Plains Road	2 km West of Wilmatha Road	Dec 2010-Jan 2011	13:00	2
14	Melrose Plains Road	West of Fifield Road	May-Jun 2010	10:00	1
15	Wilmatha Road	North of Red Heart Road	Dec 2010-Jan 2011	17:00	2
16	Wilmatha Road	West of Wilga Ridge Road	Nov 2010	11:00	3
17	Fifield Road	22 km North of Henry Parkes Way	May-Jun 2013	16:00	12
18	Fifield Road	North of Raynella Road	Feb-Apr 2014	16:00	19

Data source: Lachlan Shire Council and Parkes Shire Council.

^A Refer to Figure 2-1.

The data indicates that at most locations, the busiest period occurs in the mid to late afternoon, and that peak hourly volumes are generally low on the relevant roads. Henry Parkes Way is the busiest road, with a peak volume of 90 vehicles per hour, while The Bogan Way carries around 35 to 48 vehicles per hour, and Fifield Road fewer than 20 vehicles per hour.

The traffic volume data provided by Parkes Shire Council and Lachlan Shire Council also provides information on the types of vehicles using each of the routes. Table 2.6 presents the proportions of light and heavy vehicles at each of the surveyed locations. Light vehicles include motorcycles, cars, vans, four wheel drives (4WDs), and utes (including those towing a trailer). Heavy vehicles includes single unit trucks and buses with two to four axles, semi-trailers, rigid trucks with trailers, B-doubles and road trains (where permissible).



Table 2.3: Traffic Composition 2010 to 2015 (percent of total traffic)

Site ^A	Road	Location	Date	Percent Light	Percent Heavy
1	Henry Parkes Way	East of Bogan Gate	Dec 2014	80.0	20.0
2	Henry Parkes Way	East of Bogan Gate	Nov 2014	79.6	20.4
3	The Bogan Way	North of Middle Trundle Road	Aug 2015	85.6	14.4
4	The Bogan Way	North of Trundle (South of Numulla Road)	Dec 2014	83.9	16.1
5	The Bogan Way	North of Henry Parkes Way	Nov 2014	80.0	20.0
6	The Bogan Way	North of Trundle	Oct 2014	67.1	32.9
7	Middle Trundle Road	East of The Bogan Way	Oct 2014	93.2	6.8
8	Middle Trundle Road	13 km Northwest of Henry Parkes Way	Sep 2014	90.9	9.1
9	Fifield-Trundle Road	At Parkes Shire Boundary	Sep-Nov 2015	72.7	27.3
10	Platina Road	East of Fifield Road	Jul 2010	81.3	18.7
11	Springvale Road	300 m North of Fifield Road	Jul 2010	94.3	5.7
12	Springvale Road	27 km North of Fifield Road	Feb-Mar 2014	55.6	44.4
13	Melrose Plains Road	2 km West of Wilmatha Road	Dec 2010-Jan 2011	60.9	39.1
14	Melrose Plains Road	West of Fifield Road	May-Jun 2010	85.6	14.4
15	Wilmatha Road	North of Red Heart Road	Dec 2010-Jan 2011	78.2	21.8
16	Wilmatha Road	West of Wilga Ridge Road	Nov 2010	68.7	31.3
17	Fifield Road	22 km North of Henry Parkes Way	May-Jun 2013	72.3	27.7
18	Fifield Road	North of Raynella Road	Feb-Apr 2014	61.1	38.9

Data source: Lachlan Shire Council and Parkes Shire Council.

Note totals may not add to 100% due to rounding.

^A Refer to Figure 2-1.

Table 2.6 demonstrates that the proportional contribution of heavy vehicles to total traffic varies significantly on the surveyed roads, and even along a single road. The lowest recorded proportion of heavy vehicles occurred on Springvale Road 300 m north of Fifield Road (5.7 percent [%]) and the highest proportion also occurred on Springvale Road, 27 km north of Fifield Road (44.4% of total traffic). It is noted however that where background traffic volumes were low, small variations in the number of heavy vehicles on an average day can result in erratic results when considering the contribution of heavy vehicles to the total traffic.

2.5 Traffic Surveys

The traffic data from Lachlan Shire Council and Parkes Shire Council has been supplemented with data collected at locations specific to the Project during November 2016:

- Fifield Road between Tullamore and Fifield;
- Slee Street in Fifield;
- Melrose Plains Road east of Wilmatha Road;
- Wilmatha Road south of Melrose Plains Road; and
- The McGrane Way north of Back Peak Hill Road.

Over the November 2016 survey period, Newell Highway was closed between Forbes and West Wyalong due to flooding, with the small possibility that travel patterns in the Fifield region may be atypical. The advertised diversion suggested a route farther to the south and west, via Temora, Stockinbingal, Young, and Cowra, so impacts within the Fifield region were likely to be low.



The original one week survey period was however extended to include several days after the reopening of Newell Highway on 11 November, so that any impact of the road closure could be determined. Review of the data however indicates that there was no significant difference between volumes during and after the closure, thus the results of the full survey period have been included in this assessment.

Ongoing surveys have also been undertaken during 2017 at the following locations relevant to the Project (Figure 2-1):

- The Bogan Way between Trundle and Fifield-Trundle Road;
- The Bogan Way between Bogan Gate and Middle Trundle Road;
- Middle Trundle Road between The Bogan Way and Henry Parkes Way;
- Platina Road/Fifield-Trundle Road between The Bogan Way and Fifield Road;
- Fifield Road between Slee Street and Platina Road;
- Fifield Road between Fifield-Trundle Road and Springvale Road;
- Wilmatha Road north of Sunrise Lane; and
- Melrose Plains Road between Fifield Road and Wilmatha Road.

During the ongoing surveys during 2017, roadworks on The Bogan Way south of its intersection with Middle Trundle Road resulted in atypical conditions for a period, with a detour via Middle Trundle Road in place. Some loss of data also occurred due to damage to the tube on The Bogan Way south of Middle Trundle Road. Information collected during those periods has been excluded from the results used in this assessment. The data used covers the first quarter of 2017, i.e. between 1 January and 31 March 2017.

Table 2.4 presents the average daily traffic volumes at the locations surveyed in 2016 and 2017.

Table 2.4: Daily Traffic Volumes 2016 and 2017 (vehicles per day)

Site ^A	Road	Location	Average Daily Traffic
November 2016 Surveys			
19	Fifield Road	Between Tullamore and Fifield	185
20	Slee Street	In Fifield	246
21	Melrose Plains Road	East of Wilmatha Road	13
22	Wilmatha Road	South of Melrose Plains Road	21
23	The McGrane Way	North of Back Peak Hill Road	124
1 January to 31 March 2017 Surveys			
24	The Bogan Way	between Trundle and Fifield-Trundle Road	367
25	The Bogan Way	between Bogan Gate and Middle Trundle Road	388
26	Middle Trundle Road	between The Bogan Way and Henry Parkes Way	118
27	Fifield-Trundle Road	between The Bogan Way and Platina Road	78
28	Fifield Road	between Slee Street and Platina Road	253
29	Fifield Road	between Platina Road and Springvale Road	198
30	Wilmatha Road	North of Sunrise Lane	19
31	Melrose Plains Road	between Fifield Road and Wilmatha Road	11

^A Refer to Figure 2-2.

Table 2.5 summarises the peak volumes recorded in any one hour over the average weekdays during the 2016 and 2017 surveys, noting that the data indicates that weekdays are busier than weekend days. The 2017 data is based on the last week of March 2017, with the exception of the survey location on The Bogan Way between Bogan Gate and Middle Trundle Road. The volume for that location is from the latest available week during the first quarter of 2017, being 27-31 March.

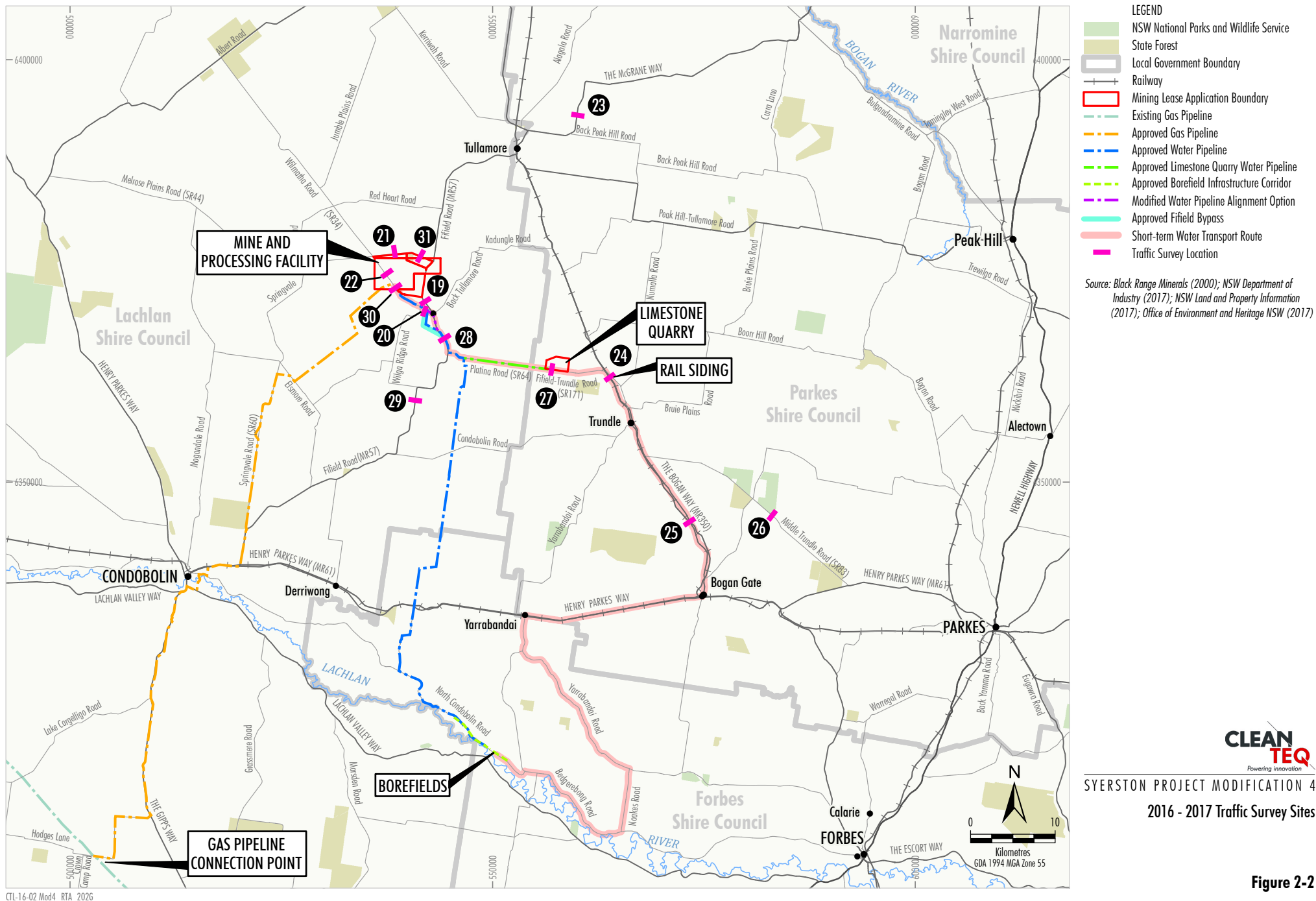


Table 2.5: Average Weekday Peak Hourly Traffic Volumes 2016 and 2017 (vehicles per hour)

Site ^A	Road	Location	Peak Hour Start	Peak Hour Volume
November 2016 Surveys				
19	Fifield Road	Between Tullamore and Fifield	16:00	21
20	Slee Street	In Fifield	16:00	26
21	Melrose Plains Road	East of Wilmatha Road	various	2
22	Wilmatha Road	South of Melrose Plains Road	various	2
23	The McGrane Way	North of Back Peak Hill Road	15:00	14
1 January to 31 March 2017 Surveys^B				
24	The Bogan Way	between Trundle and Fifield-Trundle Road	8:00	43
25	The Bogan Way ^C	between Bogan Gate and Middle Trundle Road	8:00	41
26	Middle Trundle Road	between The Bogan Way and Henry Parkes Way	8:00	17
27	Fifield-Trundle Road	between The Bogan Way and Platina Road	8:00	11
28	Fifield Road	between Slee Street and Fifield-Trundle Road	various	28
29	Fifield Road	between Fifield-Trundle Road and Springvale Road	12:00	20
30	Wilmatha Road	North of Sunrise Lane	various	2
31	Melrose Plains Road	between Fifield Road and Wilmatha Road	15:00	4

^A Refer to Figure 2-2.

^B Average weekday 27-31 March 2017.

^C Average weekday 6-10 March 2017.

The data indicates that the busiest period during those surveys occurred at various times of the day, with some being in the morning and others in the mid to late afternoon. The average weekday peak hourly volumes are generally low on the surveyed roads. Of the roads surveyed during 2016 and 2017, The Bogan Way north of Trundle is the busiest road, with a peak volume of 43 vehicles per hour.

Table 2.6 summarises the proportional contribution of heavy vehicles to total traffic during the 2016 and 2017 surveys.

Table 2.6: Traffic Composition 2016 to 2017 (percent of total traffic)

Site ^A	Road	Location	Light	Heavy
November 2016 Surveys				
19	Fifield Road	Between Tullamore and Fifield	70.4	9.5
20	Slee Street	In Fifield	71.4	28.5
21	Melrose Plains Road	East of Wilmatha Road	50.6	49.4
22	Wilmatha Road	South of Melrose Plains Road	61.9	38.1
23	The McGrane Way	North of Back Peak Hill Road	75.9	24.1
1 January to 31 March 2017 Surveys				
24	The Bogan Way	between Trundle and Fifield-Trundle Road	80.7	19.3
25	The Bogan Way	between Bogan Gate and Middle Trundle Road	76.0	24.0
26	Middle Trundle Road	between The Bogan Way and Henry Parkes Way	78.0	22.0
27	Fifield-Trundle Road	between The Bogan Way and Platina Road	82.1	17.9
28	Fifield Road	between Slee Street and Fifield-Trundle Road	71.1	28.9
29	Fifield Road	between Fifield-Trundle Road and Springvale Road	64.6	35.4
30	Wilmatha Road	North of Sunrise Lane	84.2	15.8
31	Melrose Plains Road	between Fifield Road and Wilmatha Road	72.7	27.3

^A Refer to Figure 2-2.

Note: Totals may not add to 100% due to rounding.



During the 2016 and 2017 surveys, the lowest recorded heavy vehicle contribution was on Fifield Road north of Fifield, where 9.5% of total vehicles were heavy vehicles, while the highest recorded contribution was 49.4% of total vehicles on Melrose Plains Road east of Wilmatha Road. As noted previously, the high proportion of heavy vehicles on roads such as Melrose Plains Road should be considered in the context of the total volumes, which are very low.

2.6 Road Safety

Road crash data was obtained from RMS for the most recent five year period available on the main Project access routes. The data covers finalised data for the period from 1 January 2011 to 31 December 2015, and provisional data for the period to 14 November 2016. Data during the provisional period may be incomplete and subject to change, noting that the provisional data includes three crashes in the assessment which follows. The data includes those crashes which conform to the national guidelines for reporting and classifying road vehicle crashes based on the following criteria:

- The crash was reported to the police.
- The crash occurred on a road open to the public.
- The crash involved at least one moving vehicle.
- The crash involved at least one person being killed or injured or at least one motor vehicle being towed away.

Crash data was obtained and reviewed for the following roads:

- Henry Parkes Way (MR61) between Condobolin and Parkes;
- The Bogan Way (MR350) between Bogan Gate and The McGrane Way (MR354) north of Tullamore;
- Fifield Road (MR57 North) between Henry Parkes Way and Tullamore;
- Middle Trundle Road (SR83) between The Bogan Way and Henry Parkes Way;
- Springvale Road (SR60) between Fifield Road and Wilmatha Road;
- Wilmatha Road (SR34) between Fifield and Springvale Road/Red Heart Road;
- Platina Road (SR64)/Fifield-Trundle Road (SR171) between Fifield Road and The Bogan Way;
- Melrose Plains Road (SR44) between Springvale Road and The Bogan Way;
- The McGrane Way (MR354) between The Bogan Way (MR350) north of Tullamore and Narromine; and
- The component of the proposed water transport route south of the Henry Parkes Way (Section 4.5.1) including North Condobolin Road, Bedgerabong Road, Noakes Road and Yarrabandai Road (for the period from 1 January 2012 to 31 March 2017).

Table 2.7 summarises the number and general types of crashes which occurred on the sections of road under consideration.

Table 2.7: Reported General Crash Types on Project Access Routes (January 2011 to November 2016)

Road	Pedestrian	Multiple Vehicles					Single Vehicle			Other
		Adjacent Approaches	Opposing Directions	Same Direction	U-turn/Parking	Overtaking	On Path	Off Path on Straight	Off Path on Curve	
Henry Parkes Way Condobolin to Parkes	-	-	-	-	-	-	4	15 ^A	8	1
The Bogan Way Bogan Gate to The McGrane Way	-	1	-	-	-	2	2	6	2	-
Fifield Road Henry Parkes Way to Tullamore	-	-	-	-	-	-	-	2	2	-
Middle Trundle Road The Bogan Way to Henry Parkes Way	-	-	-	-	-	-	1	9 ^B	2 ^B	-
Springvale Road Fifield Road to Wilmatha Road	-	-	-	-	-	-	-	-	-	-
Wilmatha Road Springvale Road to Fifield Road	-	-	-	-	-	-	-	-	-	-
Platina Road/Fifield-Trundle Road Fifield Road to The Bogan Way	-	-	-	-	-	-	-	-	-	-
Melrose Plains Road Springvale Road to The Bogan Way	-	-	-	-	-	-	-	-	-	-
The McGrane Way Tullamore to Narromine	-	-	-	-	-	-	-	-	-	1 ^B
Water Transport Route Henry Parkes Way to Borefields ^C	-	-	-	-	-	-	1	-	-	-
Total Crashes by Type	-	1	-	-	-	2	8	32	14	2
Total People Injured	-	1	-	-	-	1	5	17	15	2
Total People Killed	-	-	-	-	-	-	-	3	1	1

^A Includes two fatal crashes. ^B Includes one fatal crash. ^C Data from 1 January 2012 to 31 March 2017.

Over the five years and routes reviewed, a total of 59 crashes occurred on the main Project access routes, resulting in five fatalities and 41 people being injured. No reported crashes occurred on Springvale Road, Wilmatha Road, Platina Road, Fifield-Trundle Road, or Melrose Plains Road.

Table 2.7 demonstrates that over all the roads investigated, the most common types of crashes involved single vehicles leaving the carriageway, known as run-off-road (ROR) crashes, which made up 79% of the reported crashes in Table 2.7, 80% of people killed, and 78% of injured people. This is consistent with Austroads (2015), which found that in rural road environments in Australia, off-path crashes were the most likely. They were also associated with the greatest numbers of fatalities, which is consistent with the routes investigated here. ARRB (2011) states that known causes of ROR crashes include:

- driver behaviours such as speed, inattention, avoidance manoeuvres, errant vehicles;
- driver impairment including fatigue, alcohol, drugs, mood state;
- road conditions such as horizontal alignment, shoulder deficiencies, slippery surface, poor delineation, damaged surfaces;
- vehicle failure; and
- environmental conditions such as rain, fog, snow, livestock or native fauna.

The road safety history of the various roads has been reviewed with regard to each road's crash exposure, which considers the rate at which crashes occur in crashes per vehicle kilometres travelled (VKT). One VKT is equivalent to one vehicle travelling a distance of 1 km, or alternatively two vehicles travelling for a distance of half a kilometre (and so on). The crash exposure increases as the length of a trip increases, and as traffic volumes increase. This is a general measure of the performance of the roads, and enables a comparison to be made between the relative safety of roads.

Table 2.8 presents the estimated average daily traffic (ADT) for each of the route sections described in Table 2.7, and the calculated crash rates for those routes. For Middle Trundle Road, the calculation is based only on those crashes which occurred on the sealed length of the route.

Table 2.8: Crash Rates on Project Access Routes January 2011 to November 2016

	Distance (km)	Estimated ADT	MVKT	Number of Crashes	Crashes per 100 MVKT
Henry Parkes Way Condobolin to Parkes	100	1,000	213.5	28	13.1
The Bogan Way Bogan Gate to Tullamore	59	500	63.0	13	20.6
Fifield Road Henry Parkes Way to Tullamore	73	230	35.8	4	11.2
Middle Trundle Road The Bogan Way to Henry Parkes Way	13	100	2.8	3	108.1
The McGrane Way Tullamore to Narromine	85	130	23.6	1	4.2
Water Transport Route Henry Parkes Way to Borefields ^A	54	100	10.3	1	0.1

ADT is based on seven day average volumes from recent surveys (Section 2.4).

MVKT = million vehicle kilometres travelled.

^A 1 January 2012 to 31 March 2017

RTA (2004) indicates that based on a review of data on 36 classified roads in NSW, undivided two lane rural roads have an average crash rate of 32.8 crashes per 100 million VKT, of which 28.6 crashes per 100 million VKT were non-intersection crashes, and 4.2 crashes per 100 million VKT were intersection crashes. The overall crash rate was higher where sealed shoulders of less than 1.0 m width were provided, at 38.1 crashes per 100 million VKT, and lower where sealed shoulders greater than 1.0 m width were provided, at 28.5 crashes per million VKT. That study was based on crash data from 1997 to 2001, noting that changes have occurred in the crash reporting protocols over that time and in general crash trends. Between 2000 and 2014, the VKT in NSW increased by 27%, while the number of casualty crashes decreased by 13% (Centre for Road Safety, 2015). Thus direct comparison with the RTA (2004) data is considered to have limited relevance, however as a general guide, comparison with the average crash rate of 32.8 crashes per 100 million VKT on two lane rural classified roads indicates that the overall crash rate on Henry Parkes Way, The Bogan Way, Fifield Road and The McGrane Way are below that average.

The rate on the sealed length of Middle Trundle Road is well above that average, however the combination of a low number of crashes and low traffic volumes over a relatively short road length exaggerates the calculated crash rate. The routes included in the RMS (2004) study were classified roads varying between 39 km and 1,059 km in length (average 273 km) and carrying significantly higher volumes than that of Middle Trundle Road. The higher than average rate calculated for the sealed portion of Middle Trundle Road is not considered to reflect any particular issue with that road, rather that it is not indicative of the routes used in the calculation of average crash rates.

A detailed review of the crashes on each of these roads is provided in the following sections.

2.6.1 Middle Trundle Road

The details of the crash history of Middle Trundle Road between January 2011 and November 2016 are summarised in Table 2.9.

Table 2.9: Middle Trundle Road Crash Summary January 2011 to November 2016

	Pedestrian	Multiple Vehicles					Single Vehicle			Other
		Adjacent Approaches	Opposing Directions	Same Direction	U-turn/Parking	Overtaking	On Path	Off Path on Straight	Off Path on Curve	
Total Crashes	-	-	-	-	-	-	1	9	2	-
Road Surface Condition										
Dry Road	-	-	-	-	-	-	1	8	2	-
Wet Road	-	-	-	-	-	-	-	1	-	-
Weather Conditions										
Fine	-	-	-	-	-	-	1	9	2	-
Overcast	-	-	-	-	-	-	-	-	-	-
Raining	-	-	-	-	-	-	-	-	-	-
Vehicle Type										
Motorcycle	-	-	-	-	-	-	1	1	-	-
Car, Station Wagon, 4WD, Van	-	-	-	-	-	-	-	6	2	-
Light or Large Truck or Bus	-	-	-	-	-	-	-	2	-	-
Articulated Vehicle	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-
Severity of Crash										
Fatal	-	-	-	-	-	-	-	1	1	-
Injury	-	-	-	-	-	-	1	4	1	-
Non-injury	-	-	-	-	-	-	-	4	-	-
People Killed or Injured^A										
Killed	-	-	-	-	-	-	-	1	1	-
Injured	-	-	-	-	-	-	-	3	-	-
Factors^B										
Alcohol	-	-	-	-	-	-	-	-	1	-
Fatigue	-	-	-	-	-	-	-	4	-	-
Speed	-	-	-	-	-	-	-	-	2	-
None	-	-	-	-	-	-	1	5	-	-

^A Note this reports the number of people injured or killed not the number of accidents resulting in injury or fatalities.

^B Factors considered to have contributed to the crash, more than one factor can be nominated for a single crash.

Two fatal crashes occurred along Middle Trundle Road, both of which occurred in 2011 and involved loss of control of a single vehicle in fine weather on a dry road surface. One occurred in darkness at 12:30am and speed and alcohol were nominated as contributing factors. The other occurred in the late afternoon at 4:20pm and fatigue was nominated as a contributing factor. Both fatal crashes occurred on the sealed length of Middle Trundle Road.

2.6.2 Henry Parkes Way

The details of the crash history of Henry Parkes Way between Condobolin and Parkes between January 2011 and November 2016 are summarised in Table 2.10.

Table 2.10: Henry Parkes Way Crash Summary January 2011 to November 2016

	Pedestrian	Multiple Vehicles					Single Vehicle			Other
		Adjacent Approaches	Opposing Directions	Same Direction	U-turn/Parking	Overtaking	On Path	Off Path on Straight	Off Path on Curve	
Total Crashes	-	-	-	-	-	-	4	15	8	1
Road Surface Condition										
Dry Road	-	-	-	-	-	-	3	11	8	1
Wet Road	-	-	-	-	-	-	1	4	-	-
Weather Conditions										
Fine	-	-	-	-	-	-	3	12	8	1
Overcast	-	-	-	-	-	-	-	2	-	-
Raining	-	-	-	-	-	-	1	1	-	-
Vehicle Type										
Motorcycle	-	-	-	-	-	-	-	1	1	-
Car, Station Wagon, 4WD, Van	-	-	-	-	-	-	2	9	3	1
Light or Large Truck or Bus	-	-	-	-	-	-	-	4	4	-
Articulated Vehicle	-	-	-	-	-	-	-	1	-	1
Other	-	-	-	-	-	-	2	-	-	-
Severity of Crash										
Fatal	-	-	-	-	-	-	-	2	-	-
Injury	-	-	-	-	-	-	2	8	6	1
Non-injury	-	-	-	-	-	-	2	5	2	-
People Killed or Injured^A										
Killed	-	-	-	-	-	-	-	2	-	-
Injured	-	-	-	-	-	-	3	8	7	1
Factors^B										
Alcohol	-	-	-	-	-	-	-	3	3	-
Fatigue	-	-	-	-	-	-	-	6	1	-
Speed	-	-	-	-	-	-	-	-	5	-
None	-	-	-	-	-	-	4	7	2	1

^A Note this reports the number of people injured or killed not the number of accidents resulting in injury or fatalities.

^B Factors considered to have contributed to the crash, more than one factor can be nominated for a single crash.



Two fatal crashes occurred along this section of Henry Parkes Way, one between Fifield Road and Condobolin, and the other to the west of Bogan Gate. Both were single vehicle crashes involving a light truck in fine weather on a dry road, and alcohol was nominated as a factor in both. Fatigue was nominated as a factor in one.

2.6.3 The Bogan Way

The details of the crash history of The Bogan Way between Bogan Gate and The McGrane Way north of Tullamore between January 2011 and November 2016 are summarised in Table 2.11.

Table 2.11: The Bogan Way Crash Summary January 2011 to November 2016

	Pedestrian	Multiple Vehicles					Single Vehicle			Other
		Adjacent Approaches	Opposing Directions	Same Direction	U-turn/Parking	Overtaking	On Path	Off Path on Straight	Off Path on Curve	
Total Crashes	-	1	-	-	-	2	2	6	2	-
Road Surface Condition										
Dry Road	-	1	-	-	-	1	1	4	2	-
Wet Road	-	-	-	-	-	1	1	2	-	-
Weather Conditions										
Fine	-	1	-	-	-	1	1	4	2	-
Overcast	-	-	-	-	-	1	1	2	-	-
Raining	-	-	-	-	-	-	-	-	-	-
Vehicle Type										
Motorcycle	-	-	-	-	-	-	-	-	-	-
Car, Station Wagon, 4WD, Van	-	-	-	-	-	2	-	2	-	-
Light or Large Truck or Bus	-	2	-	-	-	2	2	-	1	-
Articulated Vehicle	-	-	-	-	-	-	-	3	1	-
Other	-	-	-	-	-	-	-	1	-	-
Severity of Crash										
Fatal	-	-	-	-	-	-	-	-	-	-
Injury	-	1	-	-	-	1	1	4	2	-
Non-injury	-	-	-	-	-	1	1	2	-	-
People Killed or Injured^A										
Killed	-	-	-	-	-	-	-	-	-	-
Injured	-	1	-	-	-	1	1	4	3	-
Factors^B										
Alcohol	-	-	-	-	-	-	-	-	-	-
Fatigue	-	-	-	-	-	-	-	1	1	-
Speed	-	-	-	-	-	-	-	-	2	-
None	-	1	-	-	-	2	2	5	-	-

^A Note this reports the number of people injured or killed not the number of accidents resulting in injury or fatalities.

^B Factors considered to have contributed to the crash, more than one factor can be nominated for a single crash.

No fatal crashes occurred along this section of The Bogan Way over the period investigated.



2.6.4 Fifield Road

The details of the crash history of Fifield Road between Henry Parkes Way and Tullamore between January 2011 and November 2016 are summarised in Table 2.12.

Table 2.12: Fifield Road Crash Summary January 2011 to November 2016

	Pedestrian	Multiple Vehicles					Single Vehicle			Other
		Adjacent Approaches	Opposing Directions	Same Direction	U-turn/Parking	Overtaking	On Path	Off Path on Straight	Off Path on Curve	
Total Crashes	-	-	-	-	-	-	-	2	2	-
Road Surface Condition										
Dry Road	-	-	-	-	-	-	-	2	2	-
Wet Road	-	-	-	-	-	-	-	-	-	-
Weather Conditions										
Fine	-	-	-	-	-	-	-	1	2	-
Overcast	-	-	-	-	-	-	-	1	-	-
Raining	-	-	-	-	-	-	-	-	-	-
Vehicle Type										
Motorcycle	-	-	-	-	-	-	-	-	-	-
Car, Station Wagon, 4WD, Van	-	-	-	-	-	-	-	1	1	-
Light or Large Truck or Bus	-	-	-	-	-	-	-	1	1	-
Articulated Vehicle	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-
Severity of Crash										
Fatal	-	-	-	-	-	-	-	-	-	-
Injury	-	-	-	-	-	-	-	-	2	-
Non-injury	-	-	-	-	-	-	-	2	-	-
People Killed or Injured^A										
Killed	-	-	-	-	-	-	-	-	-	-
Injured	-	-	-	-	-	-	-	-	2	-
Factors^B										
Alcohol	-	-	-	-	-	-	-	-	-	-
Fatigue	-	-	-	-	-	-	-	-	1	-
Speed	-	-	-	-	-	-	-	-	1	-
None	-	-	-	-	-	-	-	2	-	-

^A Note this reports the number of people injured or killed not the number of accidents resulting in injury or fatalities.

^B Factors considered to have contributed to the crash, more than one factor can be nominated for a single crash.

No fatal crashes occurred along this section of Fifield Road over the period investigated.

2.6.5 The McGrane Way

One crash occurred on The McGrane Way between Tullamore and Narromine between 1 January 2011 and November 2016. It was a fatal crash, in which an eastbound B-double struck a southbound train at the railway level crossing just out of Narromine. Speed was identified as a contributing factor. The crash occurred in fine weather on a dry road surface at 5.15pm on Wednesday 23 September 2015. One person was killed and one person injured.

2.6.6 Water Transport Route

One crash occurred on the proposed water transport route south of Henry Parkes Way between 1 January 2012 and 31 March 2017. It was a non-injury crash, in which an eastbound car in Yarrabandai Road struck straying stock 100m east of Bollingers Lane. The crash occurred in fine weather on a dry road surface at 9.30pm on Monday 20 May 2013.

Provisional data for the period from 1 April 2017 to 9 November 2017 identified a crash at the intersection of Henry Parkes Way and Yarrabandai Road, in which a northbound utility in Yarrabandai Road struck an eastbound truck on Henry Parkes Way. The crash description suggests the utility was crossing Henry Parkes Way into the loop road opposite Yarrabandai Road which serves the Yarrabandai coach stop, rather than turning left or right into Henry Parkes Way. The crash occurred in fine weather on a dry road surface on Tuesday 20 June 2017. As the data is provisional, and therefore subject to change, this crash is not included in Table 2.7.

2.6.7 Other Routes

No crashes were reported on the following routes included in the review:

- Springvale Road between Fifield Road and Wilmatha Road;
- Wilmatha Road between Springvale Road and Fifield Road;
- Platina Road/Fifield Trundle Road between Fifield Road and The Bogan Way;
- Melrose Plains Road between Springvale Road and The Bogan Way; and
- The McGrane Way between Tullamore and Narromine.

2.7 Road Network Operations

2.7.1 Road Capacity

The theoretical capacity of a two way two lane road under ideal conditions is 3,200 passenger cars per hour (Austroads, 2013). A two lane two way road is the most basic road with a single stream of traffic travelling in each direction, such that vehicles are required to cross to the opposing carriageway to overtake. The capacity of the sealed two lane two way roads in the vicinity of the Project would be expected to be somewhat less than the theoretical ideal, as the latter assumes no restrictive roadway, terrain or traffic conditions. Taking into account the proportion of heavy vehicles (Table 2.6), the peak hourly flows on the road network (Table 2.5) are very low in comparison to the theoretical capacity. A detailed assessment of midblock roadway capacity of the roads in the vicinity of the Project is therefore not warranted (i.e. there is no capacity concerns on roads in the vicinity of the Project).

The ideal road conditions assumed for general road capacity above assume that the road is sealed. The capacity or desirable traffic range carried on unsealed roads differs from that of sealed roads, as the quality of the road surface can vary significantly, and the type of surface can have a major influence on the speed at which drivers travel and how close behind another vehicle that drivers will choose to travel. The desirable traffic range can also vary according to the weather conditions.

Wilmatha Road is unsealed and carries some 21 vehicles per day, which is consistent with the volume range for Class U3 unsealed roads (Austroads, 2009), which carry between 20 and 100 vehicles per day with a travel speed of 80 km/h (not necessarily equivalent to the posted speed limit).

Middle Trundle Road contains a length of gravel roadway, and currently carries some 118 vehicles per day, which is the lower threshold for Class U2 unsealed roads (Austroads, 2009). Austroads (2009) suggests that for a Class U2 road, a mostly all-weather formed pavement with some drainage, made up of two pavement layers over subgrade is appropriate, with granular or modified materials adopted in the wearing course. Dust suppressants may be incorporated in maintenance strategies of such roads. Class U2 roads carry volumes between 100 and 200 vehicles per day and between 10% and 20% heavy vehicles (heavy being Class 4 and above), with a traffic speed of 100 km/h on two travel lanes with shoulders. Typical Class U2 roads are main links between communities, national parks, recreation areas, and haul roads.

Nevertheless, the existing volumes on the unsealed portion of Middle Trundle Road and Wilmatha Road remain very low, with the road surface and weather conditions having a greater impact on travel behaviour than the potential for being delayed by other vehicles.

2.7.2 Intersection Operation

At unsignalised intersections with minor roads, where there are relatively low volumes of through and turning vehicles, capacity considerations are usually not significant, and detailed analysis of capacity is not warranted. As a guide, at volumes below the following combinations of maximum hourly volumes at a cross intersection with a two lane two way road, capacity analysis is not warranted:

- major road 400 vehicles per hour, minor road 250 vehicles per hour;
- major road 500 vehicles per hour, minor road 200 vehicles per hour; and
- major road 650 vehicles per hour, minor road 100 vehicles per hour.

The majority of intersections in the vicinity of the Project are T-intersections and so have fewer potentially conflicting movements than a cross intersection. Comparison between these threshold volumes and the peak hourly volumes on the key roads (Table 2.5) indicates that the existing traffic volumes on all roads are well below the threshold volumes above, and as such, there is no capacity concerns regarding the operation of intersections in the vicinity of the Project.

3. Approved Project

3.1 Project Description

The Project includes the establishment and operation of:

- a MPF;
- a limestone quarry;
- a rail siding;
- a natural gas pipeline;
- borefields and water pipeline; and
- associated transport and infrastructure.

Construction of the Project substantially commenced in 2006 with the construction of the borefields, however Project operations are yet to commence.

The approved Project involves an Initial Production Phase focussed on scandium oxide production, transitioning to the Full Production Phase of scandium oxide, nickel and cobalt precipitate production when market conditions are favourable. The Initial Production Phase will be a smaller scale operation, with a significantly lower level of activity, and will not include construction of the limestone quarry and rail siding.

The Project is approved to operate 24 hours per day (the limestone quarry may operate from 7:00am to 5:00pm, with truck loading permitted 24 hours), seven days per week for a period of 21 years after commencement of mining operations.

3.2 Road Transport Trip Generation

A Road Transport Assessment was prepared by Masson Wilson Twiney (MWT) (2000) for the Environmental Impact Statement (EIS) for the Project. The study assessed the road transport implications of the Approved Project during both operational and construction phases. A Traffic Report was later prepared (MWT, 2005) which assessed the traffic and transport implications of Modification 1. Those road transport assessments assumed that construction of the Fifield Bypass would occur, which would allow traffic travelling to and from the MPF to bypass the village of Fifield. A Road Transport Assessment was prepared by GTA Consultants (2016) for Modification 3, which assessed the traffic and transport implications of the small-scale Initial Production Phase. That modification assumes construction of the Fifield Bypass will not occur during the Initial Production Phase. Modification 3 did not change traffic associated with the Project at full development (the Full Production Phase).

The approved Project road transport trip generation and distribution outlined by GTA Consultants (2016) for the Initial Production Phase and by MWT (2005) for the Full Production Phase are described below.

3.2.1 Deliveries and Product Transport

Table 3.1 summarises the approved Project deliveries and product transport demands.

Table 3.1: Approved Project Deliveries and Product Transport

Project Component	Initial Production Phase	Full Production Phase
Hours of Operation	24 hours per day 7 days per week	24 hours per day 7 days per week
Autoclave Feed Rate	100,000 tonnes per annum (tpa)	2.5 million tonnes per annum (Mtpa)
Product	Up to 80 tpa scandium oxide Up to 1,000 tpa of nickel and cobalt metal equivalents as either sulphide or sulphate precipitate products	Up to 80 tpa scandium oxide Up to 40,000 tpa of nickel and cobalt metal equivalents as either sulphide or sulphate precipitate products
Key Process Consumables	30,000 tpa sulphuric acid up to 25,000 tpa limestone minor reagents	260,000 tpa sulphur 790,000 tpa limestone 1,100 tpa flocculant 100 tpa caustic soda minor reagents
Employees	45	300

Initial Production Phase

For the Initial Production Phase, raw materials would be transported to the Project by road using a range of vehicle types, including rigid trucks, B-doubles and pneumatic tippers. Trucks from Sydney, Port Kembla, Newcastle and Parkes would approach along Henry Parkes Way, The Bogan Way, Fifield-Trundle Road, Platina Road, Fifield Road, Slee Street and Wilmatha Road to the MPF Access Road. Trucks transporting miscellaneous items between local retailers at Condobolin and the MPF will use Henry Parkes Way, Fifield Road, Slee Street and Wilmatha Road to the MPF Access Road. The Fifield Bypass will not be constructed for the Initial Production Phase.

The transport of raw materials and product associated with the Initial Production Phase will generate an average of fewer than 24 vehicle trips per day.

Full Production Phase

For the Full Production Phase, the rail loading and unloading facility north of Trundle will allow for the transport of various raw materials and products to and from the Project by rail, with back loading of products from the MPF by rail. From the rail siding, road trains and B-doubles will transport containers of raw materials and nickel-cobalt sulphide precipitate to and from the MPF, travelling along Fifield-Trundle Road, Platina Road, Fifield Road, the Fifield Bypass¹, and Wilmatha Road. Trucks transporting limestone from the quarry on Fifield-Trundle Road will use the same road trains and B-doubles used for sulphur transport, and will travel along Fifield-Trundle Road, Platina Road, Fifield Road, the Fifield Bypass and Wilmatha Road.

Trucks transporting miscellaneous items between local retailers in Condobolin and the MPF will use Henry Parkes Way, Fifield Road, the Fifield Bypass¹ (or Slee Street) and Wilmatha Road. Magnesia will be sourced from Young, and transported in bulk pressure B-doubles, travelling from Young via Grenfell, Forbes, Parkes, Bogan Gate, and Trundle. Fuel and lubricants will be transported by 19 m long B-double tankers from Sydney, or smaller tankers from Parkes. Nickel and cobalt product will be transported by backloading the containers bringing sulphur to the MPF.

The transport of raw materials and product associated with the Full Production Phase will generate an average of 169 vehicle trips per day.

¹ In accordance with the proposed Voluntary Planning Agreement terms included in Appendix 3 of Development Consent 374-11-00, a road safety audit will be undertaken in consultation with the Lachlan Shire Council to assist in determining if the Fifield Bypass is required (Section 7.1.4). If it is determined that the Fifield Bypass is not required, Project traffic would approach the site via Slee Street.

3.2.2 Employee Traffic

The Initial Production Phase workforce will generate 90 vehicle trips per day (GTA Consultants, 2016) and the Full Production Phase will generate 225 vehicle trips per day (MWT, 2005). Taking into account the residential distribution of the workforce, Table 3.2 summarises the daily vehicle trips generated by the workforce during the Initial and Full Production Phases.

Table 3.2: Daily Employee Trip Generation (vehicle trips per day)

Location	Initial Production Phase	Full Production Phase
Parkes	60	147
Condobolin	30	65
Trundle	-	6
Tullamore	-	5
Ootha	-	1
Bogan Gate	-	1
Total	90	225

Employee traffic from Trundle, Tullamore and Bogan Gate will use The Bogan Way, Fifield-Trundle Road, Platina Road, Fifield Road, the Fifield Bypass² (or Slee Street) and Wilmatha Road to the MPF Access Road. Employee traffic from Parkes will use Henry Parkes Way, Middle Trundle Road, The Bogan Way, Fifield-Trundle Road, Platina Road, Fifield Road, the Fifield Bypass² (or Slee Street) and Wilmatha Road to the MPF Access Road. Employee traffic from Condobolin and Ootha will use Henry Parkes Way, Fifield Road, Slee Street and Wilmatha Road to the MPF Access Road.

3.2.3 Other Project Traffic

Other traffic visiting the MPF during its operational phases will include deliveries of daily consumables, locally sourced spare parts and equipment, maintenance contractors, MPF staff visiting off-site facilities, regulating inspectors and general visitors. This traffic would occur mainly between 7:00am and 6:00pm. Approximately 90% of the other Project traffic would travel to and from the Parkes region, and 10% towards the Condobolin region.

For the Initial Production Phase, this will generate some 25 vehicle movements per day (GTA Consultants, 2016). Vehicles travelling to and from Parkes will use Henry Parkes Way, Middle Trundle Road (light vehicles only), The Bogan Way, Fifield-Trundle Road, Platina Road, Fifield Road, Slee Street and Wilmatha Road to the MPF Access Road. Vehicles travelling to and from Condobolin will use Henry Parkes Way, Fifield Road, Slee Street and Wilmatha Road.

For the Full Production Phase, this will generate some 75 vehicle movements per day (MWT, 2005). Vehicles travelling to and from Parkes will use Henry Parkes Way, The Bogan Way, Fifield-Trundle Road, Platina Road, Fifield Road, the Fifield Bypass² (or Slee Street) and Wilmatha Road to the MPF Access Road. Vehicles travelling to and from Condobolin will use Fifield Road, the Fifield Bypass² (or Slee Street) and Wilmatha Road.

² In accordance with the proposed Voluntary Planning Agreement terms included in Appendix 3 of Development Consent 374-11-00, a road safety audit will be undertaken in consultation with the Lachlan Shire Council to assist in determining if the Fifield Bypass is required (Section 7.1.4). If it is determined that the Fifield Bypass is not required, Project traffic would approach the site via Slee Street.

3.2.4 Total Traffic

Table 3.3 summarises the average daily traffic volumes anticipated to be generated by the Initial Production Phase and Full Production Phase of the approved Project, based on the assessments undertaken by GTA Consultants (2016) and MWT (2005) respectively.

Table 3.3: Approved Project Average Daily Traffic (vehicles per day)

Site ^A	Road	Location	Initial Production Phase			Full Production Phase		
			Light	Heavy	Total	Light	Heavy	Total
A	Henry Parkes Way	East of Bogan Gate	0	35	35	0	34	34
B		East of Middle Trundle Road	71	35	106	181	34	215
C	The Bogan Way	North of Henry Parkes Way	0	35	35	1	34	35
D		North of Middle Trundle Road	71	35	106	182	34	216
E		North of Trundle	71	35	106	188	68	256
F	Fifield Road	North of Henry Parkes Way	32	1	33	69	49	118
G		North of Fifield-Trundle Road ^B	103	36	139	258	207	465
H		North of Wilmatha Road	0	0	0	5	0	5
I	Middle Trundle Road	East of The Bogan Way	71	0	71	181	0	181
J	Fifield-Trundle Road	West of The Bogan Way	71	35	106	188	68	256
K	Platina Road	East of Fifield Road	71	35	106	189	158	347
M	Wilmatha Road	North of Sunrise Lane	103	36	139	263	207	470
N	MPF Access Road	East of Wilmatha Road	103	36	139	263	207	470

^A Refer to Figure 5-1.

^B Including Slee Street for Initial Production Phase, and Fifield Bypass³ for Full Production Phase.

Source: MWT (2005) and GTA Consultants (2016).

Table 3.3 demonstrates that for the approved Full Production Phase, the Syerston Project can be expected to generate some 470 vehicles trips per day, of which 263 trips would be by light vehicles and 207 trips per day would be by heavy vehicles.

3.2.5 Rail Movements

Up to three trains per week will be required for the Project. A maximum of two trains per day will be required.

³ In accordance with the proposed Voluntary Planning Agreement terms included in Appendix 3 of Development Consent 374-11-00, a road safety audit will be undertaken in consultation with the Lachlan Shire Council to assist in determining if the Fifield Bypass is required (Section 7.1.4). If it is determined that the Fifield Bypass is not required, Project traffic would approach the site via Slee Street.

4. Modified Project (Modification 4)

4.1 Modification 4 Description

The Modification involves the implementation of a number of opportunities to optimise the Full Production Phase of the Project, including:

- mining in a more selective manner to initially increase the processing facility ore feed grade;
- addition of drilling and blasting at the mine site;
- adoption of the resin-in-pulp (RIP) processing method option (i.e. the counter current decantation processing method option is no longer proposed)⁴;
- increased sulphur and sulphuric acid demand to leach additional nickel, cobalt and scandium from the higher grade ore;
- increased limestone demand to neutralise the additional acid required in the acid leach circuit;
- addition of a crystalliser to the processing facility to extract ammonium sulphate from an existing waste stream for use as a fertiliser product;
- changes to process input and product road transport requirements;
- addition of a water treatment plant to the processing facility to recycle process water and minimise make-up water demand;
- increased tailings storage facility capacity to hold increased tailings volume due to the additional limestone required for acid neutralisation;
- reduced evaporation pond capacity due to the recycling of process water;
- relocation of mine infrastructure to avoid resource sterilisation and improve operational efficiency;
- addition of surface water extraction from the Lachlan River to improve water supply security;
- minor changes to borefield transfer station layout and water pipeline alignment;
- short-term road transport of water from the borefield to the mine site during the initial construction phase; and
- reduced gas demand as the increased sulphuric acid production would generate additional steam for power generation.

The Modification would not involve changes to any aspects of the approved limestone quarry, rail siding or gas pipeline.

4.2 Road Transport Trip Generation

Table 4.1 summarises a comparison between road transport-related aspects of the Full Production Phase as approved and with the Modification. The Modification would not alter the approved Initial Production Phase activity assessed by GTA Consultants (2016).

⁴ The Approved Project includes the option to use either the RIP or counter current decantation processing method.

Table 4.1: Comparison of Road Transport Related Aspects of Approved Project and Modification

Project Component	Approved Project	Modification
Hours of Operation	24 hours per day 7 days per week	24 hours per day 7 days per week
Autoclave Feed Rate	2.5 Mtpa	2.5 Mtpa
Product	180 tpa scandium oxide 40,000 tpa of nickel and cobalt metal equivalents as either sulphide or sulphate precipitate products	180 tpa scandium oxide 40,000 tpa of nickel and cobalt metal equivalents as sulphate precipitate products 100,000 tpa of ammonium sulphate
Key Process Consumables	260,000 tpa sulphur 790,000 tpa limestone 1,100 tpa flocculant 100 tpa caustic soda minor reagents	350,000 tpa sulphur 990,000 tpa limestone 3,000 tpa caustic soda 50,000 tpa lime minor reagents
Employees	300	300

Similar to the approved Full Production Phase of the Project, the Modification would generate road traffic associated with the movement of the workforce to and from the MPF, the delivery of raw materials and transport of product to and from the site, and other miscellaneous vehicle traffic associated with the mining activity. The main differences would result from changes to the transport demands. The anticipated number of trips generated with the Modification is determined in this section.

For the purposes of this assessment, it has been assumed that the road safety audit undertaken in consultation with the Lachlan Shire Council in accordance with the proposed Voluntary Planning Agreement (VPA) terms included in Appendix 3 of Development Consent 374-11-00 and other assessments of operational conditions will determine that the Fifield Bypass is not required. Project traffic has therefore been assumed to approach the site via Slee Street rather than the Fifield Bypass. This assessment approach is expected to capture the maximum case road transport impacts on the road network.

4.2.1 Employees

A workforce of 300 employees would be required, with rostered shifts resulting in 180 employees on day shift and 60 employees on night shift. This assessment conservatively assumes that all employee travel would be by private vehicles, which would generate a higher number of vehicle trips on the road network. GTA Consultant's experience with employee transport to and from regional mining projects is that some level of car pooling occurs, with a typical average car occupancy of 1.2 people per vehicle, and hence this rate has been adopted for this assessment. On this basis, the 240 employees present each day would generate 400 vehicle trips on the surrounding road network each day. Clean TeQ intends to investigate operating shuttle bus services for employees to and from the Project. Details of such a scheme have not yet been determined, however it is likely that buses would operate to and from Parkes and Condobolin.

It is anticipated that half the employees would reside in Parkes, one-third would reside in Condobolin, and the remainder in regional locations including Trundle, Tullamore, Ootha and Bogan Gate. The resulting vehicle trips generated by the workforce are summarised in Table 4.2.

Table 4.2: Daily Employee Trip Distribution

Location	Percent of Employees	Employees Present at MPF	Daily Vehicle Trips
Parkes	50	120	200
Condobolin	33	80	134
Trundle	17	40	30
Tullamore			24
Ootha			6
Bogan Gate			6
Total	100	240	400

The workforce would work two 12-hour shifts per day, and so the generated traffic would be on the road network around the shift changeover times as follows:

- AM 150 vehicles arriving prior to start of day shift, 50 vehicles departing after end of night shift; and
- PM 50 vehicles arriving prior to start of night shift, 150 vehicles departing after end of day shift.

By way of comparison, should buses be used to transport employees between the Project and Parkes and Condobolin, up to 200 employees may travel by bus rather than private vehicle, removing up to 334 private vehicle trips per day from the road network. The extent to which employees would use the service would depend on a number of factors. The number of bus trips generated in place of the private vehicles would depend on the size of buses being operated and the management of the routes. As a guide, and assuming larger coaches are used with a capacity of 60 people per bus, two buses would operate between the Project and Parkes, and two buses would operate between the Project and Condobolin. These would generate eight vehicle trips per day on the road network, an overall reduction of up to 326 vehicle trips per day.

4.2.2 Materials and Product Transport

Raw materials would be transported to the Project using a range of vehicle types, including rigid trucks, B-doubles, and pneumatic bulk tippers. The typical types of trucks used for each material or product are described below, noting that actual vehicle types used may vary. Clean TeQ would minimise the number of heavy vehicles movements by maximising the use of rail transport and consolidating materials and product transport where practicable.

Sulphur

Sulphur would be transported by rail from Newcastle to the Project rail siding north of Trundle. The containers would be transported from the storage area near the road siding to the MPF using a shuttle fleet of five trucks, likely to include road trains and/or B-doubles. Transport of the total annual load of 350,000 tpa would generate an average of 21 deliveries per day and three rail trips from Newcastle per week. Clean TeQ is considering the use of larger capacity trucks (e.g. AB-triples) subject to approval from the relevant roads authority. The use of larger trucks would reduce the number of deliveries required to transport 350,000 tpa of sulphur from the rail siding. For the purposes of this assessment, the smaller trucks generating the larger number of movements has been assessed.

Caustic Soda

Caustic soda would be transported in containers by rail or road, with transport by rail from Sydney assumed for this assessment. Caustic soda containers would be unloaded at the Project rail siding and trucked to the MPF in containers using B-doubles. Transport of the total annual load of 3,000 tpa would generate five deliveries per month.

Limestone

Up to 990,000 tpa of limestone would be required at the MPF. This would be sourced from the limestone quarry (up to 790,000 tpa) and from other local quarries (up to 560,000 tpa).

Limestone would be transported from the quarry to the MPF using a dedicated fleet of trucks with a 48 tonne capacity. The processing plant would be available for an average of 46 weeks per year, operating seven days per week. The maximum annual load of 790,000 tpa of limestone from the limestone quarry would generate an average of 51 deliveries per day over the 46 operating weeks. Clean TeQ is considering the use of larger trucks (90 tonne capacity) subject to approval from the relevant roads authority. The use of larger trucks would reduce the number of deliveries required to transport 790,000 tpa of limestone from the limestone quarry to an average of 27 deliveries per day over the 46 operating weeks. For the purposes of this assessment, the smaller trucks generating the larger number of movements has been assessed.

As above, up to 560,000 tpa of limestone may be procured from local quarries and transported to the MPF using similar vehicles to those above. The maximum annual load of 560,000 tpa of limestone from local quarries would generate an average of 36 deliveries per day over the 46 operating weeks. A supplier has not yet been identified, however it is noted that local quarries include WestLime Quarry off The Bogan Way and EzyLime on Lynton Lane off Henry Parkes Way. For the purpose of this assessment, it is assumed that these delivery trips would follow a similar route to those vehicles approaching from Parkes.

The combined total requirement for 990,000 tpa of limestone would generate an average of 64 deliveries per day over the 46 operating weeks.

Limestone sourced from the quarry would be transported on the heavy vehicle route only between the quarry and the MPF. Limestone transported from local quarries is assumed to be transported on the heavy vehicle route from Henry Parkes Way (east) to the MPF. To account for the variations which may occur in the routes used for limestone deliveries, this assessment assumes that 560,000 tpa limestone is transported on the heavy vehicle route between Henry Parkes Way (east) and the quarry, and 990,000 tpa limestone is transported on the heavy vehicle route between the quarry and the MPF. This represents the conditions under which the transport of limestone would have its greatest impact on each part of the road network.

Lime

Up to 50,000 tpa of lime may be sourced from external suppliers and transported to the MPF by trucks with an average capacity of 40 tonnes. Assuming this would occur over some 46 operating weeks per year and seven days per week, this would generate an average of four deliveries per day during the operating weeks. A supplier has not yet been identified, and for the purpose of this assessment, it is assumed that the lime delivery trucks would follow a similar route to those vehicles approaching from Parkes.

Fuel and Lubricants

Fuel would be transported to the MPF using 19 m B-double tankers from Parkes. Lubricants would be sourced from Parkes. Fuel and lubricant would generate an average of three deliveries per week.

Miscellaneous Bulk Materials

Miscellaneous bulk materials would be transported from Newcastle by rail and transported from the Project rail siding to the MPF. Transport of these materials would generate an average of two deliveries per day.

Other Materials and Equipment

Supplies and equipment are expected to generate two deliveries per day from local sources and two deliveries per day from Sydney. Half of these would be by heavy vehicles, and half by light trucks and vans, however for the purpose of this assessment, it is conservatively assumed that all such deliveries would be by heavy vehicles.

Ammonia

Ammonia would be transported by rail then by truck from the rail siding to the MPF in containers, with each truck carrying one container with a 30 tonne capacity. Transport of 35,000 tpa of ammonia would generate an average of three deliveries per day, occurring over 52 weeks of the year, seven days per week.

Hydrochloric Acid

Hydrochloric acid would be transported from Newcastle to the MPF using B-doubles. Transport of 13,000 tpa would generate an average of two deliveries per day, occurring over 52 weeks of the year, seven days per week.

Soda Ash

Soda ash would be transported by rail to the Project siding, and then transported by road using the same truck fleet as would be used to transport sulphur. The transport of 7,000 tpa of soda ash would generate an average of three deliveries per week.

Other Reagents

Other reagents would be typically transported by rail then by truck from the rail siding to the MPF in containers. Transport of 8,000 tpa of other reagents would generate an average of three to four deliveries per week.

MPF Product

Nickel and cobalt metal equivalents (as sulphate precipitate products) and scandium oxide would be transported from the MPF to the rail siding by backloading the sulphur containers. Due to this backloading, transport of up to 40,000 tpa of nickel and cobalt metal equivalents as sulphate precipitate products and 180 tpa of scandium oxide would generate no additional vehicle trips.

Similarly, the transport of 100,000 tpa of ammonium sulphate extracted for sale as fertiliser would be backloaded in the sulphur containers to the rail siding, and would generate no additional vehicle trips.

Total Materials and Product Transport

Table 4.3 summarises the total transport demand generated by the movement of raw materials and product to and from the modified Project during the Full Production Phase.

Table 4.3: Modification Raw Materials and Product Delivery Summary

Product	Rail Siding	Quarry	Parkes/ Sydney	Newcastle	Condobolin	Total
Sulphur	21 / day	-	-	-	-	-
Caustic Soda	5 / month	-	-	-	-	-
Limestone - Quarry	-	51 / day ^A 28 / day ^B	-	-	-	-
Limestone (Local Sources)	-	-	13 / day ^A 36 / day ^B	-	-	-
Lime	-	-	4 / day	-	-	-
Fuel and Lubricants	-	-	3 / week	-	-	-
Miscellaneous Bulk Materials	2 / day	-	-	-	-	-
Other Materials and Equipment	-	-	2 / day	-	2 / day	-
Ammonia	3 / day	-	-	-	-	-
Hydrochloric Acid	-	-	-	2 / day	-	-
Soda Ash	3 / week	-	-	-	-	-
Other Reagents	4 / week	-	-	-	-	-
MPF Product	-	-	-	-	-	-
Ammonium Sulphate	-	-	-	-	-	-
Average Day Total (rounded)^B	27	28	43	2	2	102
Average Day Two Way Trips^B	54	56	86	4	4	204

^A 790,000 tpa limestone sourced from the limestone quarry, and 200,000 tpa limestone sourced from local quarries

^B 560,000 tpa limestone sourced from local quarries, and 430,000 tpa limestone sourced from the limestone quarry

The transport of raw materials and product associated with the modified Project would generate an average of approximately 102 deliveries per day (or 204 vehicle trips per day).

4.2.3 Other Traffic

Other traffic visiting the MPF during its operational phase would include deliveries of daily consumables, locally sourced spare parts and equipment, maintenance contractors, MPF staff visiting off-site facilities, regulating inspectors and general visitors. These activities would generate an average of approximately 16 deliveries or visits per day:

- 2 heavy vehicle deliveries per weekday (only) from Parkes;
- 2 heavy vehicle deliveries per weekday (only) from Condobolin;
- 10 light vehicles deliveries per day from Parkes; and
- 2 light vehicle deliveries per day from Condobolin.

4.3 Traffic Travel Routes

The routes used by vehicles travelling to and from the modified Project would vary according to the origin/destination. The following routes have been adopted for the modified Project traffic for this assessment:

- rail siding – Scotson Lane, Fifield-Trundle Road, Platina Road, Fifield Road, Slee Street, Wilmatha Road, and the MPF Access Road;
- limestone quarry – Quarry Access Road, Fifield-Trundle Road, Platina Road, Fifield Road, Slee Street, Wilmatha Road, and MPF Access Road;
- Sydney/Parkes – Henry Parkes Way, The Bogan Way, Fifield-Trundle Road, Platina Road, Fifield Road, Slee Street, Wilmatha Road, and MPF Access Road (external limestone supply and lime deliveries (Table 4.3) would adopt this route);

- Sydney/Parkes – Henry Parkes Way, Middle Trundle Road, The Bogan Way, Fifield-Trundle Road, Platina Road, Fifield Road, Slee Street, Wilmatha Road, and MPF Access Road (this route would be adopted for deliveries of fuel and lubricants (Table 4.3), other materials and equipment (Table 4.3), and other consumables and equipment from Parkes (Section 4.2.3);
- Newcastle – Mitchell Highway, The McGrane Way, The Bogan Way, Fifield Road, Wilmatha Road, and MPF Access Road;
- Condobolin, Ootha and local sources – Henry Parkes Way, Fifield Road, Slee Street, Wilmatha Road, and MPF Access Road;
- Trundle and Bogan Gate – The Bogan Way, Fifield-Trundle Road, Platina Road, Fifield Road, Slee Street, Wilmatha Road, and MPF Access Road; and
- Tullamore – Fifield Road, Wilmatha Road, and MPF Access Road.

4.4 Total Traffic

4.4.1 Daily Traffic

Table 4.4 summarises the average daily traffic volumes on the road network anticipated to be generated by the modified Project.

Table 4.4: Modified Project Average Daily Traffic (vehicles per day)

Road	Section	Light Vehicles	Heavy Vehicles	Total Vehicles
Mitchell Highway	Narromine to Dubbo	0	4	4
The McGrane Way	Tullamore to Narromine	0	4	4
Scotson Lane	Rail Siding to The Bogan Way	0	54	54
Henry Parkes Way	Condobolin to Fifield Road	138	8	146
	Parkes to Middle Trundle Road	220	90	310
	Middle Trundle Road to The Bogan Way	0	82	82
	Ootha to Fifield Road	6	0	6
Middle Trundle Road	Henry Parkes Way to The Bogan Way	220	8	228
The Bogan Way	Henry Parkes Way to Middle Trundle Road	6	82	88
	Middle Trundle Road to Trundle	226	90	316
	Trundle to Fifield-Trundle Road	256	90	346
Quarry Access Road	Off Fifield-Trundle Road	0	56	56
Fifield-Trundle Road	The Bogan Way to Quarry Access Road	256	144	400
	Quarry Access Road to Platina Road	256	200	456
Platina Road	Fifield-Trundle Road to Fifield Road	256	200	456
Fifield Road	Tullamore to Wilmatha Road	24	4	28
	Henry Parkes Way to Platina Road	144	8	152
	Platina Road to Slee Street	400	208	608
Slee Street	Fifield Road to Wilmatha Road	400	208	608
Wilmatha Road	Slee Street to MPF Access Road	424	212	636
MPF Access Road	Off Wilmatha Road	424	212	636

^A Assumes 430,000 tpa limestone sourced from the limestone quarry. If 790,000 tpa limestone is sourced from the limestone quarry, average daily traffic on the Quarry Access Road would be 102 heavy vehicles per day.

The modified Project is expected to generate an average of 636 vehicle trips per day, of which 424 vehicle trips would be light vehicles (noting that this assumes private vehicle travel by the workforce), and 212 vehicle trips would be heavy vehicles.

4.4.2 Peak Hourly Traffic

Employee traffic would tend to be concentrated at the shift change times, with employees arriving just prior to the start of their shift followed by employees leaving at the end of their shift. Transport of materials and product, and other Project traffic would tend to be more spread throughout the day and night. For the purpose of this assessment, it is assumed that the employee traffic occurs in two distinct hours in the day at shift change times, and that approximately 10% of the materials and other transport activity occurs during each of the same hours as the employee traffic.

On this basis, Table 4.5 summarises the peak hourly traffic volumes on the average day anticipated to be generated by the modified Project.

Table 4.5: Modification Peak Hourly Traffic (vehicles per hour)

Road	Section	Light Vehicles	Heavy Vehicles	Total Vehicles
Mitchell Highway	Narromine to Dubbo	0	2	2
The McGrane Way	Tullamore to Narromine	0	2	2
Scotson Lane	Rail Siding to The Bogan Way	0	6	6
Henry Parkes Way	Condobolin to Fifield Road	69	4	73
	Parkes to Middle Trundle Road	102	12	114
	Middle Trundle Road to The Bogan Way	0	9	9
	Ootha to Fifield Road	3	0	3
Middle Trundle Road	Henry Parkes Way to The Bogan Way	102	3	105
The Bogan Way	Henry Parkes Way to Middle Trundle Road	3	9	12
	Middle Trundle Road to Trundle	105	12	117
	Trundle to Fifield-Trundle Road	120	12	132
Quarry Access Road	Off Fifield-Trundle Road	0	6 ^A	6
Fifield-Trundle Road	The Bogan Way to Quarry Access Road	120	18	138
	Quarry Access Road to Platina Road	120	24	144
Platina Road	Fifield-Trundle Road to Fifield Road	120	24	144
Fifield Road	Tullamore to Wilmatha Road	12	2	14
	Henry Parkes Way to Platina Road	72	4	76
	Platina Road to Slee Street	192	28	220
Slee Street	Fifield Road to Wilmatha Road	192	28	220
Wilmatha Road	Slee Street to MPF Access Road	204	30	234
MPF Access Road	Off Wilmatha Road	204	30	234

^A Assumes 430,000 tpa limestone sourced from the limestone quarry. If 790,000 tpa limestone is sourced from the limestone quarry, average day peak hourly traffic on the Quarry Access Road would be 10 to 12 heavy vehicles per hour.

The modified Project is expected to generate an average of 234 vehicle trips per hour during the peak hours at shift change times, of which 204 vehicle trips would be light vehicles (noting that this assumes private vehicle travel by the workforce), and 30 vehicle trips would be heavy vehicles.

4.5 Construction Traffic

Construction aspects of the Project were assessed by MWT (2000), and the modified Project construction activity is expected to remain generally consistent with those findings, with some exceptions which are discussed in this section.

4.5.1 Water Transport

It is proposed to transport water to the MPF from the borefield by road for a short period (approximately six months) during the initial construction phase while the water supply pipeline is being constructed, which was not previously considered by MWT (2000) as part of the construction activity.

The water trucks are proposed to operate six days per week during daylight hours only, with between 23 and 35 deliveries per day. This would generate between 46 and 70 vehicle trips per day when operating. The proposed route for the water trucks is shown in Figure 2-1 and includes:

- North Condobolin Road;
- Bedgerabong Road;
- Noakes Road;
- Yarrabandai Road;
- Henry Parkes Way;
- The Bogan Way;
- Fifield-Trundle Road;
- Platina Road;
- Fifield Road;
- Slee Street; and
- Wilmatha Road.

Clean TeQ would continue to consult with the Forbes Shire Council (FSC) and the final short-term construction phase water transport route would be determined in consultation with the FSC.

Between Bogan Gate and the MPF, the route proposed to be used by the water trucks is the same as that expected to be used by other construction vehicles. The road transport of water would occur when other construction activity is relatively low, and so would not coincide with the peak activity forecast in MWT (2000). The southern part of the route from North Condobolin Road to The Bogan Way is a "new" route with regard to Project construction traffic. Yarrabandai Road, Noakes Road and Henry Parkes Way are approved for use by B-Doubles, with a restriction of 80 km/h on Yarrabandai Road south of Henry Parkes Way where school buses operate. The review of the crash history of the route found that one crash occurred along the route south of Henry Parkes Way between 1 January 2012 and 31 March 2017, and provisional data (subject to change) found one crash occurred at the intersection of Henry Parkes Way and Yarrabandai Road. The crash data indicates no particular crash causal factors exist along the route. The short-term road transport of water would therefore not exacerbate any existing safety concerns along the route.

The overall impacts of the proposed short-term road transport of water are considered to be small, and well within the capacity of the existing roads. This minor short-term increase in construction traffic during the initial construction phase would not overlap with peak construction activity and has therefore not been assessed in further detail in this study.

4.5.2 Accommodation Camp

MWT (2000) assessed the construction period implications of the Project on the basis that a temporary accommodation camp for the construction workforce would be provided within the MPF site. Clean TeQ is separately seeking approval for an accommodation camp on the "Sunrise" property off Sunrise Lane (Figure 5-1). If separate approval for the "Sunrise" accommodation camp is obtained, the approved accommodation camp at the MPF site would not be constructed.

This would require the construction workforce to travel on public roads between the camp and the MPF each day, and other vehicle trips associated with the construction camp would be to and from "Sunrise" rather than the MPF access road. These trips were not previously accounted for by MWT (2000). The access road to "Sunrise" is located off Sunrise Lane.

Traffic generated to and from the "Sunrise" accommodation camp is expected to include:

- Travel by resident employees to and from the MPF;
- Recreational travel by resident employees;
- Bus trips to and from Parkes Airport;
- Delivery trips of consumables and supplies.

Resident Employee Travel to/from MPF

MWT (2000) found that the average construction workforce would be approximately 540 employees, with a peak of 962 employees. Ninety percent of the workforce was assumed to be accommodated in the temporary accommodation camp, i.e. an average of approximately 486 and peak of 866 workers would be accommodated at the camp. With the modified Project, those workers residing in the accommodation camp would travel to and from the MPF each day, using Sunrise Lane and Wilmatha Road.

Assuming that those workers travel by private vehicle, car pooling would be convenient, and an average vehicle occupancy of three persons per vehicle has been assumed. On this basis, the workforce would generate an average of 162 and peak of 289 vehicle trips each day from the camp to the MPF, and the same number of trips each day from the MPF to the camp. This is a conservatively high estimate which does not take into account absenteeism due to roster arrangements or the like. Should Clean TeQ implement a shuttle bus system between the camp and the MPF, the number of vehicle trips would be significantly reduced. The vehicles would turn left from Sunrise Lane to Wilmatha Road in the morning, and right from Wilmatha Road to Sunrise Lane in the evening.

Construction activity would occur on a continuous 24 hour basis. Assuming that the construction employees work two 12-hour shifts per day, the trips would occur during two hours of the day around the shift change times. With 70 percent of the workforce on day shift and 30 percent on night shift, the workforce would generate:

AM Peak Hour

- Average 113 and peak 202 vehicle trips from the camp to the MPF
- Average 49 and peak 87 vehicle trips from the MPF to the camp

PM Peak Hour

- Average 49 and 87 vehicle trips from the camp to the MPF
- Average 113 and peak 202 vehicle trips from the MPF to the camp.

Camp Resident Recreational Travel

MWT (2000) found that non-work trips by the employee residents of the camp would generate an average of 34 vehicle trips per day and a peak of 68 vehicle trips per day. Relocation of the accommodation camp to Sunrise Lane would not alter the number of non-work vehicle trips made by the camp residents, but would divert those trips to Sunrise Lane. The vehicles would therefore turn left from Wilmatha Road to Sunrise Lane when arriving, and turn right from Sunrise Lane to Wilmatha Road when departing.

Airport-Camp Bus Travel

MWT (2000) found that buses to and from Parkes Airport would generate an average of two vehicle trips per day and a peak of four vehicle trips per day. Relocation of the accommodation camp to Sunrise Lane would not alter the number of bus trips between the camp and Parkes Airport, but would divert those trips to Sunrise Lane. The buses would therefore turn left from Wilmatha Road to Sunrise Lane when arriving, and turn right from Sunrise Lane to Wilmatha Road when departing.

Camp Deliveries

MWT (2000) found that delivery trips to the camp would generate an average of 20 vehicle trips per day and a peak of 30 vehicle trips per day. Relocation of the accommodation camp to Sunrise Lane would not alter the number of delivery trips to and from the camp, but would divert those trips to Sunrise Lane. The delivery vehicles would therefore turn left from Wilmatha Road to Sunrise Lane when arriving, and turn right from Sunrise Lane to Wilmatha Road when departing.

4.6 Rail Movements

The Modification would not result in any change to the average number of train movements (i.e. three trains per week) or the approved maximum number of trains per day (i.e. two trains per day).

5. Future Traffic Conditions

The timing of the modified Project would be dependent upon market conditions. For the purpose of this assessment, a ten-year (2027) horizon has been adopted as a suitable basis for assessing the impacts of the modified Project together with other changes to traffic conditions which may occur over time. Should the modified Project commence operations before 2027, the combined impacts of the Project with other traffic changes would be less than assessed here.

Other developments in the region and general background growth in traffic may impact on traffic conditions on those roads serving the Project. Recent approvals and applications made to the NSW Department of Planning and Environment for major projects in the region have been reviewed and are described below, in the context of the potential road transport implications on roads of relevance to the modified Project.

5.1 Parkes Solar Farm

A commercial scale solar photovoltaic site, known as the Parkes Solar Farm, located to the south of Henry Parkes Way, some 10 km west-northwest of Parkes has recently been approved. The Environmental Impact Statement (NGH Environmental, 2016) indicates that construction of the Parkes Solar Farm is expected to take nine months, and would employ approximately 100 people at peak construction. The operational workforce would be very low, at 0.5 full time equivalent operational staff for the life of the Parkes Solar Farm. The operational life would be approximately 30 years.

Vehicular access would be via an access road from Pat Meredith Drive, which extends southwards from Henry Parkes Way. It is not expected that the construction phase of the Parkes Solar Farm would coincide with the Full Production Phase of the Project as construction of the Parkes Solar Farm is scheduled for 2017 (NGH Environmental, 2016). Given the very low number of operational workers, the ongoing increase in traffic as a result of the Parkes Solar Farm would be negligible, and well within the day-to-day variations in traffic.

This assessment therefore does not include forecasts of traffic specifically to and from the Parkes Solar Farm, as background traffic growth (Section 5.3) is considered to adequately address the potential traffic generation of the Parkes Solar Farm.

5.2 North Parkes Mine

The North Parkes Mine is a copper-gold mine located approximately 27 km northwest of Parkes via the Newell Highway and Bogan Road. It has been operating since 1993, and the North Parkes Step Change Project allows for continued mining operations until 2032. Transport & Urban Planning (2013) assessed the traffic implications of the Step Change Project, which included the relocation of the North Parkes Mine vehicle access to McClintocks Lane. That assessment found that the Step Change Project would result in some construction traffic activity, assumed to occur during 2015, while ongoing operational traffic generation would remain unchanged, as the employment and production levels would remain unchanged. Localised changes in traffic distribution would result from the relocation of the North Parkes Mine vehicle access.

The contribution of the North Parkes Mine on traffic conditions in the vicinity of the Project would be negligible, noting that less than 5% of the workforce is assumed to travel to and from Trundle and Bogan Gate. As the traffic survey data (Section 2.4) captures that contribution, and no change to operational traffic generation is expected from the North Parkes Mine, no changes to future traffic conditions as a result of activity at North Parkes Mine are anticipated in the assessment which follows.

5.3 Background Traffic Growth

The survey data supplied by Parkes Shire Council and Lachlan Shire Council was collated over the period from May 2010 to November 2015, while additional data was collected at some locations during November 2016 and continually over the first quarter of 2017. For the purpose of this assessment, it has been assumed that traffic growth on the roads of relevance to the Project has occurred at a rate of 2% per year between the date that survey data was collected and 2017, and will continue to grow at that same rate until 2027. This is considered to be a conservatively high estimate of future traffic growth over that period, noting that the State Infrastructure Strategy forecasts assume that the population of regional NSW will grow by 0.7% per year, with employment growth of 0.86% per year over the period from 2011 to 2031.

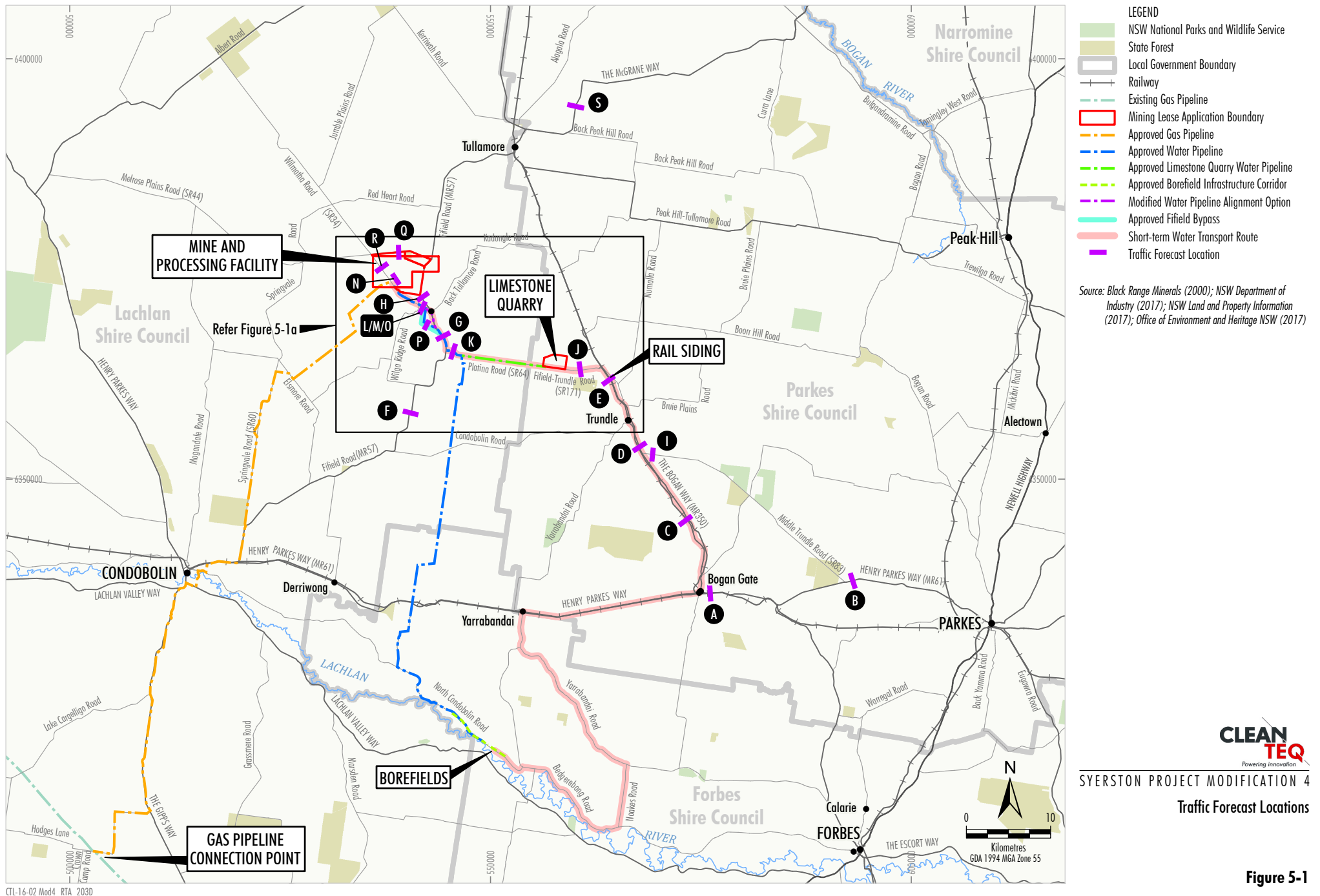
This rate of growth has been applied over the surveyed conditions from the survey date at each location (Table 2.4). Wherever possible, the most recent survey data has been used as the basis of the forecast. The resulting baseline average daily traffic volumes are presented for 2017 and 2027 conditions in Table 5.1 at the locations shown on Figure 5-1. These results exclude any traffic associated with the approved Project.

Table 5.1: Background Average Daily Traffic 2017 and 2027 No Syerston Project (vehicles per day)

Site ^A	Road	Location	Year 2017			Year 2027		
			Light	Heavy	Total	Light	Heavy	Total
A	Henry Parkes Way	East of Bogan Gate	853	219	1,072	1,024	263	1,287
B		East of Middle Trundle Road ^B	927	874	1,801	941	878	1,819
C	The Bogan Way	North of Henry Parkes Way	295	93	388	354	112	466
D		North of Middle Trundle Road ^B	369	114	483	442	137	579
E		North of Trundle	296	71	367	355	85	440
F	Fifield Road	North of Henry Parkes Way	128	70	198	154	84	238
G		North of Platina Road ^B	180	73	253	216	88	304
H		North of Wilmatha Road	132	54	186	158	65	223
I	Middle Trundle Road	East of The Bogan Way	92	26	118	110	31	141
J	Fifield-Trundle Road	West of The Bogan Way	64	14	78	77	17	94
K	Platina Road	East of Fifield Road	64	14	78	77	17	94
L/M	Wilmatha Road	West of Fifield Road	16	3	19	19	4	23
N	MPF Access Road	East of Wilmatha Road	0	0	0	0	0	0
O	Slee Street	in Fifield	177	70	247	212	84	296
Q	Melrose Plains Road	East of Wilmatha Road	8	3	11	10	4	14
R	Wilmatha Road	South of Melrose Plains Road	13	8	21	16	10	26
S	The McGrane Way	North of Black Peak Hill Road	95	30	125	114	36	150

^A Refer to Figure 5-1.

^B Assumes 80% of traffic on Middle Trundle Road uses Henry Parkes Way (east) and The Bogan Way (north).

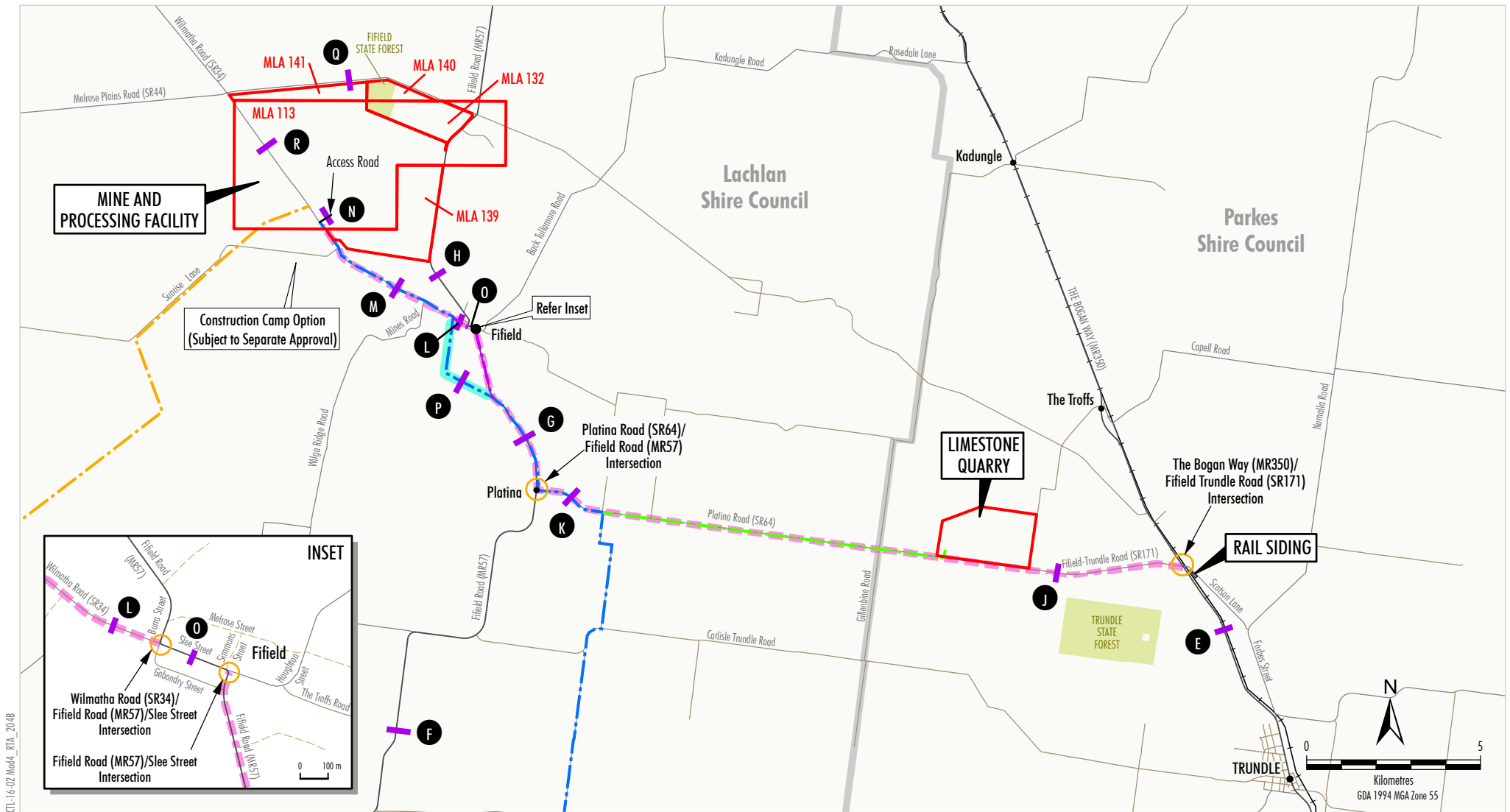


CTL-16-02 Mod4 RTA 203D



SYERSTON PROJECT MODIFICATION 4
Traffic Forecast Locations

Figure 5-1



CTL-16-02 Mod4_RTA_2048

- LEGEND**
- State Forest
 - Local Government Boundary
 - Mining Lease Application Boundary
 - Approved Gas Pipeline
 - Approved Water Pipeline
 - Approved Limestone Quarry Water Pipeline
 - Extent of Road Upgrade (Condition 3 of VPA)
 - Approved Fifield Bypass
 - Traffic Forecast Location

Source: Black Range Minerals (2000); NSW Department of Industry (2017);
NSW Land & Property Information (2017); Office of Environment
and Heritage NSW (2017)

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**SYERSTON PROJECT MODIFICATION 4
Road Upgrades Inset**

Figure 5-1a

The resulting baseline average weekday peak hourly traffic volumes are presented for 2017 and 2027 conditions in Table 5.2 at the locations shown on Figure 5-1. These results exclude any traffic associated with the approved Project.

Table 5.2: Average Weekday Peak Hour Traffic 2017 and 2027 No Syerston Project (vehicles per hour)

Site ^A	Road	Location	Year 2017			Year 2027		
			Light	Heavy	Total	Light	Heavy	Total
A	Henry Parkes Way	East of Bogan Gate	75	19	94	90	23	113
B		East of Middle Trundle Road ^B	55	52	107	67	62	129
C	The Bogan Way	North of Henry Parkes Way	31	10	41	37	12	49
D		North of Middle Trundle Road ^B	42	13	55	50	15	65
E		North of Trundle	35	8	43	42	10	52
F	Fifield Road	North of Henry Parkes Way	13	7	20	16	8	24
G		North of Platina Road ^B	20	8	28	25	9	34
H		North of Wilmatha Road	15	6	21	18	7	25
I	Middle Trundle Road	East of The Bogan Way	13	4	17	15	5	20
J	Fifield-Trundle Road	West of The Bogan Way	9	2	11	11	2	13
K	Platina Road	East of Fifield Road	9	2	11	11	2	13
L/M	Wilmatha Road	West of Fifield Road	2	0	2	2	0	2
N	MPF Access Road	East of Wilmatha Road	0	0	0	0	0	0
O	Slee Street	in Fifield	19	7	26	22	9	31
Q	Melrose Plains Road	East of Wilmatha Road	3	1	4	4	1	5
R	Wilmatha Road	South of Melrose Plains Road	1	1	2	1	1	2
S	The McGrane Way	North of Black Peak Hill Road	11	3	14	13	4	17

^A Refer to Figure 5-1.

^B Assumes 80% of traffic on Middle Trundle Road uses Henry Parkes Way (east) and The Bogan Way (north).

6. Impact of the Modification

6.1 Comparison with Approved Project

Table 6.1 compares the assumed traffic generation of the approved Full Production Phase of the Project (MWT, 2005) with that of the modified Project. This demonstrates that the estimated heavy vehicle trip generation of the modified Project is similar to that of the approved Project. The increase in trips generated by the transport of higher volumes of limestone and sulphur with the modified Project compared with the approved Project would be partly offset by a reduction in other heavy vehicle delivery trips, and changes to some of the transport characteristics from those assumed in MWT (2005).

The estimated light vehicle generation of the modified Project is higher than that of the approved Project, primarily as a result of changes in the assumptions regarding the workforce present on site and its travel characteristics. The total workforce remains unchanged. As noted (Section 4.2.1), the forecasts for the modified Project assume private vehicle travel, while Clean TeQ proposes to implement shuttle bus services between the mine and Condobolin and Parkes. The modified Project forecasts also assume a flat level of car pooling throughout the day and night, while the approved Project forecasts (MWT, 2005) assumed higher levels of car pooling for night shift works, based on surveys undertaken at the Cadia Gold Operations.

Table 6.1: Approved Project and Modified Project Traffic Generation Forecasts (vehicle trips)

	Approved Full Production Phase			Modified Full Production Phase		
	Light	Heavy	Total	Light	Heavy	Total
Average Day						
Employees	225	0	225	400	0	400
Materials	0	169	169	0	204	204
Other	38	38	76	24	8	32
Total	263	207	470	424	212	636
Weekday Peak Hour						
Employees	113	0	113	200	0	200
Materials	0	20	20	0	26	26
Other	6	6	12	4	4	8
Total	119	26	145	204	30	234

6.2 Future Daily Traffic Volumes

As described in Section 4.2, it has been assumed that the road safety audit undertaken in consultation with the Lachlan Shire Council in accordance with the proposed VPA terms included in Appendix 3 of Development Consent 374-11-00 and other assessments of operational conditions will determine that the Fifield Bypass is not required. Project traffic has therefore been assumed to approach the site via Slee Street rather than the Fifield Bypass.

Table 6.2 presents the estimated average daily light and heavy vehicle traffic volumes on the surrounding roads with 10 years of growth in background non-Project traffic and the modified Project. Table 6.2 compares these volumes with those assuming the Project is constructed as approved and operating in its Full Production Phase. For ease of comparison, Table 6.2 assumes that the Fifield Bypass is not constructed for either the approved Project or modified Project.

Table 6.2: Year 2027 Average Daily Traffic with Approved and Modified Project (vehicles per day)

Site ^A	Road	Location	Approved Project ^B			Modified Project		
			Light	Heavy	Total	Light	Heavy	Total
A	Henry Parkes Way	East of Bogan Gate	1,024	297	1,321	1,024	345	1,369
B		East of Middle Trundle Road	1,122	912	2,034	1,161	968	2,129
C	The Bogan Way	North of Henry Parkes Way	355	146	501	360	194	554
D		North of Middle Trundle Road	624	171	795	668	227	895
E		North of Trundle	543	119	662	611	175	786
F	Fifield Road	North of Henry Parkes Way	224	133	357	298	92	390
G		North of Platina Road	474	295	769	616	296	912
H		North of Wilmatha Road	163	65	228	182	69	251
I	Middle Trundle Road	East of The Bogan Way	291	31	322	330	39	369
J	Fifield-Trundle Road	West of The Bogan Way	265	85	350	333	161	494
K	Platina Road	East of Fifield Road	265	175	440	333	217	550
L	Wilmatha Road	West of Slee Street	282	211	493	443	216	659
N	MPF Access Road	East of Wilmatha Road	263	207	470	424	212	636
O	Slee Street	in Fifield	470	291	761	612	292	904
Q	Melrose Plains Road	East of Wilmatha Road	10	4	14	10	4	14
S	The McGrane Way	North of Black Peak Hill Road	114	36	150	114	40	154

^A Refer to Figure 5-1^B Full Production Phase

Table 6.2 demonstrates that on the average day, the total future daily traffic volumes with the modified Project would be higher than with the approved Project, with the most significant differences related to the light vehicle movements. As above, should Clean TeQ implement shuttle bus services between the mine and Condobolin and Parkes, the number of light vehicle trips would be significantly reduced from those forecast in Table 6.2.

6.3 Future Peak Hourly Traffic Volumes

Table 6.3 presents the estimated average weekday peak hourly light and heavy vehicle traffic volumes on the routes to and from the Project with 10 years of growth in background non-Project traffic, and with the Modification operational. As for the daily traffic forecasts, this assumes growth at a rate of 2% per year over the previously surveyed conditions between the survey date and 2027. These are conservatively high estimates of peak hourly traffic, as they assume that the peak hour for traffic generated by the modified Project would coincide with the peak hour recorded in the background traffic. Table 2.5 indicates that the time of the peak hour for background traffic varies significantly, thus the modified Project peak cannot coincide with the background peak at all locations.

For ease of comparison, Table 6.3 assumes that the Fifield Bypass is not constructed for either the approved Project or modified Project.

Table 6.3: Year 2027 Peak Hourly Traffic with Approved and Modified Project (vehicles per hour)

Site ^A	Road	Location	Approved Project ^B			Modified Project		
			Light	Heavy	Total	Light	Heavy	Total
A	Henry Parkes Way	East of Bogan Gate	90	27	117	90	32	122
B		East of Middle Trundle Road	145	66	211	169	74	243
C	The Bogan Way	North of Henry Parkes Way	38	16	54	40	21	61
D		North of Middle Trundle Road	129	19	148	155	27	182
E		North of Trundle	124	14	138	162	22	184
F	Fifield Road	North of Henry Parkes Way	51	16	67	88	12	100
G		North of Platina Road	142	35	177	217	37	254
H		North of Wilmatha Road	20	7	27	30	9	39
I	Middle Trundle Road	East of The Bogan Way	93	5	98	117	8	125
J	Fifield-Trundle Road	West of The Bogan Way	93	10	103	131	20	151
K	Platina Road	East of Fifield Road	93	20	113	131	26	157
L	Wilmatha Road	West of Fifield Road	121	26	147	206	30	236
N	MPF Access Road	East of Wilmatha Road	119	26	145	204	30	234
O	Slee Street	in Fifield	139	35	174	214	37	251
Q	Melrose Plains Road	East of Wilmatha Road	4	1	5	4	1	5
S	The McGrane Way	North of Black Peak Hill Road	13	4	17	13	6	19

^A Refer to Figure 5-1

^B Full Production Phase

Table 6.3 indicates that with the Modification, peak hourly traffic volumes on the part of the access route closest to the Project can be expected to reach approximately 230 to 250 vehicles per hour. This is a conservatively high estimate, noting that the main component of generated traffic during the peak hours is employees travelling to and from the Project. The forecasts assume that all employees travel by private vehicle. Clean TeQ plans to investigate providing a shuttle bus service at shift change times, possibly between the Project and Parkes and Condobolin. To the extent that such a service is used by employees, the total traffic would be reduced below those presented in Table 6.3.

6.4 Future Road Capacity

As noted (Section 2.7.1), the theoretical capacity of a two way two lane road under ideal conditions is 3,200 passenger cars per hour (Austroads, 2013a). Considering the future traffic peak hour volume forecasts (Table 6.3) the peak hourly flows on the road network would remain very low in comparison to the theoretical capacity, and a detailed assessment of midblock roadway capacity is not warranted.

The forecast increase in peak hourly traffic volumes may however impact the driver's experience on some of the key routes. To assess the change in conditions, the forecast traffic volumes on the roads which would experience the greatest increases in traffic as a result of the Project have been reviewed with regard to the Level of Service experienced along those routes.

Austroads (2013a) provides guidelines for the capacity and performance of two lane, two way rural roads, which in turn, refers to the *Highway Capacity Manual* (HCM) (Transportation Research Board, 2010). Level of Service (LOS) is defined as a qualitative measure describing the operational conditions within a traffic stream as perceived by drivers and/or passengers. A LOS definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. LOS A provides the best traffic conditions, with no restriction on desired travel speed or overtaking. LOS B to D describes progressively worse traffic conditions. LOS E occurs when traffic conditions are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre in the traffic stream. The service flow rate for LOS E is taken as the capacity of a lane or roadway. In rural situations, LOS C is generally considered to be acceptable. At LOS C, most vehicles are travelling in platoons, and travel speeds are curtailed. At LOS D, platooning increases significantly, and the demand for passing is high, but the capacity to do so is low.

The LOS experienced by drivers on two way rural roads is dependent on the drivers' expectations regarding the road, and three classes of road are defined in the HCM. Class I roads are those on which motorists expect to travel at relatively high speeds. They most often serve long-distance trips or provide connecting links between facilities that serve long-distance trips. Class II roads are those on which motorists do not necessarily expect to travel at high speeds, and may function as access routes to Class I facilities, serve as scenic or recreational routes or pass through rugged terrain. Class III roads serve moderately developed areas, and may be portions of a Class I or Class II highway that pass through small towns or developed recreational areas, where local traffic mixes with through traffic, and the density of unsignalised roadside access points increases.

The roads with the highest forecasts of peak hourly traffic associated with the Modification are Wilmatha Road, Slee Street and Fifield Road (between Slee Street and Platina Road). These roads would generally be considered as Class II roads under the HCM descriptions, as drivers would expect some level of restriction to their freedom of movement along the routes as a result of characteristics of the route such as limits on the opportunities for overtaking (e.g. centre line marking, sight distances, lack of overtaking lanes). On Class II LOS is defined in terms of Percent Time Spent Following (PTSF). The PTSF is a measure of the level of opportunities to overtake, and is estimated from the demand traffic volumes, the directional distribution of that traffic, and the opportunities that drivers have to overtake. The LOS criteria for Class II two lane roads are as shown in Table 6.4.

Table 6.4: Level of Service Criteria for Class II Two Lane Roads

Level of Service	Class II PTSF (%)
A	≤ 40
B	> 40 – 55
C	> 55 – 70
D	> 70 – 85
E	≥ 85

Table 6.5 presents estimated PTSF and LOS results for these busiest routes with the modified Project, considering each as a Class II road. The HCM model is not valid for the existing posted speed limit of 50 km/h on Slee Street, thus as a general examination of capacity, the calculation is based on a speed limit of 60 km/h.



Table 6.5: Indicative Peak Hour Midblock Road Performance 2027 with Modification

Traffic Volume Scenario	Peak	Contrapeak Direction		Peak Direction	
		PTSF	LOS	PTSF	LOS
Slee Street	AM	17.2	A	40.9	B
	PM	17.2	A	49.0	B
Fifield Road between Slee Street and Platina Road	AM	17.2	A	40.4	B
	PM	18.8	A	40.6	B
Wilmatha Road between Slee Street and MPF Access	AM	17.4	A	41.4	B
	PM	17.5	A	41.3	B

Table 6.5 indicates that good Levels of Service can be expected on the busiest part of the routes accessing the Project with the modified Project traffic, with Level of Service B forecast for travel in the peak direction with the combined effects of background growth over ten years and the modified Project traffic. Level of Service B represents good operating conditions.

6.5 Intersection Operation

Formal assessment of intersection capacity is not warranted at low traffic volumes (Section 2.7.2). Comparison between these threshold volumes and the expected peak hourly volumes on the key roads indicates that the future traffic volumes on all roads are well below the threshold volumes, and as such, there is no capacity concerns regarding the operation of intersections in the vicinity of the modified Project.

Two new intersections are required as part of the approved and modified Project:

- Fifield-Trundle Road and the Limestone Quarry access road;
- Wilmatha Road and the MPF Access Road.

If the Fifield Bypass is to be constructed, new intersections would also be required at:

- Fifield Bypass and Wilmatha Road; and
- Fifield Bypass and Fifield Road.

If required, the new intersections would be designed in accordance with RMS and Austroads guidelines, including intersection geometry, sight distances, lane width, shoulder widths, signage and line marking.

6.6 Construction Phase

As described in Section 4.5.1, it is proposed to transport water to the MPF from the borefield by road for a short period (approximately six months) during the initial construction phase while the water supply pipeline is being constructed, which was not previously considered by MWT (2000) as part of the construction activity.

The water trucks are proposed to operate six days per week during daylight hours only, with between 23 and 35 deliveries per day. This would generate between 46 and 70 vehicle trips per day when operating.

The road transport of water would occur when other construction activity is relatively low, and so would not coincide with the peak activity forecast in MWT (2000). The review of the crash history of the route found that no crashes were reported along the component of the route south of Henry Parkes Way between 1 January 2012 and 31 March 2017, indicating no particular crash causal factors exist along the route. The short-term road transport of water would therefore not exacerbate any existing safety concerns along the route.

The overall impacts of the proposed short-term road transport of water are considered to be small, and well within the capacity of the existing roads. This minor short-term increase in construction traffic during the initial construction phase would not overlap with peak construction activity and has therefore not been assessed in further detail in this study.

As described in Section 4.5.2, Clean TeQ is separately seeking approval to relocate the construction accommodation camp to the "Sunrise" property off Sunrise Lane (Figure 5-1). With regard to the wider road network in the region, the relocation of the accommodation camp to Sunrise Lane would have negligible effect on the impacts of the modified Project on the operation of the key access routes. The main implications of the relocation of the camp on the road network compared with that assessed by MWT (2000) would be limited to:

- Sunrise Lane between Wilmatha Road and the access to "Sunrise" with an additional 218 vehicles per day on average during the construction period, and 391 vehicles per day during the peak construction period;
- Wilmatha Road between Sunrise Lane and the MPF access road with an additional 162 vehicles per day on average during the construction period, and 289 vehicles per day during the peak construction period; and
- the MPF access road, with an additional 162 vehicles per day on average during the construction period, and 289 vehicles per day during the peak construction period.

Based on the forecast of approximately 400 vehicles per day on Sunrise Lane, including buses and heavy vehicles, if the separate application is approved, it is recommended that Sunrise Lane be upgraded to be consistent with a Class 4A unsealed road (ARRB, 2010). On this basis, Sunrise Lane between Wilmatha Road and the access to "Sunrise" would be upgraded and maintained for the duration of the construction accommodation camp to a minimum of an all weather road standard with an operating speed standard of 80 km/h and carriageway width of 9 m (equivalent to two 3.5 m lanes and two 1.0 m wide shoulders). ARRB (2010) indicates that Class 4A roads may be sealed, depending on economic justification. As Sunrise Lane would only carry these higher volumes during the construction phase of the modified Project, it is unlikely to be economically justifiable to seal Sunrise Lane due to the relatively short duration of construction.

The separately proposed relocation of the construction accommodation camp would result in increased turning movements at the intersection of Wilmatha Road and Sunrise Lane. With upgrading of Sunrise Lane as above, the intersection would be improved to remove the current transition between the dirt surface of Sunrise Lane and the gravel surface of Wilmatha Road. If Wilmatha Road is sealed while the temporary accommodation camp is in use, a minimum of 30 m of Sunrise Lane should also be sealed on the approach to the intersection to provide a transition between the two surfaces separated from the intersection, and to prevent gravel drifting from Sunrise Lane onto the sealed surface of Wilmatha Road. The intersection would be designed to meet Austroads requirements with regard to geometry, signage and line marking where appropriate, and to ensure sight distances are adequate for the speed environment.

As noted above, the proposed relocation of the construction accommodation camp to the "Sunrise" property off Sunrise Lane (Figure 5-1) is subject to separate approval (i.e. not part of the Modification).

6.7 The McGrane Way

Condition 43 of Development Consent DA 374-11-00 requires that MR354 The McGrane Way not be used by heavy vehicles travelling to and from the MPF, unless otherwise agreed by the Secretary. The Modification proposes the limited use of The McGrane Way by heavy vehicles travelling to and from Newcastle, via Dubbo on the Mitchell Highway, The McGrane Way, The Bogan Way, Fifield Road, Wilmatha Road, and the MPF Access Road. As demonstrated in Table 4.3, this amounts to an average of two deliveries per day, or four heavy vehicles trips per day on The McGrane Way. The alternative route for these vehicles to avoid use The McGrane Way is to travel via Parkes, a significantly longer route.

It is considered that the modified Project would have acceptable impacts on the operation of The McGrane Way with no significant impacts on its performance, capacity, efficiency and safety. This very low level of additional traffic would not warrant any upgrading of The McGrane Way.

6.8 Road Safety

The review of the crash history of the surrounding road network (Section 2.6) does not reveal any specific concerns with the safety of the key routes and accesses used by Project traffic. A number of road upgrades, intersection upgrades and contributions to road maintenance are proposed with the Project, which are discussed in Section 7. All road works would be designed and constructed in accordance with Austroads and RMS requirements to provide a safe road environment for all road users.

6.9 Car Parking

Car parking for employees and visitors during operational stages would be located within the MPF site to meet the expected demands. The peak demand for employee parking would occur at the shift change over time, when those who are ending a shift are still present while those who are starting a shift are arriving. Based on the travel and shift assumptions, this would generate a peak demand for 200 employee parking spaces. Should a shuttle bus service be implemented, the employee parking demand would decrease, and provision for parking of buses would need to be made.

The quantity of parking required would be reviewed as part of the investigation into provision of an employee shuttle bus service.

7. Mitigation Measures

7.1 Development Consent Conditions

7.1.1 Traffic Management Plan

Condition 46, Schedule 3 of Development Consent DA 374-11-00 requires that a Traffic Management Plan be developed, including a Road Transport Protocol for haulage vehicles travelling to and from the MPF.

It is recommended that a Traffic Management Plan be prepared for the modified Project.

7.1.2 Voluntary Planning Agreements

Condition 17 of Schedule 2 of Development Consent DA 374-11-00 requires that:

Prior to carrying out any development under this consent after 6 May 2017, unless otherwise agreed by the Secretary, the Applicant must enter into a VPA with each of the relevant Councils, consistent with the offers summarised in Appendix 3. The VPA must include the provision of funding for:

- a) the road upgrades required for the development;
- b) ongoing road maintenance for the development; and
- c) community enhancement initiatives in the locality.

Table 7.1 summarises the relevant Lachlan Shire Council proposed VPA requirements contained within Appendix 3 of Development Consent DA 374-11-00 with respect to condition 17.

Table 7.1: Summary of Development Consent DA 374-11-00 Lachlan Shire Council Requirements

Location	Requirements and Timing
Lachlan Shire Council VPA Road Upgrades^A	
Platina Road between Lachlan Shire boundary and Fifield Road	Prior to commissioning of the Mine and processing facility, 8.0 m sealed pavement and 1.0 m gravel shoulders, 3.5 m sealed private access road approach and 3.0 m gravel shoulders 30 m on either side of all private access roads.
Fifield Road between Platina Road and Slee Street in Fifield Village	Prior to commissioning of the Mine and processing facility, 8.0 m sealed pavement and 1.0 m gravel shoulders, 3.5 m sealed private access road approach and 3.0 m gravel shoulders 30 m on either side of all private access roads.
Wilmatha Road between Slee Street and the MPF access road	Prior to commissioning of the Mine and processing facility, 8.0 m sealed pavement and 1.0 m gravel shoulders, 3.5 m sealed private access road approach and 3.0 m gravel shoulders 30 m on either side of all private access roads.
Lachlan Shire Council VPA Intersection Upgrades^A	
Platina Road and Fifield Road	Prior to commissioning of the Mine and processing facility, upgrade signage and line marking in accordance with relevant Austroads requirements.

Location	Requirements and Timing
Fifield Road and Slee Street	Prior to commissioning of the Mine and processing facility, upgrade signage and line marking in accordance with relevant Austroads requirements.
Slee Street, Wilmatha Road and Fifield Road	Prior to commissioning of the Mine and processing facility, upgrade signage and line marking in accordance with relevant Austroads requirements, including installation of advance warning signs on Slee Street, Fifield Road and Wilmatha Road approaches.
Lachlan Shire Council VPA Road Safety Audit	
Henry Parkes Way between Jones Lane and Fifield Road; Fifield Road between Henry Parkes Way and Slee Street; Fifield Road between Slee Street and Red Heart Road; Platina Road between Lachlan Shire boundary and Fifield Road; Slee Street between Fifield Road and Wilmatha Road; Wilmatha Road between Slee Street and Melrose Plains Road; Springvale Road between Fifield Road and Melrose Plains Road; Melrose Plains Road between Springvale Road and 4.65km after the Melrose Plains Road/Back Tullamore Road intersection.	Prior to commissioning of the limestone quarry and/or rail siding, the owner shall pay for a road safety audit to determine road upgrade requirements on specified roads, including intersections and rail crossings. The road safety audit must also determine if the Fifield Bypass is required. Prior to commissioning of the limestone quarry and/or rail siding, the owner shall pay for the road upgrades identified in the road safety audit and agreed with the LSC. The road safety audit must also determine if the Fifield Bypass is required.
Lachlan Shire Council VPA Road Maintenance	
Platina Road between Lachlan Shire boundary and Fifield Road; Fifield Road between Platina Road and Slee Street; Slee Street between Fifield Road and Wilmatha Road; and Wilmatha Road between Slee Street and MPF access road.	The owner shall make annual contributions to LSC towards the maintenance of the specified roads associated with the heavy vehicle transport route.
Fifield Road between Henry Parkes Way and Platina Road; and Henry Parkes Way between Jones Lane and Fifield Road.	The owner shall make annual contributions to LSC towards the maintenance of the specified roads that are likely to experience additional light vehicle traffic.

^A A road construction programme detailing timing and scheduling of these upgrades to be prepared in consultation with Lachlan Shire Council prior to commencement of construction

Table 7.2 summarises the relevant Parkes Shire Council proposed VPA requirements contained within Appendix 3 of Development Consent DA 374-11-00 with respect to Condition 17.



Table 7.2: Summary of Development Consent DA 374-11-00 Parkes Shire Council Requirements

Parkes Shire Council VPA Road Upgrades^A	
Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary	Prior to commissioning of the Mine and processing facility, 8.0 m sealed pavement and 1.0 m gravel shoulders, 3.5 m sealed private access road approach and 3.0 m gravel shoulders 30 m on either side of all private access roads.
Parkes Shire Council VPA Intersection Upgrades^A	
The Bogan Way and Fifield-Trundle Road	Prior to commissioning of the Mine and processing facility, upgrade signage and line marking in accordance with Austroads requirements including installation of "give way" signs on Fifield-Trundle Road.
Parkes Shire Council VPA Road Safety Audit	
Henry Parkes Way between Westlime Road and The Bogan Way; Middle Trundle Road between Henry Parkes Way and The Bogan Way; The Bogan Way between Henry Parkes Way and Fifield Road; and Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary.	Prior to commissioning of the limestone quarry and/or rail siding, the owner shall pay for a road safety audit to determine road upgrade requirements on the specified roads, including intersections and rail crossings. The owner shall pay for the road upgrades identified in the road safety audit and agreed with PSC.
Parkes Shire Council VPA Road Maintenance	
Henry Parkes Way between Westlime Road and The Bogan Way; Middle Trundle Road between Henry Parkes Way and The Bogan Way; The Bogan Way between Henry Parkes Way and Fifield-Trundle Road; and Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary	The owner shall make annual contributions to PSC towards the maintenance of the specified roads associated with the heavy vehicle transport route.

^A A road construction programme detailing timing and scheduling of these upgrades to be prepared in consultation with Parkes Shire Council prior to commencement of construction

7.1.3 Road Upgrade and Maintenance Strategy

Condition 44 of Schedule 3 of Development Consent DA 374-11-00 requires that:

Prior to carrying out any development under this consent after 6 May 2017, the Applicant must prepare a Road Upgrade and Maintenance Strategy for the development, in consultation with RMS and Council, and to the satisfaction of the Secretary. This strategy must:

- a) *identify the road and intersection upgrades required for the project, including all those outlined in Appendix 5; and*
- b) *include a program for:*
 - *the implementation of the road upgrades in accordance with the timing outlined in Appendix 5; and*
 - *the maintenance of the relevant sections of the road network following the upgrades.*

Table 7.3 summarises the relevant timing requirements contained within Appendix 5 of Development Consent DA 374-11-00 with respect to condition 44. It is noted that these requirements are generally consistent with the requirements of Appendix 3 of the Development Consent DA 374-11-00.

Table 7.3: Summary of Development Consent DA 374-11-00 Appendix 5 Timing Requirements

Location	Timing
Road Upgrades	
Platina Road between the Lachlan Shire boundary and Fifield Road; Fifield Road between Platina Road and Slee Street; Wilmatha Road between Slee Street and the MPF; and Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary.	Prior to commissioning of the MPF
Intersection Upgrades	
Platina Road and Fifield Road; Fifield Road and Slee Street; Slee Street, Wilmatha Road and Fifield Road; The Bogan Way and Fifield-Trundle Road; Henry Parkes Way and Middle Trundle Road; and Henry Parkes Way and The Bogan Way.	Prior to commissioning of the MPF
Further Road and Intersection Upgrades	
Henry Parkes Way between Jones Lane and Fifield Road; Fifield Road between Henry Parkes Way and Slee Street; Fifield Road between Slee Street and Red Heart Road; Platina Road between Lachlan Shire boundary and Fifield Road; Slee Street between Fifield Road and Wilmatha Road; Wilmatha Road between Slee Street and Melrose Plains Road; Springvale Road between Fifield Road and Melrose Plains Road; Henry Parkes Way between Westlime Road and The Bogan Way; Middle Trundle Road between Henry Parkes Way and The Bogan Way; The Bogan Way between Henry Parkes Way and Fifield-Trundle Road; Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary; and Melrose Plains Road between Springvale Road and 4.65km after the Melrose Plains Road/Back Tullamore Road intersection.	Prior to development of the limestone quarry or rail siding

7.1.4 Road Safety Audit Requirements

The VPAs with both Lachlan Shire Council and Parkes Shire Council require that road safety audits be conducted on a number of specific routes, with the aim of determining road upgrade requirements along those routes, including intersections and rail crossings. The proposed VPA with Lachlan Shire Council also requires that the road safety audit must determine if the Fifield Bypass is required.

Road safety audits have been conducted in November 2015 and August 2017 along many of the routes specified in the VPAs, and the results of those audits have been taken into account in this assessment of road and intersection upgrade requirements (Sections 7.2 and 7.3). With the modified Project, some parts of the routes specified for upgrades and/or audit in the VPAs would not be used by traffic travelling to and from the MPF, and so should not be included in the VPA requirements. These include:

- Wilmatha Road between the MPF access and Melrose Plains Road;
- Springvale Road between Fifield Road and Melrose Plains Road; and
- Melrose Plains Road between Springvale Road and 4.65km after the Melrose Plains Road/Back Tullamore Road intersection.

The requirements for road safety audits should therefore be amended to include only those routes that would be used by Project traffic and exclude those roads listed above. This assessment assumes that Project-generated light vehicle traffic to and from the east on Henry Parkes Way would use Middle Trundle Road, and the alternative route via Bogan Gate (using Henry Parkes Way and The Bogan Way) would be used by the majority of Project-generated heavy vehicles. Both routes are therefore recommended to be retained in the VPA requirements.

As included in the Lachlan Shire Council VPA, a road safety audit of the existing roads in conjunction with forecast traffic volumes may be used as part of the determination of whether or not the Fifield Bypass should be constructed. Similarly, the Parkes Shire Council VPA requires that the owner shall pay for the road upgrades identified in the road safety audit. An audit identifies potential safety risks to road users, including identifying deficiencies or non-conformances along a route. The non-conformances are allocated a risk rating based on the likelihood and severity of a poor safety outcome. Treatment of non-conformances can then be identified and prioritised, although this is not part of the audit itself. A road safety audit in itself will not determine the need for the Fifield Bypass, nor identify road upgrades.

To determine the need for the Fifield Bypass, consideration would however also need to be given to comparing the forecast traffic conditions on the Bypass (if constructed) with those of the alternative route (if the Bypass is not constructed), and identifying which option is preferred based on established performance guidelines or other considerations such as residential amenity along one route or another. This would take into account what standards of roads would be required under both options, and the potential works required to achieve those standards. The works required for the option without the Bypass would then consider the difference between the existing road standards and the required road standards. The findings of an audit of the existing roads, particularly those which form the alternative route to the Fifield Bypass, may therefore inform the decision, but would form only part of that determination.

7.2 Road Upgrades

All road upgrades would be designed in accordance with Austroads requirements, including any relevant RMS supplementary requirements, relating to lane widths, shoulder widths, horizontal and vertical alignments, sight distances, clear zones, line marking and signage.

7.2.1 Project Heavy Vehicle Route

The Lachlan Shire Council proposed VPA specifies upgrading requirements of that part of the heavy vehicle route within the Lachlan Shire, and the Parkes Shire Council proposed VPA specifies upgrading requirements for that part of the heavy vehicle route within the Parkes Shire. The suggested road standard in the VPAs allows for:

- two travel lanes of 3.5 m width;
- 0.5 m sealed shoulders on each side; and
- 1.0 m gravel shoulders on each side.

This road standard is sufficient to allow heavy vehicles to pass or overtake without either vehicle having to move sideways towards the outer edge of the lane. It is consistent with Austroads (2010) desirable standard for a rural road carrying up to 1,000 vehicles per day, noting that Table 6.2 indicates that Fifield Road between Platina Road and Slee Street would be expected to carry 912 vehicles per day with the modified Project and background traffic growth. This is the highest forecast volume along the heavy vehicle route, which suggests that the nominated road standard is appropriate.

Table 6.2 indicates that Fifield-Trundle Road would be expected to carry 494 vehicles per day with the modified Project and background traffic growth. This is the lowest forecast volume along the heavy vehicle route. At less than 500 vehicles per day, Austroads (2010) suggests that the traffic lanes may be reduced from 3.5 m each to 3.1 m each, however recommends a minimum seal width of 7.0 m on designated heavy vehicle routes or where the average daily traffic is more than 15% heavy vehicles. Considering that heavy vehicles travelling to and from the rail siding would use this route, the standard suggested in the proposed VPAs is appropriate for the entire heavy vehicle route between the MPF and the rail siding.

The treatment of the private access roads, with a 3.5 m wide sealed approach is consistent with Austroads (2010) for rural roads carrying up to 150 vehicles per day. The suggested treatment with 3.0 m wide gravel shoulders on the main road for a minimum of 30 m on either side of minor accesses is consistent with the basic intersection treatments under Austroads guidelines.

These general requirements are considered appropriate for the heavy vehicle route for the modified Project, which is made up of:

- Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary;
- Platina Road between the Lachlan Shire boundary and Fifield Road;
- Fifield Road between Platina Road and Slee Street;
- Slee Street; and
- Wilmatha Road between Slee Street and the MPF access road.

These routes were included in the road safety audits, and based on the existing road conditions, this would require sealing and/or widening of:

- Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary;
- Platina Road between the Lachlan Shire boundary and Fifield Road;
- Fifield Road between Platina Road and Slee Street; and
- Wilmatha Road between Slee Street and the MPF access.

7.2.2 Fifield Road

With the modified Project, traffic travelling to and from the MPF would use parts of Fifield Road outside of the heavy vehicle route discussed in Section 7.2.1. These are discussed below.

Fifield Road South of Platina Road

The section of Fifield Road between Henry Parkes Way and Platina Road is included in the Development Consent requirement for a road safety audit (Section 7.1.4) to identify non-conformances and for maintenance contributions (Section 7.4). This section of Fifield Road was included in the 2017 road safety audit.

The surveys indicate that Fifield Road south of Platina Road presently carries an average of 198 vehicles per day, of which 70 vehicles (35 per cent) are heavy vehicles. With the modified Project traffic and background growth, Fifield Road would carry 390 vehicles per day, of which 92 vehicles (24 per cent) would be heavy vehicles. At less than 500 vehicles per day, Austroads (2010) suggests that the traffic lanes may be reduced from 3.5 m each to 3.1 m each, however recommends a minimum seal width of 7.0 m on designated heavy vehicle routes or where the average daily traffic is more than 15% heavy vehicles. It is therefore considered that the desirable minimum seal width on Fifield Road between Henry Parkes Way and Platina Road is 7.0 m for existing and forecast conditions, due to the background proportion of heavy vehicles. The existing pavement width is approximately 7.6 m, thus meets the desirable minimum standard. The Project's contribution to traffic on Fifield Road south of Platina Road is expected to be predominantly light vehicles.

Fifield Road North of Fifield

The section of Fifield Road between Slee Street and Red Heart Road is included in the requirement for a road safety audit (Section 7.1.4) to identify non-conformances and upgrade requirements. This section of Fifield Road was included in the 2017 road safety audit.

The surveys indicate that Fifield Road north of Fifield presently carries an average of 186 vehicles per day, of which 54 vehicles (29%) are heavy vehicles. With the modified Project traffic and background growth, Fifield Road north of Fifield would carry 251 vehicles per day, of which 69 vehicles (27%) would be heavy vehicles. As above, comparing with Austroads (2010). It is considered that the desirable seal width on Fifield Road north of Fifield is 7.0 m for existing and forecast conditions due to the background proportion of heavy vehicles. The existing pavement width is approximately 7.2 m, thus meets the desirable minimum standard. The Project's contribution to traffic on Fifield Road south of Platina Road is expected to be predominantly light vehicles.

7.2.3 Henry Parkes Way

Henry Parkes Way between Jones Lane and Fifield Road

The modified Project traffic travelling between the MPF and Condobolin would travel on Henry Parkes Way between Jones Lane (on the outskirts of Condobolin) and Fifield Road. The modified Project is forecast to contribute 138 light and 8 heavy vehicles per day on this section of Henry Parkes Way.

This section of road is included in the requirement for a road safety audit (Section 7.1.4) to identify non-conformances and for maintenance contributions (Section 7.4). It was included in the 2017 road safety audit.

Henry Parkes Way between Westlime Road and The Bogan Way

Westlime Road lies on the western outskirts of Parkes. Light vehicles associated with the modified Project would use Middle Trundle Road as the route for travel between Parkes and the MPF, and so would not contribute any additional traffic to Henry Parkes Way between The Bogan Way and Middle Trundle Road. The majority of heavy vehicles associated with the modified Project would travel via Bogan Gate, and so would contribute additional traffic to Henry Parkes Way between The Bogan Way and Middle Trundle Road. The modified Project is forecast to contribute up to 220 light and 90 heavy vehicles per day on Henry Parkes Way east of Middle Trundle Road, and 82 heavy vehicles per day on Henry Parkes Way between Middle Trundle Road and The Bogan Way. This assumes up to 560,000 tpa limestone would be sourced from local quarries located to the east of Middle Trundle Road such that limestone transport trucks would use all or part of this section of Henry Parkes Way. If the maximum amount of limestone is sourced from the limestone quarry (790,000 tpa), up to 200,000 tpa limestone would be sourced from local quarries, and the heavy vehicle contribution of the modified Project on Henry Parkes Way would be reduced to 44 heavy vehicles per day east of Middle Trundle Road, and to 36 heavy vehicles per day between The Bogan Way and Middle Trundle Road.

Henry Parkes Way between The Bogan Way and Westlime Road was included in the 2017 road safety audit. It is recommended that contributions towards maintenance of Henry Parkes Way between The Bogan Way and Westlime Road would be appropriate with the modified Project traffic. Details of the Project's contribution to traffic on this route would be determined once the local sources of limestone are known, and should take into consideration the potential variability of use of the route by limestone trucks.

7.2.4 The Bogan Way

With the modified Project, The Bogan Way would be used by Project-generated light and heavy vehicle traffic between Henry Parkes Way and Fifield-Trundle Road. Only a small number of light vehicle trips would be generated by the Project on The Bogan Way south of Middle Trundle Road travelling to and from Bogan Gate. Table 4.4 demonstrates that the modified Project would contribute 6 light vehicle and 82 heavy vehicles per day on The Bogan Way between Henry Parkes Way and Middle Trundle Road, and 226 to 256 light vehicle trips per day and 90 heavy vehicles per day on The Bogan Way between Middle Trundle Road and Fifield-Trundle Road. These forecasts assume that up to 560,000 tpa limestone is sourced from local quarries located to the east such that the limestone transport trucks use The Bogan Way between Fifield-Trundle Road and Henry Parkes Way. If the maximum amount of limestone is sourced from the limestone quarry (790,000 tpa), up to 200,000 tpa limestone would be sourced from local quarries, and the heavy vehicle contribution of the modified Project on The Bogan Way would be reduced to 44 heavy vehicles per day on The Bogan Way between Fifield-Trundle Road and Middle Trundle Road, and 36 heavy vehicles per day on The Bogan Way between Middle Trundle Road and Henry Parkes Way.

The Bogan Way between Henry Parkes Way and Fifield-Trundle Road was included in the 2015 road safety audit. It is understood that Parkes Shire Council has been undertaking seal works on The Bogan Way, and it is recommended that Clean TeQ make contributions to the maintenance of The Bogan Way.

The need for upgrading of the rail level crossings of The Bogan Way with the Bogan Gate Tottenham Railway would be considered in consultation with the rail authority. Austroads (2017b) sets out a range of treatment options that may be considered, with their implementation requiring coordination between the road and rail authorities. It is recommended that all signage and line marking at the rail level crossings be upgraded to meet authority requirements, and to be consistent along the route.

7.2.5 Melrose Plains Road

Melrose Plains Road would not be used by MPF-related traffic and upgrading would not be required by the modified Project.

7.2.6 Middle Trundle Road

Middle Trundle Road between Henry Parkes Way and The Bogan Way was included in the 2015 road safety audit. It is understood that the remaining unsealed length of Middle Trundle Road between Henry Parkes Way and The Bogan Way is to be sealed, and the resulting road standard would be suitable for use by heavy vehicles. On that basis, no further upgrading of the road is warranted, noting the recommended upgrading of the Middle Trundle Road intersections are discussed in Sections 7.3.5 and 7.3.7.

The proposed VPA with Parkes Shire Council requires contributions to the maintenance of Middle Trundle Road, which is considered to be appropriate.

7.2.7 Springvale Road

Springvale Road would not be used by MPF-related traffic (which would use Fifield Road) and upgrading would not be required by the modified Project.

7.2.8 Wilmatha Road

Between Slee Street and the MPF access road, Wilmatha Road is recommended to be upgraded as part of the heavy vehicle route for the Project (Section 7.2.1). Between the MPF access road and Melrose Plains Road, Wilmatha Road would not be used by MPF-related traffic and so does not warrant upgrading as a result of the modified Project.

7.3 Intersection Upgrades

All intersection upgrades would be designed in accordance with Austroads requirements, including any relevant RMS supplementary requirements, relating to lane widths, shoulder widths, horizontal and vertical alignments, sight distances, clear zones, line marking and signage.

7.3.1 Intersection Treatments

The current Austroads (2017b) rural intersection designs are described in this subsection.

Basic Intersection Treatment

The general minimum preferred treatment at rural road intersections are Basic Auxiliary Left (BAL) and Basic Auxiliary Right (BAR) treatments. The rural BAL treatment on the major road has a widened shoulder, which assists turning vehicles to move further off the through carriageway, making it easier for through vehicles to pass. The rural BAR treatment features a widened shoulder on the major road that allows through vehicles, having slowed, to pass to the left of turning vehicles. The BAL treatment on the minor road allows turning movements to occur from a single lane, with a shoulder that is too narrow to be used by left-turning vehicles, so as to prevent vehicles from standing two abreast at the holding line. These design features are preferred to safely manage the movement of vehicles in the high speed rural environment.

Auxiliary Lane Treatment

Auxiliary lane turn treatments have short lengths of auxiliary lane provided to improve safety, especially on high speed roads. The Auxiliary Right-turn treatment (AUR) on the major road is created by the use of a short lane with standard painted stripes, where the median lane is shared between through and right turning vehicles, and the auxiliary kerbside lane allows through vehicles to pass a vehicle which has slowed to turn right. AUR treatments are not used in NSW, rather a channelised right turn treatment with a short turn bay known as a CHR(S) treatment is used. This is a modification of the channelised treatment described below.

Auxiliary Left-turn (AUL) treatments on the major and minor road are normal indented turn lanes, used only by vehicles turning left. The auxiliary lane treatment on the major road is safer than a basic treatment, however the channelised treatment described below is preferred where practicable, as the risk of collisions is lower. Consequently, Austroads (2017b) indicates that a channelised left turn (CHL) treatment should be used wherever practicable. The AUL treatment on the minor road is less safe than a basic or channelised treatment, and is therefore while it is included in the warrants, it is not recommended, and Austroads (2017b) indicates that a BAL or CHL treatment should be used wherever practicable.

Channelised Treatment

Channelised treatments at the intersections are CHR and channelised left turn (CHL) treatments for right and left turns respectively. The channelised "CH" treatments separate conflicting vehicle paths by raised or painted medians and/or islands, and often use auxiliary lanes in conjunction with channelisation. The CHR treatment on the major road provides a continuous lane for through vehicles only, and an auxiliary turn lane for right turning vehicles only. CHL treatments on the major or minor road provide a separate left turn "slip" lane, separated from the adjacent lane by a painted or raised island.

Channelised treatments are preferred over auxiliary lane treatments where practicable, as the risk of collisions is lower.

Platina Road and Fifield Road

At the intersection of Platina Road and Fifield Road, the modified Project is forecast to contribute the following peak hourly vehicle movements:

AM Peak Hour

- Fifield Road southbound: 18 light and 2 heavy vehicles
- Left turn from Fifield Road to Platina Road: 31 light and 12 heavy vehicles
- Right turn from Platina Road to Fifield Road: 90 light and 12 heavy vehicles
- Fifield Road northbound: 53 light and 2 heavy vehicles.

PM Peak Hour

- Fifield Road southbound: 53 light and 2 heavy vehicles
- Left turn from Fifield Road to Platina Road: 90 light and 12 heavy vehicles
- Right turn from Platina Road to Fifield Road: 31 light and 12 heavy vehicles
- Fifield Road northbound: 18 light and 2 heavy vehicles.

The baseline background traffic in 2027 is forecast at 13 vehicles per hour on Platina Road and 34 vehicles per hour on Fifield Road north of Platina Road (both two way volumes during the busiest hour of the day). With the modified Project, the forecast number of vehicles turning to and from Platina Road and Fifield Road north is likely to be significantly greater than the number travelling through on Fifield Road. Under these conditions, it may be prudent to consider altering the priority of the intersection, such that the southern approach of Fifield Road becomes the minor leg of the intersection, with appropriate design to ensure the priority is clear, and with the relevant signage and line marking. It should be noted though that should Clean TeQ implement a shuttle bus system for employees, the volumes would not increase so greatly and the change of priority may not then be warranted.

The details of the required intersection treatment would be dependent upon the traffic demands. Should the existing priority remain, signage and line marking at the intersection should be upgraded to meet Austroads requirements. Should the priority be altered, the design of the intersection should be in accordance with Austroads guidelines, including intersection geometry, sight distances, lane width, shoulder widths, signage and line marking.

7.3.2 Fifield Road and Slee Street (East)

At the intersection of Fifield Road and Slee Street, the modified Project is forecast to contribute the following peak hourly vehicle movements:

AM Peak Hour

- Left turn from Fifield Road to Slee Street: 143 light and 14 heavy vehicles
- Right turn from Slee Street to Fifield Road: 49 light and 14 heavy vehicles.

PM Peak Hour

- Left turn from Fifield Road to Slee Street: 49 light and 14 heavy vehicles
- Right turn from Slee Street to Fifield Road: 143 light and 14 heavy vehicles.

These left and right turn movements have priority at the intersection, and the movements to and from the minor road would remain very low and would not be increased by the modified Project. No specific upgrading of the intersection is required to accommodate the additional demand resulting from the Modification. It is recommended that the signage and line marking at the intersection of Fifield Road and Slee Street be upgraded to meet Austroads requirements.

7.3.3 Fifield Road, Slee Street (West) and Wilmatha Road

The baseline background traffic in 2027 is forecast at peak hourly volumes of 25 vehicles per hour on Fifield Road, 31 vehicles per hour on Slee Street, and 2 vehicles per hour on Wilmatha Road. The modified Project is forecast to contribute the following peak hourly vehicle movements at the intersection of Slee Street, Wilmatha Road and Fifield Road:

AM Peak Hour

- Wilmatha Road eastbound to Slee Street: 49 light and 14 heavy vehicles
- Left turn from Wilmatha Road to Fifield Road: 3 light and 1 heavy vehicle
- Right turn from Fifield Road to Wilmatha Road: 9 light and 1 heavy vehicles
- Slee Street westbound to Wilmatha Road: 143 light and 14 heavy vehicles.

PM Peak Hour

- Wilmatha Road eastbound to Slee Street: 143 light and 14 heavy vehicles
- Left turn from Wilmatha Road to Fifield Road: 9 light and 1 heavy vehicle
- Right turn from Fifield Road to Wilmatha Road: 3 light and 1 heavy vehicles
- Slee Street westbound to Wilmatha Road: 49 light and 14 heavy vehicles.

The most significant increases in traffic generated by the modified Project would therefore be the movements between Slee Street and Wilmatha Road. Priority at the intersection lies along Slee Street (east) and Fifield Road (north). Inbound traffic from Slee Street to Wilmatha Road would have right of way at the intersection, and so would not be delayed by any opposing traffic, thus upgrading to separate the "turning" traffic from the "through" traffic would not be warranted. Outbound traffic from Wilmatha Road to Slee Street would be required to give way to the "through" traffic on Fifield Road-Slee Street. During the peak hours, this volume of traffic would exceed the through traffic, however it is recommended that Slee Street – Fifield Road remain the major road at this intersection.

As described in Section 7.2.1, Wilmatha Road would be widened and sealed as part of the Project heavy vehicle route. Upgrading of signage and line marking to Austroads standards would be undertaken as part of that upgrading, and it is recommended that this include advance warning signs for the intersection and its priority for drivers approaching on Slee Street (W9-2L) and Fifield Road (W9-2L) and advance warning of the Give Way signs (W3-2) on Wilmatha Road. This would encourage outbound drivers from the MPF to slow before entering Slee Street, which has a speed limit of 50 km/h.

7.3.4 The Bogan Way and Fifield-Trundle Road

With the modified Project, the intersection of The Bogan Way and Fifield-Trundle Road should be considered together with Scotson Lane, which would provide access to the rail siding. The modified Project is forecast to contribute the following peak hourly vehicle movements:

AM Peak Hour

- Left turn from The Bogan Way to Fifield-Trundle Road: 90 light and 6 heavy vehicles
- Westbound through Scotson Lane to Fifield-Trundle Road: 3 heavy vehicles
- Eastbound through Fifield-Trundle Road to Scotson Lane: 3 heavy vehicles
- Right turn Fifield-Trundle Road to The Bogan Way: 31 light and 6 heavy vehicles.

PM Peak Hour

- Left turn from The Bogan Way to Fifield-Trundle Road: 31 light and 6 heavy vehicles
- Westbound through Scotson Lane to Fifield-Trundle Road: 3 heavy vehicles
- Eastbound through Fifield-Trundle Road to Scotson Lane: 3 heavy vehicles
- Right turn Fifield-Trundle Road to The Bogan Way: 90 light and 6 heavy vehicles.

Baseline traffic volumes in 2027 are forecast at 13 vehicles per hour on Fifield-Trundle Road and 52 vehicles per hour on The Bogan Way.

The Austroads (2017b) warrants for unsignalised intersection turn treatments do not apply to four way intersections, however it is noted that the volumes using Scotson Lane are expected to be very low, with the Modification generating six heavy vehicle movements in an hour. As a guide to considering the need for treatment of this intersection, the volumes excluding Scotson Lane are considered below.

Comparison with the Austroads (2017b) warrants indicates that the peak hourly volumes resulting from the combination of baseline and Modification traffic would remain well below the volumes at which a additional treatment (AUL, CHL or CHR) in The Bogan Way would be warranted. The existing flared layout of The Bogan Way at the intersection is therefore considered sufficient with regard to left turns from The Bogan Way to Fifield-Trundle Road. With the modified Project traffic and assuming private vehicle travel by employees, the dominant movements at the intersection would be the turns between The Bogan Way south and Fifield-Trundle Road, which may suggest altering the priority of the intersection. However, this intersection should be considered together with Scotson Lane, discussed below.

Notwithstanding the above, with the modified Project, there would be a demand for vehicle movements across The Bogan Way between Fifield-Trundle Road and Scotson Lane. Scotson Lane is presently unsealed and slightly offset from Fifield-Trundle Road, and crosses the railway line at a passive level crossing approximately 30m east of the eastern edge of The Bogan Way. The intersection design may either aim to better align Scotson Lane with Fifield-Trundle Road, resulting in a four way intersection, however it is noted that such intersections, with one road having priority, record high crash rates for the through movements from the minor road. The alternative is to form a staggered T-intersection.



The current layout of Scotson Lane and Fifield-Trundle Road suggests that a right-left stagger may be suitable, i.e., vehicles approaching from Scotson Lane and Fifield-Trundle Road must turn right onto The Bogan Way before turning left onto the opposing side road. This type of staggered arrangement is suitable where capacity is not a concern, and may be provided with a basic or channelised right turn treatment in the major road (The Bogan Way). The stagger distance for a right-left stagger on a two lane two way road such as The Bogan Way is important in that it should be small enough to enable an efficient crossing manoeuvre in a single movement (i.e., not staged), yet great enough to eliminate the possibility of high speed crossing manoeuvres from the minor roads (Austroads, 2017a).

In addition to considering the intersection design, the adjacent level crossing would require upgrading to meet current signage and line marking requirements of Australian Standard 1742.7 (2016). The design of the level crossing and intersection of The Bogan Way with Scotson Lane and Fifield-Trundle Road would also need to take into consideration other potential risks including:

- queuing of vehicles from the intersection back across the crossing;
- short stacking, i.e. ensuring the distance between the crossing and the adjacent road intersection is long enough to accommodate the largest stationary gazetted vehicles without the rear of the vehicle fouling the track; and
- proximity of the level crossing to the siding, and whether a train in the siding could block the crossing.

To eliminate short stacking risks, a storage length of 25 m would need to be provided in Scotson Lane between The Bogan Way and the level crossing.

7.3.5 Henry Parkes Way and Middle Trundle Road

The modified Project is forecast to contribute the following peak hourly vehicle turning movements at the intersection:

AM Peak Hour

- Left turn from Middle Trundle Road to Henry Parkes Way: 26 light and 1 heavy vehicle
- Right turn from Henry Parkes Way to Middle Trundle Road: 76 light and 2 heavy vehicles
- Westbound on Henry Parkes Way: 4 heavy vehicles
- Eastbound on Henry Parkes Way: 4 heavy vehicles.

PM Peak Hour

- Left turn from Middle Trundle Road to Henry Parkes Way: 76 light and 2 heavy vehicles
- Right turn from Henry Parkes Way to Middle Trundle Road: 26 light and 1 heavy vehicle
- Westbound on Henry Parkes Way: 4 heavy vehicles
- Eastbound on Henry Parkes Way: 4 heavy vehicles.

Henry Parkes Way is forecast to carry 129 vehicles per hour (two way) east of Middle Trundle Road during the busiest hour of the day, excluding Project traffic.

Comparison with the Austroads (2017b) warrants for intersection treatments indicates that basic right turn treatment of Henry Parkes Way would be warranted, which is consistent with its current layout. It is recommended that the shoulder widening required for BAL/BAR treatments be constructed to a sealed surface in place of the existing unsealed shoulders. It is also recommended that signage and line marking at the intersection be upgraded to meet Austroads requirements, including advance warning of the give way signs (W3-2) to encourage lower vehicle speeds due to the angle at which Middle Trundle Road meets Henry Parkes Way.

7.3.6 Henry Parkes Way and The Bogan Way

The modified Project is forecast to contribute the following peak hourly vehicle turning movements at the intersection:

AM Peak Hour

- Left turn from The Bogan Way to Henry Parkes Way: 4 heavy vehicles
- Right turn from Henry Parkes Way to Middle Trundle Road: 4 heavy vehicles.

PM Peak Hour

- Left turn from The Bogan Way to Henry Parkes Way: 4 heavy vehicles
- Right turn from Henry Parkes Way to Middle Trundle Road: 4 heavy vehicles.

Henry Parkes Way is forecast to carry 113 vehicles per hour (two way) east of Bogan Gate during the busiest hour of the day, excluding Project traffic.

The existing intersection of The Bogan Way and Henry Parkes Way has BAL and BAR treatments on Henry Parkes Way, with a wide sealed shoulder for vehicles turning left into The Bogan Way, and a wide unsealed shoulder for westbound vehicles to pass vehicles turning right into The Bogan Way. Comparison with the Austroads (2017b) warrants indicates that the peak hourly volumes resulting from the combination of baseline and Project traffic would remain well below the volumes at which any additional treatment (AUL, CHL or CHR) in Henry Parkes Way would be warranted.

It is recommended that linemarking and signage be improved to meet Austroads requirements as part of ongoing maintenance activities.

7.3.7 The Bogan Way and Middle Trundle Road

The intersection of Middle Trundle Road with The Bogan Way was upgraded in 2013 to cater for access by low volumes of road trains, but did not include any auxiliary lanes. The upgraded intersection was reviewed by Crossroads Civil Design (2014) and deemed suitable due to low volumes. Line marking of the existing intersection has been worn by the movement of heavy vehicles, which means that drivers in Middle Trundle Road have only a limited indication of where to position their vehicle to stop.

The baseline background traffic in 2027 is forecast at peak hourly volumes of 65 vehicles per hour on The Bogan Way (south of Middle Trundle Road) and 20 vehicles per hour on Middle Trundle Road. The modified Project is forecast to contribute the following peak hourly vehicle turning movements at the intersection:

AM Peak Hour

- Southbound on The Bogan Way: 1 light and 4 heavy vehicles
- Left turn from The Bogan Way to Middle Trundle Road: 26 light and 1 heavy vehicle
- Right turn from Middle Trundle Road to The Bogan Way: 76 light and 2 heavy vehicles
- Northbound on The Bogan Way: 2 light and 4 heavy vehicles.

PM Peak Hour

- Southbound on The Bogan Way: 2 light and 4 heavy vehicles
- Left turn from The Bogan Way to Middle Trundle Road: 76 light and 2 heavy vehicles
- Right turn from Middle Trundle Road to The Bogan Way: 26 light and 1 heavy vehicle
- Northbound on The Bogan Way: 1 light and 4 heavy vehicles.

Comparison with the Austroads (2017b) warrants for intersection treatments indicates that further upgrading of the intersection to provide auxiliary lanes would not be warranted with the modified Project traffic. It is recommended that signage and line marking be improved to meet Austroads requirements, including give way signs (R1-2) and advance warning of the give way signs (W3-2) for drivers approaching on Middle Trundle Road.

7.3.8 New Intersections

Two new intersections are required as part of the modified Project:

- Fifield-Trundle Road and the Limestone Quarry access road; and
- Wilmatha Road and the MPF Access Road.

The new intersections would be designed in accordance with Austroads guidelines, including intersection geometry, sight distances, lane width, shoulder widths, signage and line marking.

The forecast movements at the intersection of Fifield-Trundle Road and the Limestone Quarry access road would warrant a basic intersection treatment, with suitable geometry to accommodate the swept path of the trucks which would be used to transport the limestone.

The forecast movements at the intersection of Wilmatha Road and the MPF access road suggest that this intersection may be appropriately designed with Wilmatha Road south and the MPF access road being the main road, and Wilmatha Road north as the minor road. With this layout, a basic rural intersection treatment would be required, with appropriate signage and line marking to clarify the priority.

7.4 Road Maintenance Contributions

The proposed VPA with Lachlan Shire Council requires annual contributions by the owner towards the maintenance of specific routes, including the heavy vehicle transport route, as well as roads which are expected to experience additional light traffic as a result of the Project. Those requirements assume that the Fifield Bypass is not constructed. With the modified Project, the Fifield Bypass would result in changes to the routes used, and it is recommended that the road maintenance requirements be amended accordingly.

It is recommended that the road maintenance contributions be required for the following routes, with the average daily traffic contributed by the modified Project set out in Table 4.4:

- Henry Parkes Way between Jones Lane and Fifield Road;
- Henry Parkes Way between Westlime Road and The Bogan Way;
- Middle Trundle Road between Henry Parkes Way and The Bogan Way;
- The Bogan Way between Henry Parkes Way and Fifield-Trundle Road;
- Fifield-Trundle Road between The Bogan Way and Parkes Shire boundary;
- Platina Road between Lachlan Shire boundary and Fifield Road;
- Fifield Road between Henry Parkes Way and Slee Street (noting that the Project's contribution to future traffic volumes differs north and south of Platina Road);
- Slee Street; and
- Wilmatha Road between Slee Street and MPF access road.

In addition to the above, Clean TeQ would contribute to the maintenance of the proposed water transport route south of the Henry Parkes Way including North Condobolin Road (approximately 8 km), Bedgerabong Road (approximately 15 km), Noakes Road (approximately 7 km) and Yarrabandai Road (approximately 24 km) (the other sections of the proposed water transport route are addressed above) during the short-term road transport of water from the borefield to the mine site. As noted in Section 4.5.1, Clean TeQ would continue to consult with the FSC and the final short-term construction phase water transport route would be determined in consultation with the FSC.

It is proposed that prior to the recommencement of construction of the Project, Clean TeQ would commission a condition assessment of this section of the proposed water transport route in consultation with the FSC. A follow-up condition assessment would be undertaken in consultation with the FSC after the water transport has ceased, to identify sections of the road requiring maintenance works as a result of the short-term road transport of water. Clean TeQ would then undertake these required maintenance works in consultation with the FSC.

7.5 Review of Voluntary Planning Agreement Requirements

Table 7.4 summaries recommended changes to the proposed VPA requirements contained within Appendix 3 of Development Consent DA 374-11-00 as a result of the Modification.

Table 7.4: Summary of Modifications to Development Consent DA 374-11-00 Lachlan Shire Council Requirements

Location	Existing Requirements and Timing	Modified Requirements and Timing
Lachlan Shire Council VPA Road Upgrades^A		
Platina Road between Lachlan Shire boundary and Fifield Road	Prior to commissioning of the MPF, 8.0 m sealed pavement and 1.0 m gravel shoulders, 3.5 m sealed private access road approach and 3.0 m gravel shoulders 30 m on either side of all private access roads.	No change.
Fifield Road between Platina Road and Slee Street in Fifield Village	Prior to commissioning of the MPF, 8.0 m sealed pavement and 1.0 m gravel shoulders, 3.5 m sealed private access road approach and 3.0 m gravel shoulders 30 m on either side of all private access roads.	No change.
Wilmatha Road between Slee Street and the MPF access road	Prior to commissioning of the MPF, 8.0 m sealed pavement and 1.0 m gravel shoulders, 3.5 m sealed private access road approach and 3.0 m gravel shoulders 30 m on either side of all private access roads.	No change.
Slee Street between Fifield Road and Wilmatha Road	-	It is recommended that a review of the need for upgrading of street lighting and pedestrian facilities on Slee Street in Fifield Village be included.
Sunrise Lane between Wilmatha Road and "Sunrise" access road	-	It is recommended that should the temporary accommodation camp be located at "Sunrise" (subject to separate approval), this road be upgraded. It is recommended that the road be upgraded and maintained for the duration of the construction accommodation camp with a minimum all weather standard for an operating speed standard of 80 km/h and carriageway width of 9 m (equivalent to two 3.5 m lanes and two 1.0 m wide shoulders).
Lachlan Shire Council VPA Intersection Upgrades^A		
Platina Road and Fifield Road	Prior to commissioning of the MPF, upgrade signage and line marking in accordance with relevant Austroads requirements.	No change.
Fifield Road and Slee Street	Prior to commissioning of the MPF, upgrade signage and line marking in accordance with relevant Austroads requirements.	No change.
Slee Street, Wilmatha Road and Fifield Road	Prior to commissioning of the MPF, upgrade signage and line marking in accordance with relevant Austroads requirements, including installation of advance warning signs on Slee Street, Fifield Road and Wilmatha Road approaches.	No change.

Location	Existing Requirements and Timing	Modified Requirements and Timing
Wilmatha Road and Sunrise Lane	-	It is recommended that should the temporary accommodation camp be located at "Sunrise" (subject to separate approval), this intersection be upgraded. It is recommended that the intersection of Wilmatha Road and Sunrise Lane be upgraded as part of upgrading of Sunrise Lane to remove the transition between the gravel and dirt surfaces while Wilmatha Road remains unsealed, and by sealing a minimum of 30 m of Sunrise Lane on the approach to the intersection when Wilmatha Road is sealed.
Lachlan Shire Council VPA Road Safety Audit		
Henry Parkes Way between Jones Lane and Fifield Road; Fifield Road between Henry Parkes Way and Slee Street; Fifield Road between Slee Street and Red Heart Road; Platina Road between Lachlan Shire boundary and Fifield Road; Slee Street between Fifield Road and Wilmatha Road; Wilmatha Road between Slee Street and Melrose Plains Road; Springvale Road between Fifield Road and Melrose Plains Road; Melrose Plains Road between Springvale Road and 4.65km after the Melrose Plains Road/Back Tullamore Road intersection.	Prior to commissioning of the limestone quarry and/or rail siding, the owner shall pay for a road safety audit to determine road upgrade requirements on specified roads, including intersections and rail crossings. The road safety audit must also determine if the Fifield Bypass is required. Prior to commissioning of the limestone quarry and/or rail siding, the owner shall pay for the road upgrades identified in the road safety audit and agreed with the LSC. The road safety audit must also determine if the Fifield Bypass is required.	It is recommended that the following road be added as it is expected to be used by modified Project traffic: <ul style="list-style-type: none"> Fifield Road between Red Heart Road and the Lachlan Shire Boundary. It is recommended that the following roads be removed as they are not expected to be impacted by the modified Project: <ul style="list-style-type: none"> Wilmatha Road between the MPF access and Melrose Plains Road; Springvale Road between Fifield Road and Melrose Plains Road; and Melrose Plains Road between Springvale Road and 4.65km after the Melrose Plains Road/Back Tullamore Road intersection.
Lachlan Shire Council VPA Road Maintenance		
Platina Road between Lachlan Shire boundary and Fifield Road; Fifield Road between Platina Road and Slee Street; Slee Street between Fifield Road and Wilmatha Road; and Wilmatha Road between Slee Street and MPF access road.	The owner shall make annual contributions to LSC towards the maintenance of the specified roads associated with the heavy vehicle transport route.	It is recommended that the following road be added as it is expected to be used by modified Project heavy vehicle traffic: <ul style="list-style-type: none"> Fifield Road between Slee Street and the Lachlan Shire Boundary.
Fifield Road between Henry Parkes Way and Platina Road; and Henry Parkes Way between Jones Lane and Fifield Road.	The owner shall make annual contributions to LSC towards the maintenance of the specified roads that are likely to experience additional light vehicle traffic.	No change.

^A A road construction programme detailing timing and scheduling of these upgrades to be prepared in consultation with Lachlan Shire Council prior to commencement of construction

Table 7.5 summaries recommended changes to the proposed Parkes Shire Council VPA requirements contained within Appendix 3 of Development Consent DA 374-11-00.

Table 7.5: Summary of Modifications to Development Consent DA 374-11-00 Parkes Shire Council Requirements

Location	Existing Requirements and Timing	Modified Requirements and Timing
Parkes Shire Council VPA Road Upgrades^A		
Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary	Prior to commissioning of the Mine and processing facility, 8.0 m sealed pavement and 1.0 m gravel shoulders, 3.5 m sealed private access road approach and 3.0 m gravel shoulders 30 m on either side of all private access roads.	No change.
Parkes Shire Council VPA Intersection Upgrades^A		
The Bogan Way and Fifield-Trundle Road	Prior to commissioning of the Mine and processing facility, upgrade signage and line marking in accordance with Austroads requirements including installation of "give way" signs on Fifield-Trundle Road.	No change.
Parkes Shire Council VPA Road Safety Audit		
Henry Parkes Way between Westlime Road and The Bogan Way; Middle Trundle Road between Henry Parkes Way and The Bogan Way; The Bogan Way between Henry Parkes Way and Fifield Road; and Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary.	Prior to commissioning of the limestone quarry and/or rail siding, the owner shall pay for a road safety audit to determine road upgrade requirements on the specified roads, including intersections and rail crossings. The owner shall pay for the road upgrades identified in the road safety audit and agreed with PSC.	It is recommended that the following roads be added as they are expected to be used by modified Project traffic: <ul style="list-style-type: none"> ○ Fifield Road between the Parkes Shire Boundary and The Bogan Way; ○ The Bogan Way (Cardigan Street) between Fifield Road and The McGrane Way; and ○ The McGrane Way between The Bogan Way and the Parkes Shire Boundary.
Parkes Shire Council VPA Road Maintenance		
Henry Parkes Way between Westlime Road and The Bogan Way; Middle Trundle Road between Henry Parkes Way and The Bogan Way; The Bogan Way between Henry Parkes Way and Fifield-Trundle Road; and Fifield-Trundle Road between The Bogan Way and the Parkes Shire boundary	The owner shall make annual contributions to PSC towards the maintenance of the specified roads associated with the heavy vehicle transport route.	It is recommended that the following roads be added as they are expected to be used by modified Project heavy vehicle traffic: <ul style="list-style-type: none"> ○ Fifield Road between the Parkes Shire Boundary and The Bogan Way; ○ The Bogan Way (Cardigan Street) between Fifield Road and The McGrane Way; and ○ The McGrane Way between The Bogan Way and the Parkes Shire Boundary.

^A A road construction programme detailing timing and scheduling of these upgrades to be prepared in consultation with Parkes Shire Council prior to commencement of construction

8. Conclusions

This study has found that the Modification would have acceptable impacts on the operation of the surrounding road system. No significant impacts on the performance, capacity, efficiency and safety of the road network is expected to arise as a result of the traffic associated with the Modification, with the implementation of the following management or mitigation measures:

- Consistent with the Lachlan Shire Council VPA terms in Appendix 3 of Development Consent DA 374-11-00, upgrading of the heavy vehicle access route between the MPF and the rail siding to 8.0 m sealed pavement with 1.0 m unsealed shoulders on each side. Private access roads to be upgraded to 3.5 m wide sealed approach with 3.0 m wide gravel shoulders on the main road for a minimum of 30 m each side of the minor access. The heavy vehicle access route for the modified Project includes:
 - MPF Access Road;
 - Wilmatha Road between MPF Access Road and Slee Street;
 - Slee Street;
 - Fifield Road between Slee Street and Platina Road;
 - Platina Road between Fifield Road and Lachlan Shire boundary;
 - Fifield-Trundle Road between Parkes Shire boundary and The Bogan Way;
 - The Bogan Way between Fifield-Trundle Road and Scotson Lane; and
 - Scotson Lane between The Bogan Way and the rail siding.
- Consistent with the VPA terms in Appendix 3 and Appendix 5 of Development Consent DA 374-11-00, the following upgrades to intersections are recommended:
 - Platina Road and Fifield Road – upgrade requirements subject to provision of shuttle bus service for employees, to Austroads standards;
 - Fifield Road and Slee Street (East) – signage and line marking to Austroads standards, as part of heavy vehicle route upgrade;
 - Fifield Road, Slee Street (West) and Wilmatha Road – signage and line marking to Austroads standards as part of heavy vehicle route upgrade;
 - The Bogan Way, Fifield-Trundle Road and Scotson Lane – right-left staggered T-intersections with signage and line marking to Austroads standards, prior to commissioning of the rail siding;
 - Henry Parkes Way and Middle Trundle Road – signage and line marking, upgrade shoulders on Henry Parkes Way to sealed surface in accordance with Austroads guidelines for basic rural intersection treatments;
 - Henry Parkes Way and The Bogan Way – signage and line marking to Austroads standards;
 - The Bogan Way and Middle Trundle Road – signage and line marking to Austroads standards;
 - Fifield-Trundle Road and Limestone Quarry access – basic rural intersection treatment; and
 - Wilmatha Road and MPF access road – basic rural intersection treatment with priority between MPF access and Wilmatha Road south.
- Consistent with the VPA terms in Appendix 3 of Development Consent DA 374-11-00, road maintenance contributions to be agreed for:
 - Henry Parkes Way between Jones Lane and Fifield Road;
 - Henry Parkes Way between Westlime Road and The Bogan Way;

- Middle Trundle Road between Henry Parkes Way and The Bogan Way;
 - The Bogan Way between Henry Parkes Way and Fifield-Trundle Road;
 - Fifield-Trundle Road between The Bogan Way and Parkes Shire boundary;
 - Platina Road between Lachlan Shire boundary and Fifield Road;
 - Fifield Road between Henry Parkes Way and Slee Street;
 - Slee Street; and
 - Wilmatha Road between Slee Street and MPF access road.
- Consistent with Condition 44, Schedule 3 of Development Consent DA 374-11-00, development of a Road Upgrade and Maintenance Strategy.
 - Consistent with Condition 46, Schedule 3 of Development Consent DA 374-11-00, development of a Traffic Management Plan.
 - In addition to the VPA terms in Appendix 3 and Appendix 5 of Development Consent DA 374-11-00, the following measures are recommended:
 - road maintenance contributions to be agreed for Fifield Road between Slee Street and the Lachlan Shire boundary; Fifield Road between Parkes Shire boundary and The Bogan Way, The Bogan Way (Cardigan Street) between Fifield Road and The McGrane Way, and The McGrane Way between The Bogan Way and the Parkes Shire boundary;
 - the need for upgrading of street lighting and pedestrian facilities on Slee Street in Fifield by reviewed, and upgrades undertaken as required;
 - road maintenance contribution to the proposed water transport route south of the Henry Parkes Way including North Condobolin Road, Bedgerabong Road, Noakes Road and Yarrabandai Road during the short-term road transport of water from the borefield to the mine site;
 - Sunrise Lane between Wilmatha Road and the access to "Sunrise" be upgraded and maintained for the duration of the construction accommodation camp at "Sunrise" (subject to separate approval), consistent with a Class 4A unsealed road, with a minimum all weather standard for an operating speed standard of 80 km/h and carriageway width of 9 m (equivalent to two 3.5 m lanes and two 1.0 m wide shoulders); and
 - the intersection of Wilmatha Road and Sunrise Lane be upgraded (subject to the separate approval of the Sunrise accommodation camp) as part of upgrading of Sunrise Lane (above) to remove the transition between the gravel and dirt surfaces while Wilmatha Road remains unsealed, and by sealing a minimum of 30 m of Sunrise Lane on the approach to the intersection when Wilmatha Road is sealed.

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