

Appendix 12



Traffic Impact Assessment

NORTHPARKES MINES
STEP CHANGE PROJECT
TRAFFIC IMPACT
ASSESSMENT

Ref. 12031r2

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EXECUTIVE SUMMARY

This report documents the assessment of the traffic impacts of the Step Change Project at Northparkes Mines (NPM) near Parkes in NSW.

Northparkes Mines (NPM), in operation since 1993, is an underground copper-gold mine located approximately 27 kilometres north-north-west of Parkes in central west New South Wales. The NPM landholdings comprise the existing NPM site as well as agricultural landholdings within the surrounding area. NPM is a joint venture between Rio Tinto, Sumitomo Metal Mining Oceania Pty Ltd and Sumitomo Corporation.

The current mine approval for NPM is to operate to 2025 and involves processing of up to 8.5Mtpa of ore, with a 24 hour operation involving at times up to 700 (full time equivalent) employees. During normal operations, which is approximately 93% of the time, NPM operates with 350 employees at the mine over the course of a day. The higher employee numbers of up to 700 employees / contractors are required during major shutdown periods, which occur on average 1-2 days per month.

Vehicle access to NPM is via Northparkes Lane from Bogan Road. The existing approval also includes road haulage of copper concentrate to the Goonumbla rail siding, which is located adjacent Bogan Road approximately 10kms south east of Northparkes Lane. The copper concentrate is then transported by rail to Port Kembla.

NPM are seeking approval for the Step Change Project (the Project) which encompasses the continuation of underground block cave mining in two existing ore bodies, the development of underground block cave mining in the E22 resource, additional campaign open cut mining located in existing mining leases and an extended mine life of 7 years until 2032.

As part of the Project the existing vehicle access to mine in Bogan Road at Northparkes Lane will be relocated to McClintocks Lane within the first 5 to 6 years. The intersection of McClintocks Lane and Bogan Road will be upgraded to provide a seagull channelisation with appropriate turning and auxiliary lanes in Bogan Road designed and constructed to Austroad standards. New internal roads as well as a new access control location and a visitor car park will also be developed as part of the Project.

The assessment of the existing traffic conditions on the road network adjacent the NPM has found that traffic conditions are relatively good, with principal intersections operating at a good level of service together with Bogan Road between the Newell Highway and the mine. North of NPM traffic volumes using the road network to Peak Hill are relatively low and traffic conditions are assessed as satisfactory to good.

NPM have approval to operate 8-9 double road train trucks between the mine and Goonumbla Rail Siding each day. These trucks are speed limited to 80km/h and do not operate during the hours that school buses operate in Bogan Road. This will remain unchanged by the Project. An assessment of the crash history on Bogan Road for the 5 year period between 2006 and 2010 does not indicate any particular deficiencies with the existing road network.

The Project will not increase the number of employees working at NPM from the existing approved workforce.

During normal operations, 350 employees will attend NPM over the course of a day and up to 700 employees / contractors during major shutdowns and construction periods.

The traffic impacts are assessed as the same as the existing impacts and traffic conditions on the road network are expected to remain satisfactory with the principal intersections operating at a good level of service as will Bogan Road.

The continued operations of NPM with the Project is not expected to lead to a deterioration in road safety on the adjacent road network.

There will be no increase in the traffic generation of NPM from existing levels during the operational phase over the life of the Project, including heavy vehicles.

The double road train vehicles carrying the copper concentrate between NPM and the Goonumbla rail siding will continue to operate at the same levels over a shorter distance in Bogan Road, due to the relocation of the mine entrance to McClintocks Lane. The proposed upgrade of McClintocks Lane and the intersection of Bogan Road / McClintocks Lane to Austroad standards will ensure that road safety is maintained.

The Construction Impacts will be of the same order as the existing traffic impacts during shutdown periods. During the approximate 12 month period of construction, while there will be more days of higher traffic levels, the assessment indicates that traffic conditions on the road network will remain satisfactory. The Construction Traffic Management Plan, which will be prepared by NPM following approval of the Project, will ensure that the impacts of construction are managed appropriately.

NPM will continue to encourage and promote driving safely with its workforce, as well as working closely with Parkes Shire Council about road safety including contributing to road maintenance and reconstruction works in Bogan Road.

1.0 INTRODUCTION

1.1 Background

Northparkes Mines (NPM), in operation since 1993, is an underground copper-gold mine located approximately 27 kilometres north-north-west of Parkes in central west New South Wales. The NPM landholdings comprise the existing NPM site as well as agricultural landholdings within the surrounding area. NPM is a joint venture between Rio Tinto, Sumitomo Metal Mining Oceania Pty Ltd and Sumitomo Corporation. NPM currently has an approved mine life to 2025.

The Proposed Step Change Project (The Project) will extend the mine life to 2032, through continuation of existing operations and the development of additional mining areas and extension to mining infrastructure including tailings storage facilities.

The Project has been declared a Major Project in accordance with the *State Environmental Planning Policy (Major Development) 2005* and will be assessed and determined as a transitional Part 3A project under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.2 Authority Requirements

As part of the preparation of the Traffic Impact Assessment for the Step Change Project of Northparkes Mines (NPM) (“The Project”) consideration was given to the requirements of the Director General (of the Department of Planning and Infrastructure) and the suggestions of the Roads and Maritime Services (RMS) including any key issues identified by these authorities.

Director-General’s Requirements

The Director - General’s Requirements (DGR’s) included:

- (i) Accurate predictions of the road traffic generated by the construction and operation of the project;
- (ii) An assessment of potential traffic impacts on the safety and efficiency of the road network; and
- (iii) A detailed description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road networks in the surrounding area over the life of the project.

Roads and Maritime Services (RMS)

The RMS suggested that the following matters should be addressed/included in a traffic impact study:

- (i) Hours/days of construction and operation of the mine;
- (ii) Total number of staff, as opposed to FTE’s during construction and operation;
- (iii) Details of any staging of the Project;
- (iv) Origin and destination for the workforce;
- (v) Principal travel routes and means of travel by workforce;
- (vi) Existing and future traffic volumes using the road network over the life of the Project;

- (vii) Intersection analysis of Bogan Road/Newell Highway for existing and future traffic volumes;
- (viii) The origin, destination and travel routes for heavy vehicles, generated by the mine, including any over mass vehicles;
- (ix) Proposed mitigation measure required by the Project;
- (x) The internal road layout and parking facilities and infrastructure within the Project boundary;
- (xi) Assessment of traffic noise and dust effects;
- (xii) Local climate conditions that may affect road safety (i.e. fog, flood) and any mitigating measures proposed;
- (xiii) Confirmation that traffic, transport and the road network will be reassessed in consultation with the relevant authorities prior to decommissioning.

Comments

A number of the matters suggested by the RMS including items (xi) and (xiii) are not matters for the traffic study and are addressed elsewhere in the EIS. This notwithstanding, it is considered that the following Traffic Impact Assessment comprehensively addresses the DGR's and matters suggested for assessment by RMS.

1.3 Structure of This Report

This report has been prepared to document the assessment of the traffic impacts of the Project. In this regard the remaining sections of the report address the following:

- Section 2 provides a description of the Project;
- Section 3 details an assessment of the existing road and traffic conditions as well as identify likely future traffic growth;
- Section 4 provides an assessment of the traffic impacts of the Project; and
- Section 5 provides conclusions.

2.0 PROJECT

2.1 Existing Operations

The current mine approval for NPM is to operate to 2025 and involves ore processing of up to 8.5Mtpa of ore, with a 24 hour operation involving at times up to 700 (full time equivalent) employees.

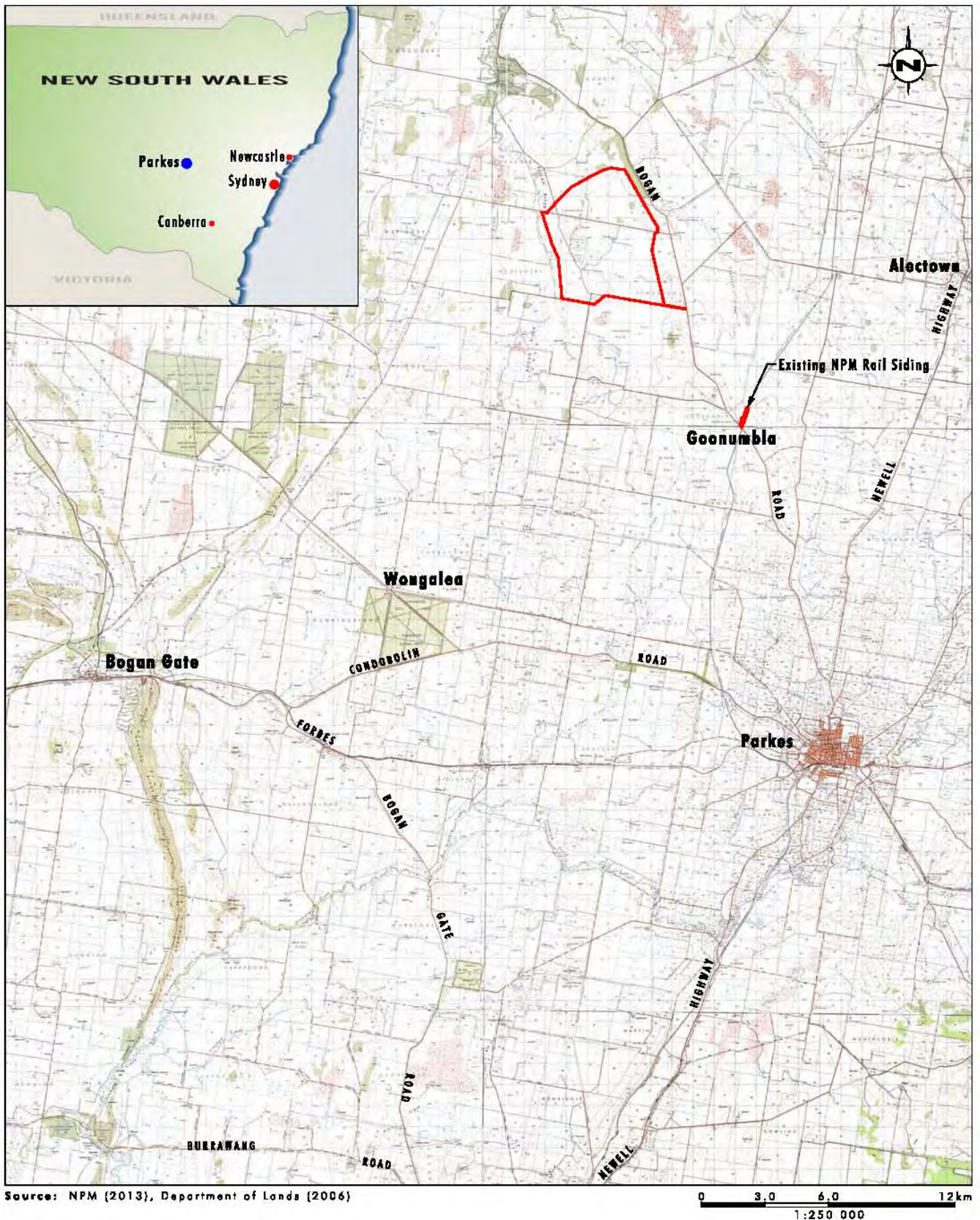
Vehicle access to NPM is via Northparkes Lane from Bogan Road. The existing planning approval (PA06_0026) also includes road haulage of concentrate to the Goonumbla rail siding, located adjacent to Bogan Road approximately 10kms south east of Northparkes Lane. The copper concentrate is transported by rail from the rail siding to Port Kembla.

2.2 Step Change Project

NPM are seeking approval for the Step Change Project (“The Project”) which encompasses the continuation of underground block cave mining in two existing ore bodies, the development of underground block cave mining in the E22 resource, additional campaign open cut mining located in existing mining leases and an extended mine life of 7 years until 2032.

The Project area is shown in **Figure 2** and consists of existing and proposed mining operations and associated infrastructure. **Figure 2** shows the major components of the Project which include:

- Continuation of approved underground block cave mining in the E48 and E26 ore bodies, and associated underground infrastructure;
- Development of underground block caving in the E22 resource beneath the existing E22 open cut void;
- Campaign open cut mining through development of five open cut resources including;
 - Development of four small open cut pits E31, E31N, E28, E28N; and
 - Proposed E26 open cut which is located in an area of previous underground block cave subsidence (existing vertical extent of subsidence void is approximately 200 metres);
- Amendments to the configuration of tailings storage facilities (TSFs) including
 - continuation of tailings disposal to the existing and approved TSFs (TSF 1 and 2, infill between TSF 1 and 2, and Estcourt) to an approved height of 28 metres;
 - provision for additional raises on Estcourt TSF to provide for an increased height from the approved 25 metres to up to approximately 28 metres above ground surface; and
 - development of a new TSF 3, which will extend to the south and from the southern embankment of TSF 2 to a height of approximately 28 metres above ground surface, which incorporates the approved Rosedale TSF;



Legend

Northparkes Mines

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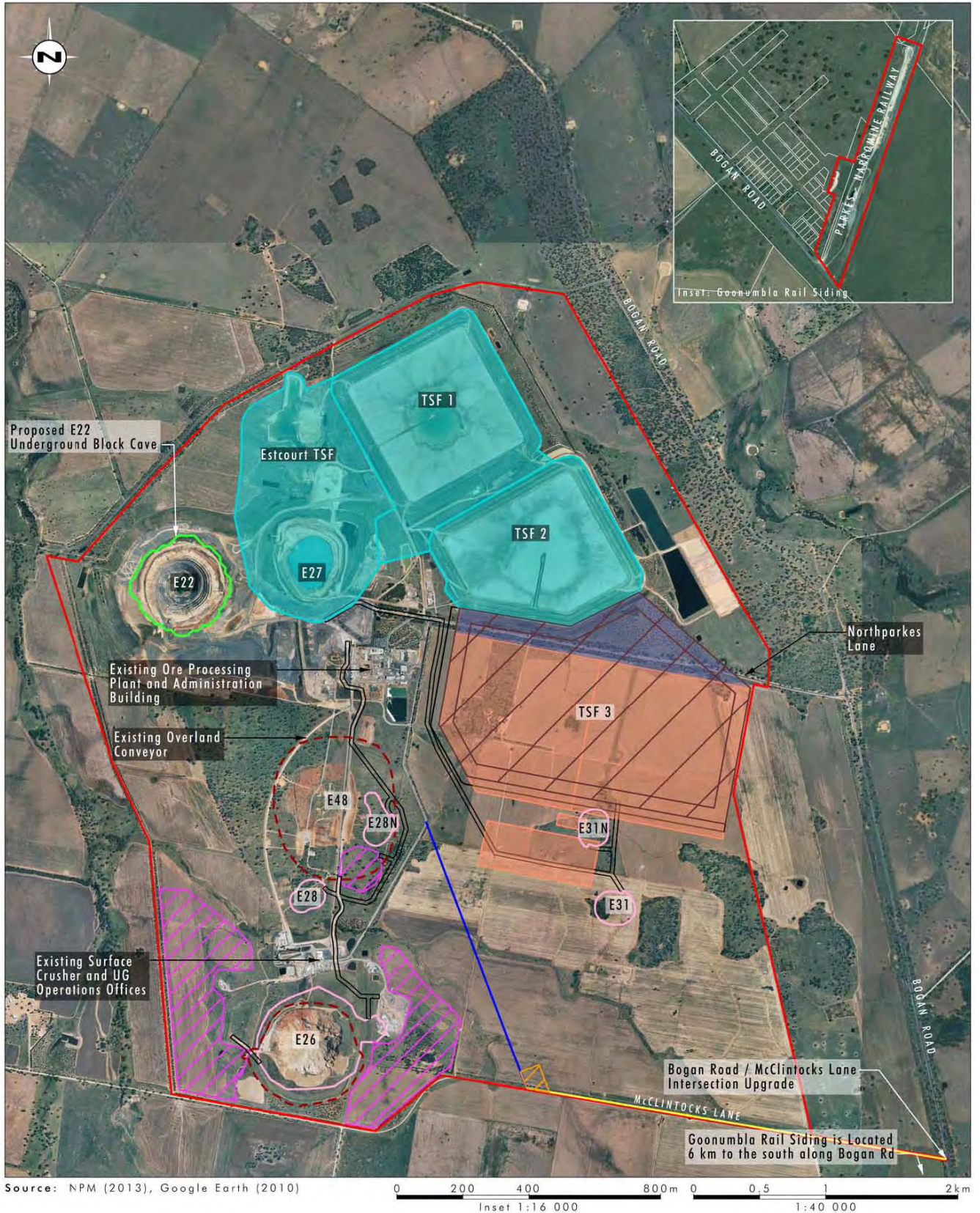


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FIGURE 1
NORTHPARKES MINES
STEP CHANGE PROJECT

SITE LOCATION

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- Project Area
- Approved Tailings Storage Facility (Rosedale)
- Approved Subsidence Management Areas
- Existing Tailings Storage Facility
- Proposed Tailings Storage Facility Extension
- Proposed TSF3
- New Underground Block Cave Mining Area
- Proposed Open Cut Areas
- Proposed Upgrade to McClintocks Lane
- Proposed Access Control and Visitor Car Park
- Proposed Waste Dumps
- Proposed Site Access Road
- Proposed Haul Road

FIGURE 2
NORTH PARKES MINES
STEP CHANGE PROJECT
PROJECT

JOB NO. 12031R2

- Development of new waste dumps for the management of E28/E28N and E26 open cut waste rock. Waste rock from E31 and E31N open cut mining areas will be utilised in the development of TSF 3.
- Continuation of approved ore processing infrastructure up to 8.5 Mtpa capacity, and road haulage of copper concentrate to the existing Goonumbla rail siding;
- Continued use of existing site infrastructure including administration buildings, workshop, internal access roads and service infrastructure;
- Continued use of surface mining infrastructure including ventilation shafts, hoisting shaft and ore conveyors;
- Continuation of existing approved water supply and management processes;
- Development of an amended access road to service all mine related traffic entering the site;
- Establishment of new visitor car parking facilities and access control to support the amended mine site access;
- Continuation of approved mining operations for an extended life of an additional 7 years until end of 2032; and
- Rehabilitation and closure of the mine site will be carried out after the end of the operational life of the Project in accordance with relevant approvals.

2.3 Current and Future Employment at NPM

There will be no change to existing employment levels with the Project.

NPM currently employs up to 700 full time equivalents (FTE) when major shut downs occur at the mine to allow for scheduled infrastructure upgrades/maintenance. Major shut downs occur intermittently, at a rate of approximately 1-2 days per month which represents about 7% of the days over a year.

For normal day to day operations a workforce of 350 people are on site on normal weekdays.

When a major shut down occurs currently up to 350 additional personnel attend NPM on a daily basis. Many of these are contractors, who travel in small teams, often with 2 or more people in one vehicle. As such they have a lower driver rate than normal day to day employees, with an estimated vehicle occupancy of 1.5 persons per vehicle, which provides a driver rate of 67%.

Table 2.1 below shows the home locations of the existing workforce at NPM. Reference to Table 2.1 shows that the majority of the workforce is drawn from the surrounding area and are residents of the Parkes Shire LGA and adjacent areas.

The home locations of the workforce are not expected to change significantly with the Project in place.

TABLE 2.1

LOCATION OF NPM EXISTING EMPLOYEES

LOCALITY	PERCENTAGE OF EMPLOYEES (%)
Parkes	74.4
Forbes	8.3
Other	4.9
Peak Hill	3.0
Trundle	3.0
Bogan Gate	1.9
Goonumbla	0.3
Dubbo	0.8
Tichbourne	1.1
Alectown	0.4
Bedgerebong	0.4
Orange	1.5
Total	100

3.0 EXISTING AND FUTURE TRAFFIC CONDITIONS

3.1 Road Network

NPM is located some 27km north-northwest of Parkes via the Newell Highway and Bogan Road and 32km southwest of Peak Hill via Bogan Road, Taweni Road, Robertson Road and Coradgery Road.

The local roads that provide the principal access to NPM are managed by Parkes Shire Council and include the following Shire Roads (SR):

- Bogan Road SR76
- Taweni Road SR82A
- Robertson Road SR130
- Coradgery Road SR136

The Newell Highway is the state highway which passes through Parkes and Peak Hill and provides principal access to Bogan Road via an intersection located just north of the Parkes Township.

Figure 3 shows the road network that serves NPM.

3.2 Bogan Road

Bogan Road, between Newell Highway and Taweni Road, is a 2 lane rural road with a sealed carriageway, road shoulders, centreline and edge line marking, reflective guideposts and a speed limit of 100km/h. Warning signs are provided as required and Raised Reflective Pavement Markers (RRPMS) are implemented as part of the linemarking in some sections.

The section of Bogan Road between Newell Highway and the rail siding at Goonumbla is approximately 13.6kms in length. The alignment in this section is relatively straight and flat except the section near the Newell Highway, which has an undulating alignment and a narrower sealed pavement.

The section of Bogan Road between the rail siding at Goonumbla and Taweni Road is approximately 15.2km long with mostly a straight and flat alignment. The road is constructed to a good standard with a high level of traffic management and a wide sealed pavement including sealed/unsealed shoulders for most of its length.

Most intersections along Bogan Road have Austroads Rural Basic (BA) turn treatments except Northparkes Lane (i.e. NPM's existing Access Road) which has a modified seagull arrangement with a left turn deceleration in Bogan Road in the southern approach together with a right turn bay in the northern approach and a southbound acceleration lane for the right turn out of Northparkes Lane to travel towards Parkes. The eastbound through lane merges with southbound acceleration lane on the southern departure side of the intersection. The sight distance at this intersection and other intersections along Bogan Road is good and meets the minimum Austroad Requirements for intersection sight distance for 100 km/h speed limit which is 248 metres¹.

¹ based on a flat grade and 2 second reaction time.

Northparkes Lane is located approximately 23.6 kms north west of the Newell Highway intersection and approximately 5.2 kms south east of Taweni Road. Northparkes Lane is a two lane sealed road owned by NPM.

The intersection of Newell Highway/Bogan Road has an Austroads Channelised Right Turn (CH) treatment and an Auxiliary Lane (AU) Left Turn treatment layout with a right turn bay and left turn lane in Newell Highway and a single lane approach in Bogan Road.

The sight distance at this intersection is generally satisfactory, although limited by a crest/curve in the northern approach of Newell Highway to around 210 metres. The sight distance to and from the southern approach exceeds 300 metres. The speed limit in the highway at the intersection is 80 km/h and the sight distance at the intersection meets Austroads requirements for the posted speed limit which is 181 metres¹.

3.3 Road to Peak Hill

Bogan Road, (north of Northparkes Lane), Taweni Road, Robertson Road and Coradgery Road provide the route north to connect to the Newell Highway at Peak Hill. Taweni Road, Robertson Road and Coradgery Road are sealed/unsealed rural roads with a variable standard and a 100km/h speed limit. The section of Taweni Road immediately east of Bogan Road is generally constructed to a good standard, as is Robertson Road, but other sections of the route vary, with some unsealed sections in Taweni Road.

Coradgery Road has a narrower sealed pavement and connects with Mingelo Street which intersects with Newell Highway at Peak Hill.

3.4 Other Minor Roads

Minor roads that intersect with Bogan Road (other than Northparkes Lane) include McClintocks Lane which is located approximately 3.6 kms south east of Northparkes Lane and Glenara Lane which is 8.9 kms south east of Northparkes Lane.

Both of these lanes are unsealed roads approximately 6-7 metres wide and form a T junction intersection with Bogan Road. The sight distance at both intersections is satisfactory and meets Austroads intersection sight distance requirements for the posted speed limit of 100 km/h. The sight distance at McClintocks Lane exceeds 300 metres in both directions and at Glenara Lane exceeds 250 metres in both directions.

3.5 Goonumbla Rail Siding and Rail Level Crossing

The Goonumbla Rail Siding is located adjacent to Bogan Road, some 10kms south east of Northparkes Lane.

An access road provides vehicle access to the siding. This forms a T junction intersection with Bogan Road, just north of the Rail Level Crossing. An Austroads Rural Basic (BA) turn treatment is implemented which includes wide sealed shoulders that allows northbound vehicles in Bogan Road to pass right turning vehicles into the Rail Siding Access Road and large trucks to turn left into the Siding Access Road from Bogan Road.

¹ based on a flat grade and 2 second reaction time.

The sight distance at the intersection and of the Rail Level Crossing is good in both directions in Bogan Road at around 300 metres and exceeds the Austroads requirement of 248m.

The traffic management at the level crossing includes flashing lights, advanced warning signs in Bogan Road, (with flashing lights) and appropriate road marking.

3.6 Existing Traffic Volumes and Service Levels on Road Network

Daily volume, vehicle classification and speed counts were undertaken at the following locations (refer to **Figure 4**) on the local road network in April and May 2012.

- Taweni Road east of Bogan Road;
- Bogan Road, north of Northparkes Lane;
- Bogan Road, south of Northparkes Lane;
- McClintock's Lane; and
- Glenara Lane.

The period when the counts were undertaken represented normal day to day operations for NPM with no major shutdowns occurring during this period.

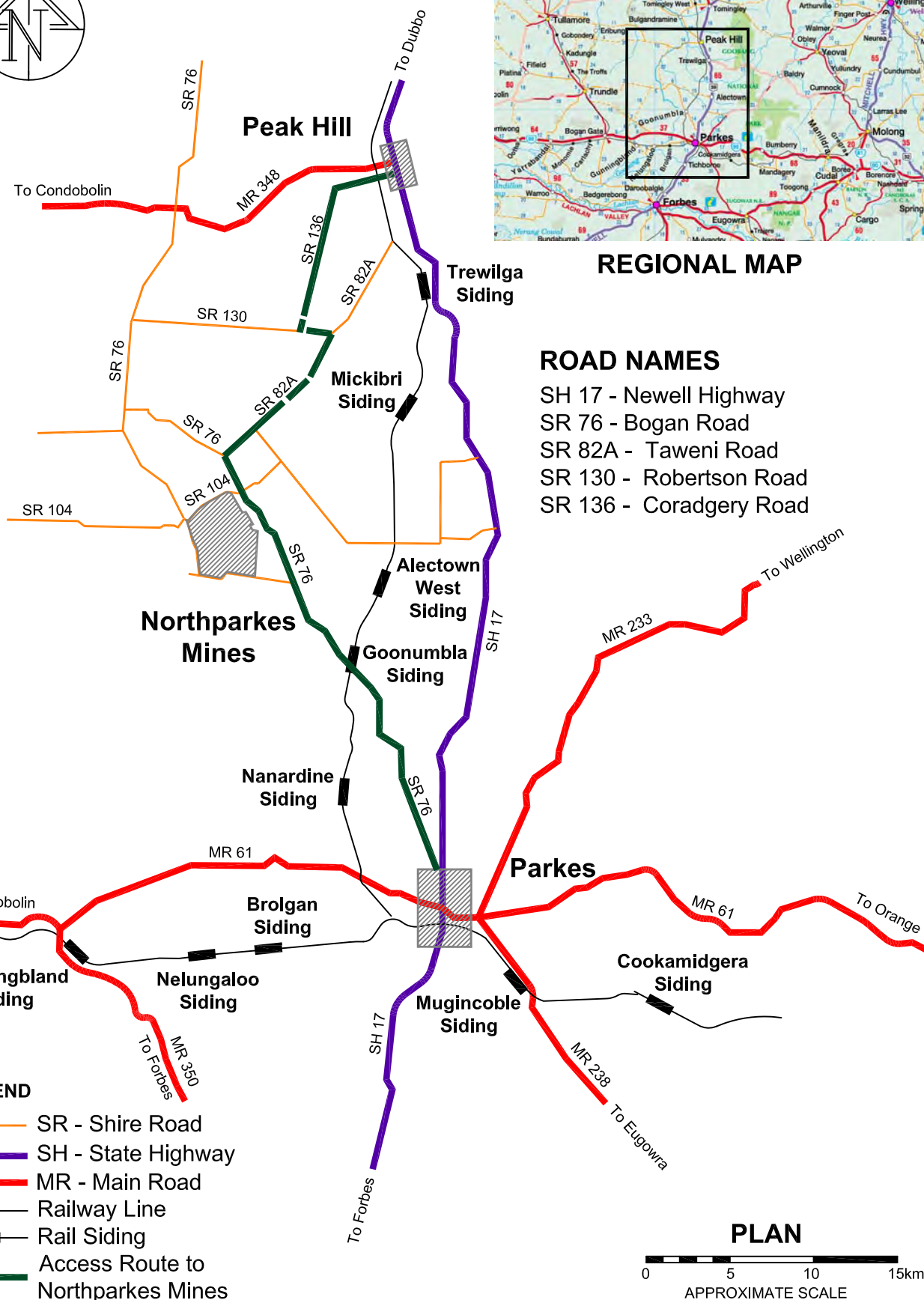
Table 3.1 provides average weekday two way traffic volumes (5 day average) and average daily (7 day average) two way volumes as recorded for a representative week during the survey period. Also shown are the proportion of heavy vehicles (Austroad Class 3-12) and two way 85th% vehicle speeds.

Figure 4 also shows a summary of existing average weekday and daily traffic volumes.

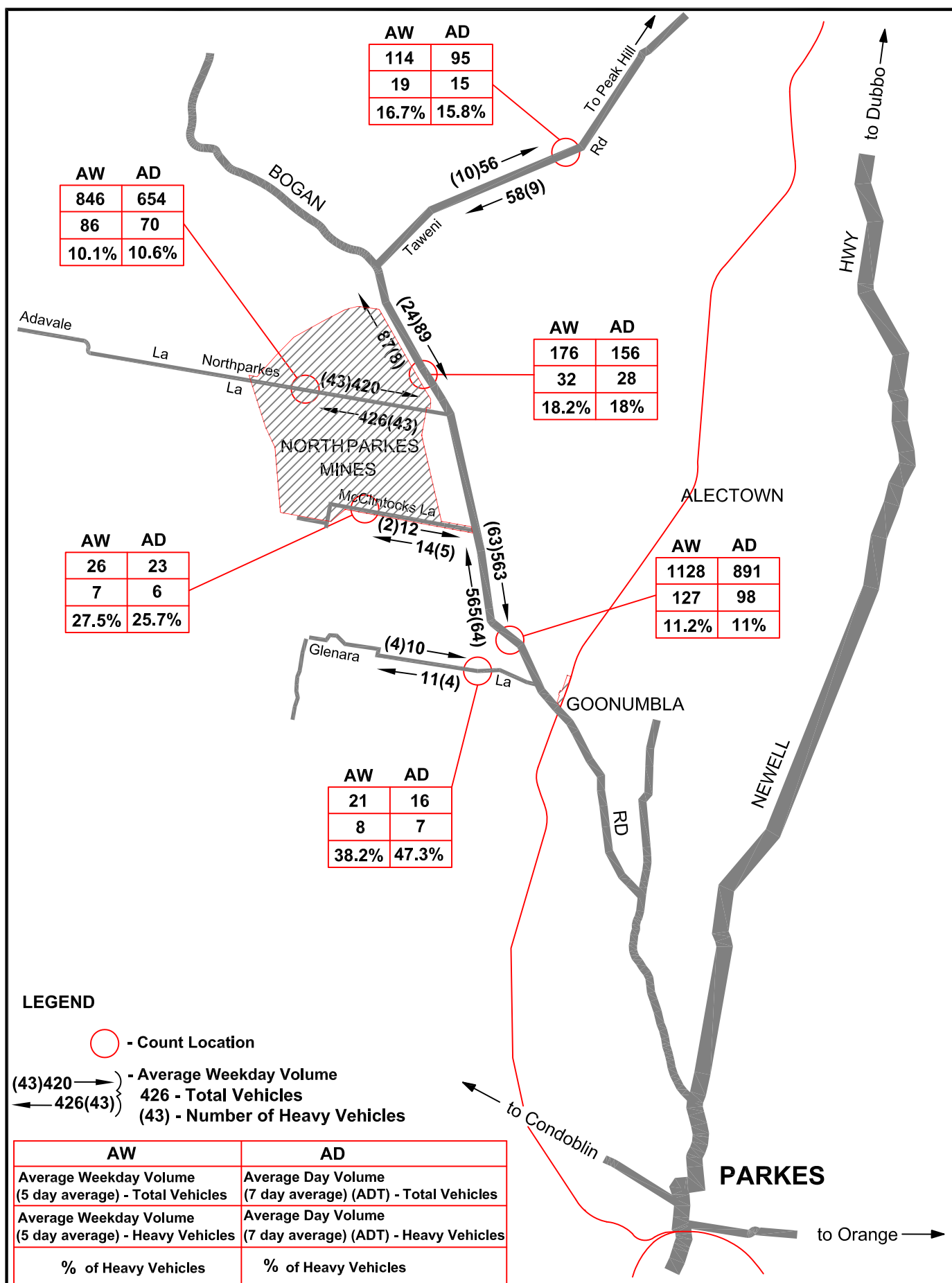
TABLE 3.1

EXISTING DAILY TWO WAY TRAFFIC VOLUMES AND SPEEDS ON ROAD NETWORK

Location	Weekday (5 Day Average)			Daily (7 Day Average)		
	Total Vehicles	% of HV	85 th % Speed	Total Vehicles	% of HV	85 th % Speed
Taweni Road (East of Bogan Road)	114	16.7%	112	95	15.8%	112
Bogan Road (North of Northparkes Lane)	176	18.2%	114	156	18.0%	114
Bogan Road (South of Northparkes Lane)	1128	11.2%	107	891	11.0%	107
Northparkes Lane	846	10.1%	100	653	10.6%	100
McClintocks Lane	26	27.5%	97	23	25.7%	97
Glenara Lane	21	38.2%	80	16	47.3%	80



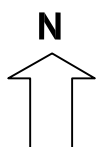
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FIGURE 4

NORTH PARKES MINES
 STEP CHANGE PROJECT

**EXISTING AVERAGE WEEKDAY
 AND DAILY VOLUMES**

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Reference to Table 3.1 and **Figure 4** show that average weekday two way volumes are:

- 1128 vehicles per day (vpd) in Bogan Road south of the NPM Access Road. The proportion of heavy vehicles represents 11.2% of the total;
- 176 vpd in Bogan Road, north of the NPM Access Road. The proportion of heavy vehicles represents 18.2% of the total;
- 114 vpd in Taweni Road east of Bogan Road. The proportion of heavy vehicles represents 16.7% of the total;
- 846 vpd in Northparkes Lane. The proportion of heavy vehicles represents 10.1%; and
- 21 and 26 vpd in Glenara and McClintock Lanes respectively.

The 6am – 7am and 4pm – 5pm hour represented the weekday AM and PM peak hours for Northparkes Lane, Bogan Road and Taweni Road, although 6pm – 7pm two way volume was marginally higher on Bogan Road. The PM peak hour appears to vary on weekdays between 4pm – 7pm. Table 3.2 shows the peak hour traffic volumes for these roads.

TABLE 3.2

**EXISTING AM AND PM PEAK HOUR VOLUMES ON
AVERAGE WEEKDAY**

Location	AM Peak Hour Volumes (6am – 7am)			PM Peak Hour Volumes (4pm – 5pm)*		
	North / West ^{xx}	South / East ^{xx}	Total	North / West ^{xx}	South / East ^{xx}	Total
Taweni Road (East of Bogan Road)	11	2	13	3	9	12
Bogan Road (North of Northparkes Lane)	5	17	22	11	5	16 ¹
Bogan Road (South of Northparkes Lane)	219	23	242	9	109	118 ²
Northparkes Lane	182	16	198	3	116	119

*PM Peak Hour varies between weekdays

^{xx} Direction of travel

¹ PM Peak Hour is 6pm - 7pm with a total of 21vph

² PM Peak Hour is 6pm - 7pm with a total of 132 vph

Reference to Table 3.2 shows that the highest volumes occur in the 6am – 7am peak hour with Bogan Road south of Northparkes Lane carrying two way volumes of 242 vph and 198 vph respectively.

The northbound direction towards the mine is the peak direction in the AM peak with the northbound direction of Bogan Road south of the mine carrying 219 vph and westbound in Northparkes Lane (i.e. towards the mine) carrying 182 vph.

The traffic volumes in the 4pm – 5pm peak hour are lower with two way volumes in the order of 118vph in Bogan Road south of Northparkes Lane and 119 vph in Northparkes Lane.

Traffic volumes in Bogan Road north of Northparkes Lane and Taweni Road are very low and range between 13 – 22 vph in AM peak hour and 12-16 vph in PM peak hour.

The mid block hourly volumes using the road network are relatively low (maximum of 242vph) when compared to the capacity of the road network. Table 4.5 of the RMS Guide to Traffic Generating Developments 2002 provides guidance on traffic volume thresholds for the level of service on rural roads based on two way peak hour volumes. For rural roads with level terrain and where heavy vehicles comprise 15% of total volumes, two way traffic volumes less than 530vph are representative of Level of Service A operation. As noted above, traffic volumes are a maximum of 242 vph with the proportion of heavy vehicles for this volume in the order of 11-12%. Therefore the roads currently operate at a good level of service.

The RMS Guide to Traffic Generating Developments 2002 indicates that acceptable criteria for rural roads is a Level of Service C or better (i.e. A, B, or C). These service levels represent good to satisfactory traffic conditions.

3.7 Existing Peak Hour Intersection Volumes and Traffic Conditions

Manual traffic counts were undertaken at the intersections of Bogan Road/Northparkes Lane and Bogan Road/Newell Highway on 31 May 2012 between the hours of 5.30am – 9.00am and 4.00pm – 7.30pm. These are the principal and critical intersections used by vehicles accessing NPM.

Figures 5 and 6 shows the AM and PM peak hours at these intersections respectively, which occurred between:

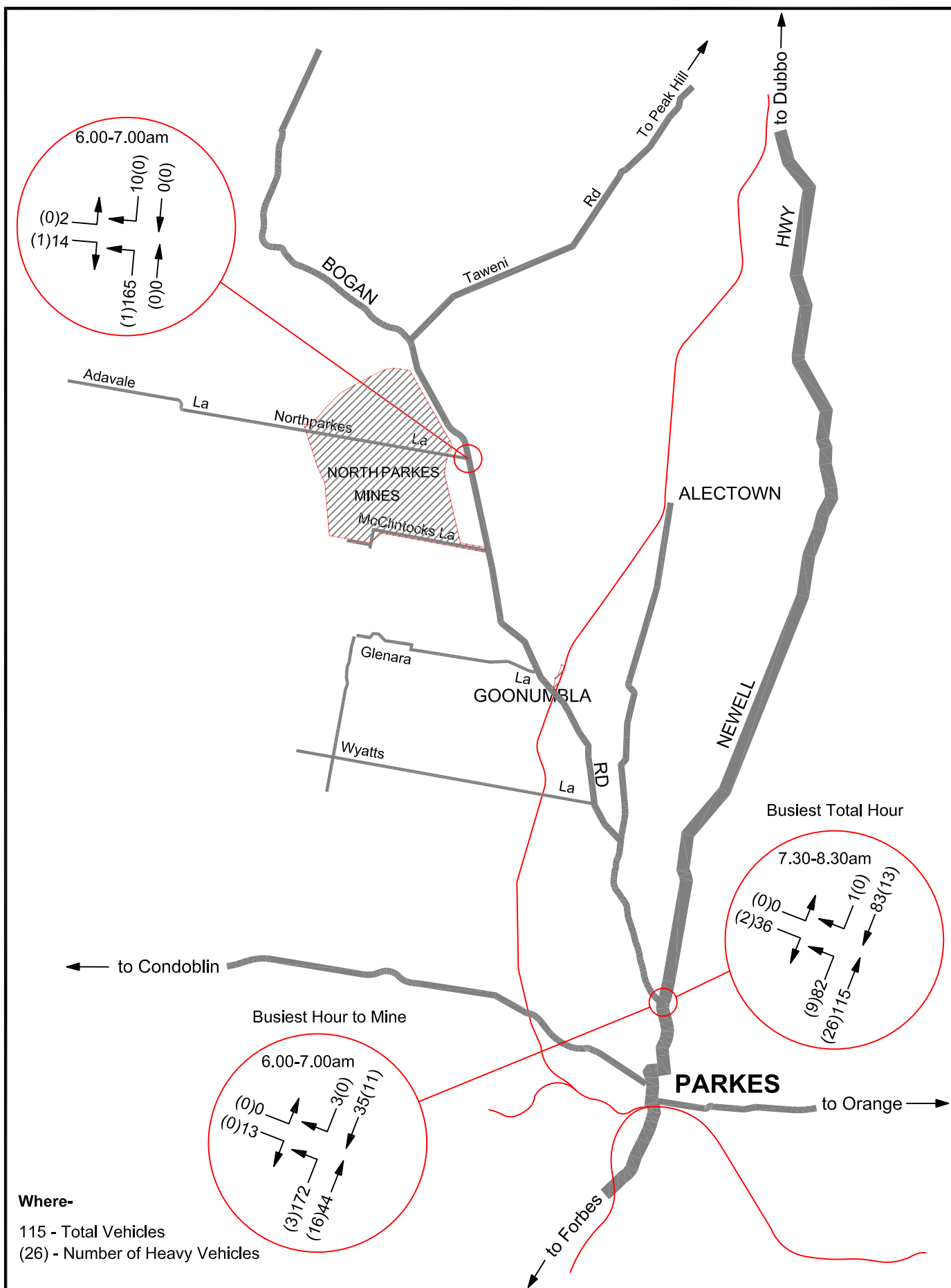
- 6am – 7am and 5pm-6pm at the Bogan Road/Northparkes Lane; and
- 7.30am-8.30am and 5pm-6pm at the Newell Highway/Bogan Road intersection. The 6.00am – 7.00am period is also shown for this intersection, as it represents the NPM peak.

To assess the operation of these intersections, traffic modelling using SIDRA software has been undertaken.

SIDRA is a suitable model to assess the operational performance of intersections controlled by traffic signal, roundabout (control) or priority stop sign control. Criteria for interpreting an intersection's operation are Level of Service (LS), Degree of Saturation (DS) and Average Vehicle Delay (AVD). SIDRA also provides 95th% queue lengths. For intersections under Priority/Stop Sign control and Roundabout control, Average Vehicle Delay for Individual Movements (AVD) is relevant.

Table 3.3 below is reproduced from the RTA's Guide to Traffic Generating Developments (October 2002) and provides an explanation of the various levels of service for intersections.

A Level of Service D or better (i.e. A, B, C or D) is generally considered to be minimum design requirements for intersections and is based on average vehicle delay. The level of service for intersections controlled by Give Way/Stop Signs or under



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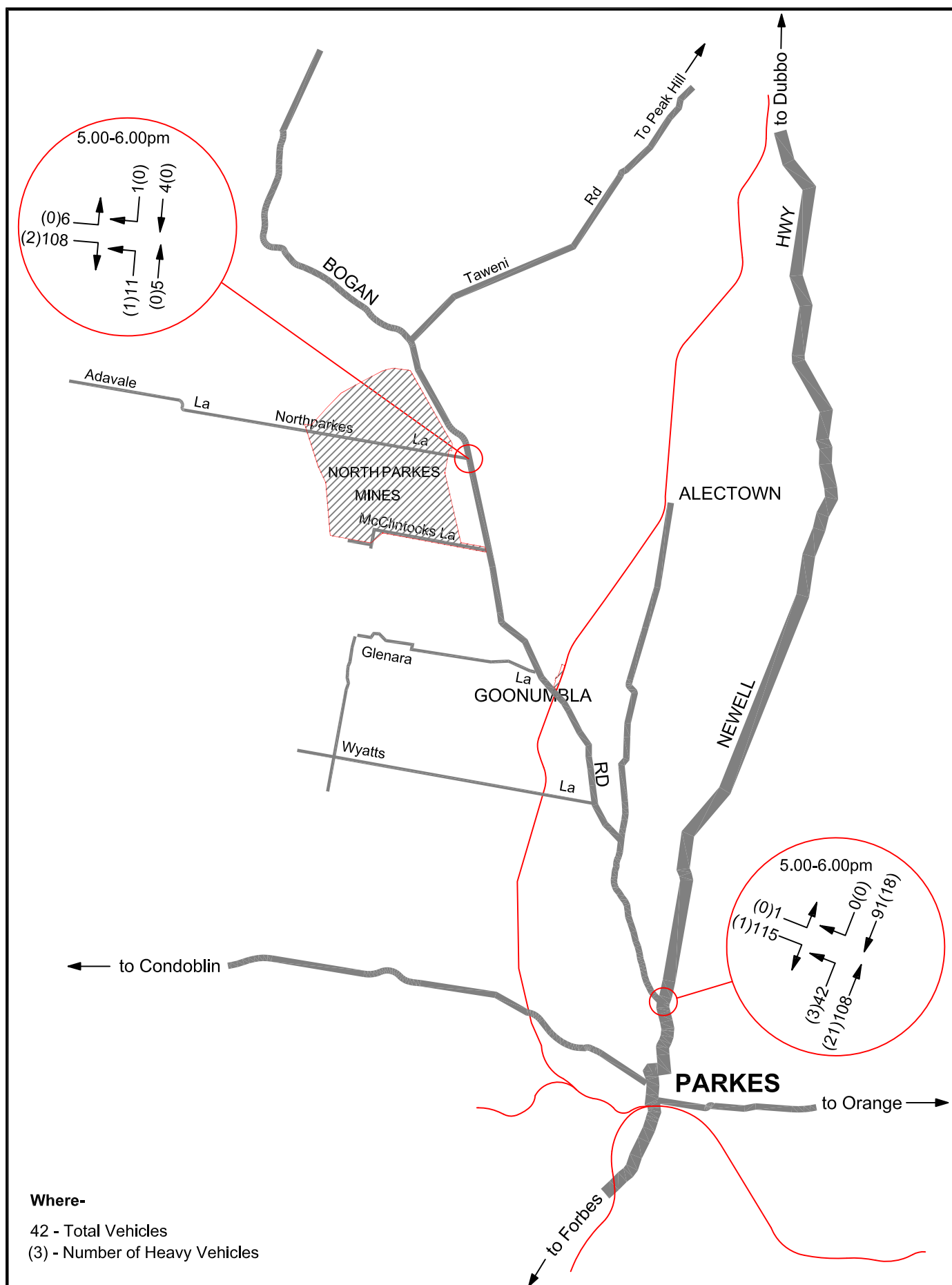
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FIGURE 5
NORTH PARKES MINES
STEP CHANGE PROJECT
EXISTING AM PEAK HOUR
VOLUMES AT PRINCIPAL
INTERSECTIONS

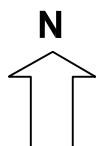
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FIGURE 6
 NORTH PARKES MINES
 STEP CHANGE PROJECT
EXISTING PM PEAK HOUR
VOLUMES AT PRINCIPAL
INTERSECTIONS

JOB NO. 12031R2

Roundabout Control, is determined from the movement with highest average vehicle delay (i.e. HMD).

TABLE 3.3
LEVEL OF SERVICE CRITERIA FOR INTERSECTIONS

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

Traffic modelling using the SIDRA software package based on the existing traffic management and geometry at both intersections and the traffic volumes as shown on **Figures 5** and **6** is summarised in Table 3.4. This modelling indicates that both intersections operate at a Level of Service A (good) operation.

TABLE 3.4

**SIDRA MODELLING RESULTS
EXISTING NORMAL OPERATIONS AT NPM**

Intersection	AM Mine Peak			
	LS	AVD (secs)	DS	95% QUEUE LENGTH
Newell Highway / Bogan Road	A	12.6	0.099	0.7
Bogan Road/ Northparkes Lane	A	12.5	0.122	4.7

Intersection	AM Peak				PM Peak			
	LS	AVD (secs)	DS	95% QUEUE LENGTH	LS	AVD (secs)	DS	95% QUEUE LENGTH
Newell Highway/ Bogan Road	A	14.1	0.071	2.3	A	14.0	0.198	7.3
Bogan Road/ Northparkes Lane	-	-	-	-	A	12.8	0.096	3.3

LS – Level of Services

AVD – Highest Average Individual Movement Delay in Seconds

95% Queue Length – 95% Back of Queue in Metres

DS – Degree of Saturation

Shutdown Periods

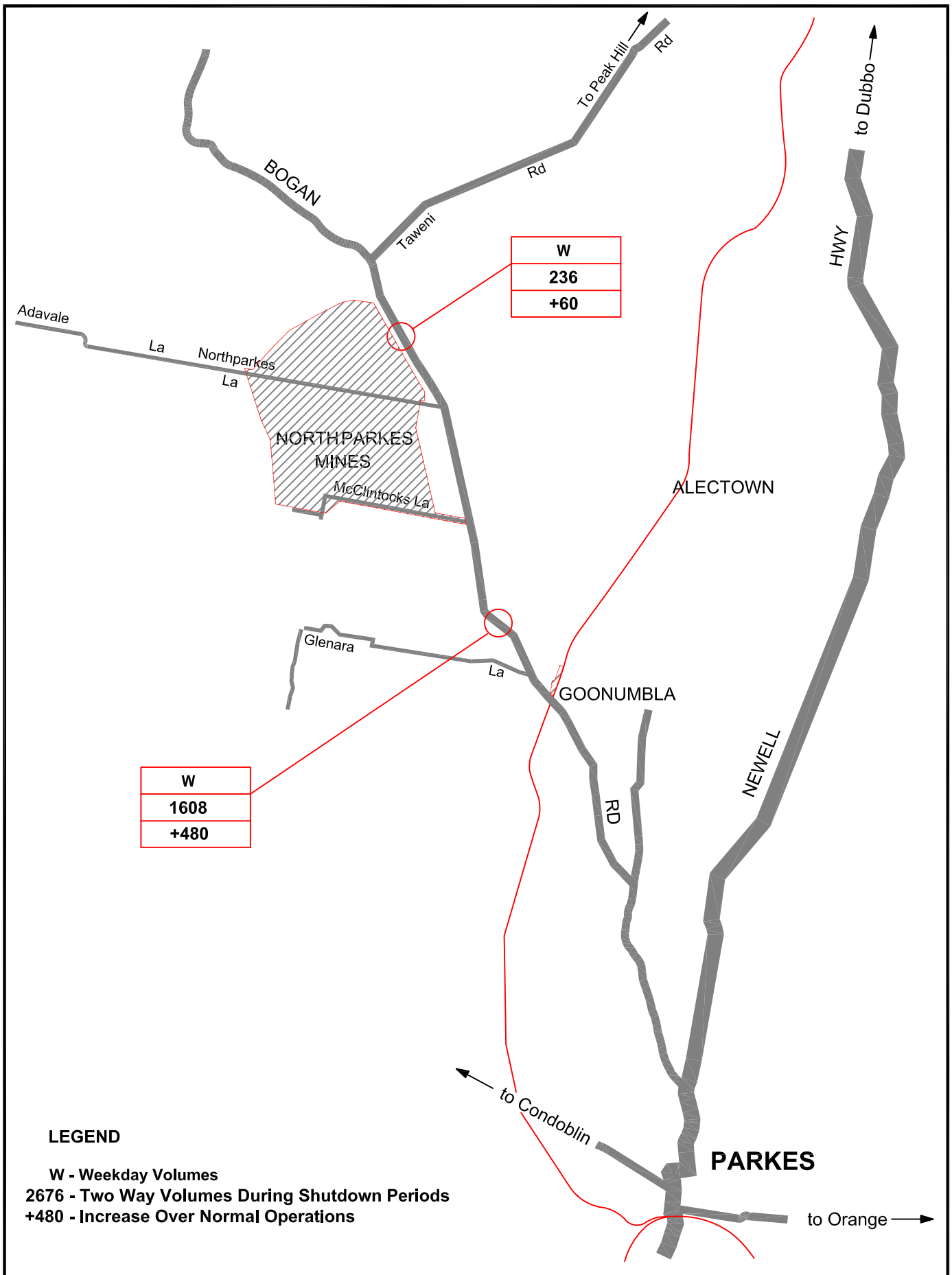
The traffic volumes shown in Tables 3.1 and 3.2 and **Figures 4, 5 and 6**, as well as the SIDRA modelling in Table 3.4 represent periods when NPM is operating under its normal day to day operations, which is typical of the majority of the time (i.e. 85% of the time).

Shutdown Periods occur on 1-2 days per month. When a major shutdown occurs, up to an additional 350 contractors/workers can be on site over the course of a day. These contractors arrive and depart as teams and typically have higher vehicle occupancies in the order of 1.5 persons per vehicle (i.e. 67% driver rate) when compared to the normal workforce. (Section 2.3 provides additional information on employment levels during normal operations and during shutdowns).

On such days an estimated additional 540vpd are generated by NPM with an additional 128vph in the AM mine peak hour and 84vph in the PM peak hour. Refer to **Figures 7A, 7B and 7C**.

SIDRA traffic modelling has been undertaken for Shutdown Periods during the AM and PM mine peak hour periods with the additional traffic using the principal intersections, as shown on **Figures 7B and 7C**.

The results of the modelling are shown in Table 3.5. Reference to Table 3.5 shows that both intersections operate at a Level of Service A or B operation which represents a good operation.



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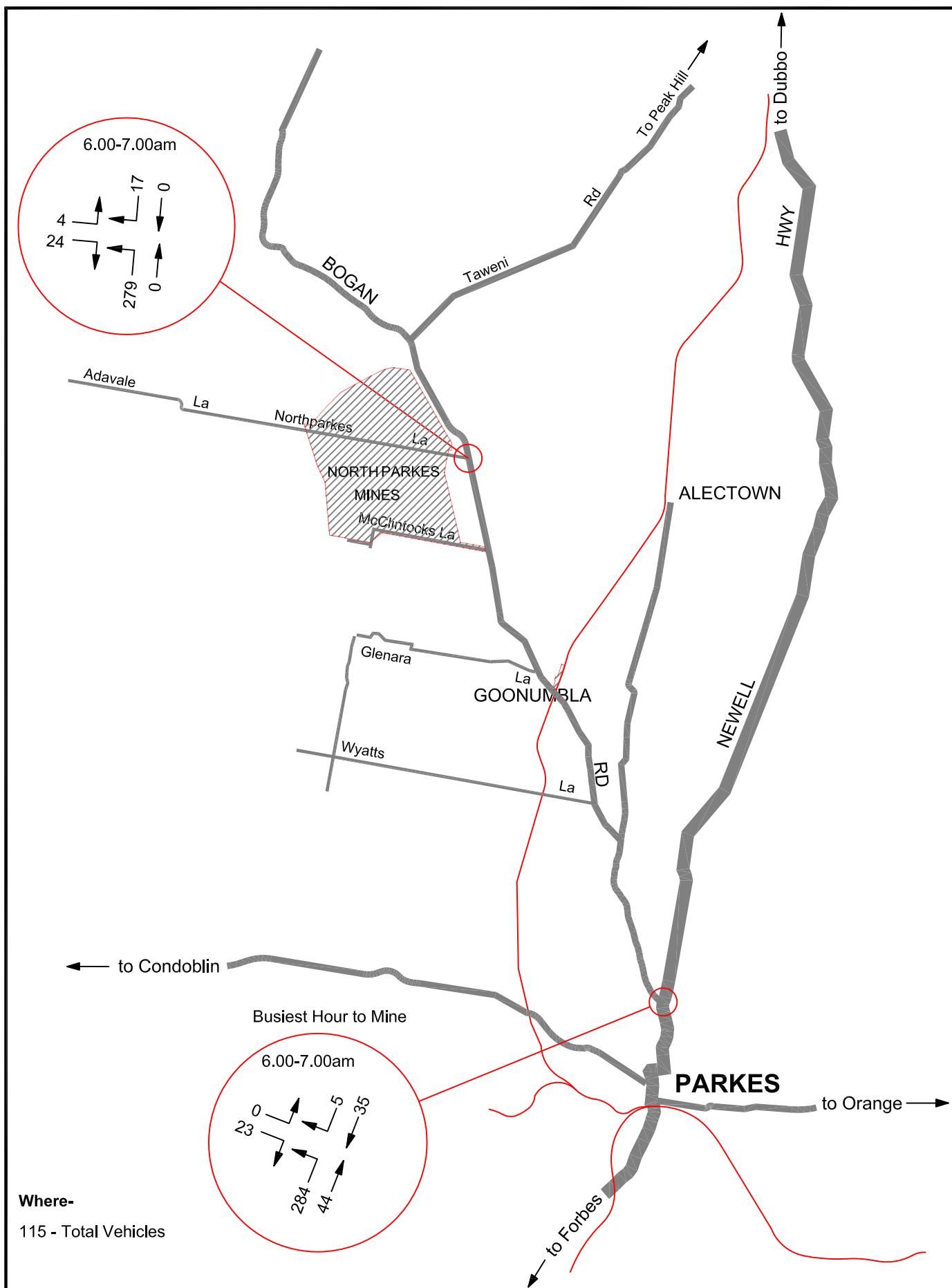
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FIGURE 7A
 NORTHPARKES MINES
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**EXISTING WEEKDAY VOLUMES
 DURING SHUTDOWN PERIODS**

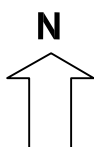
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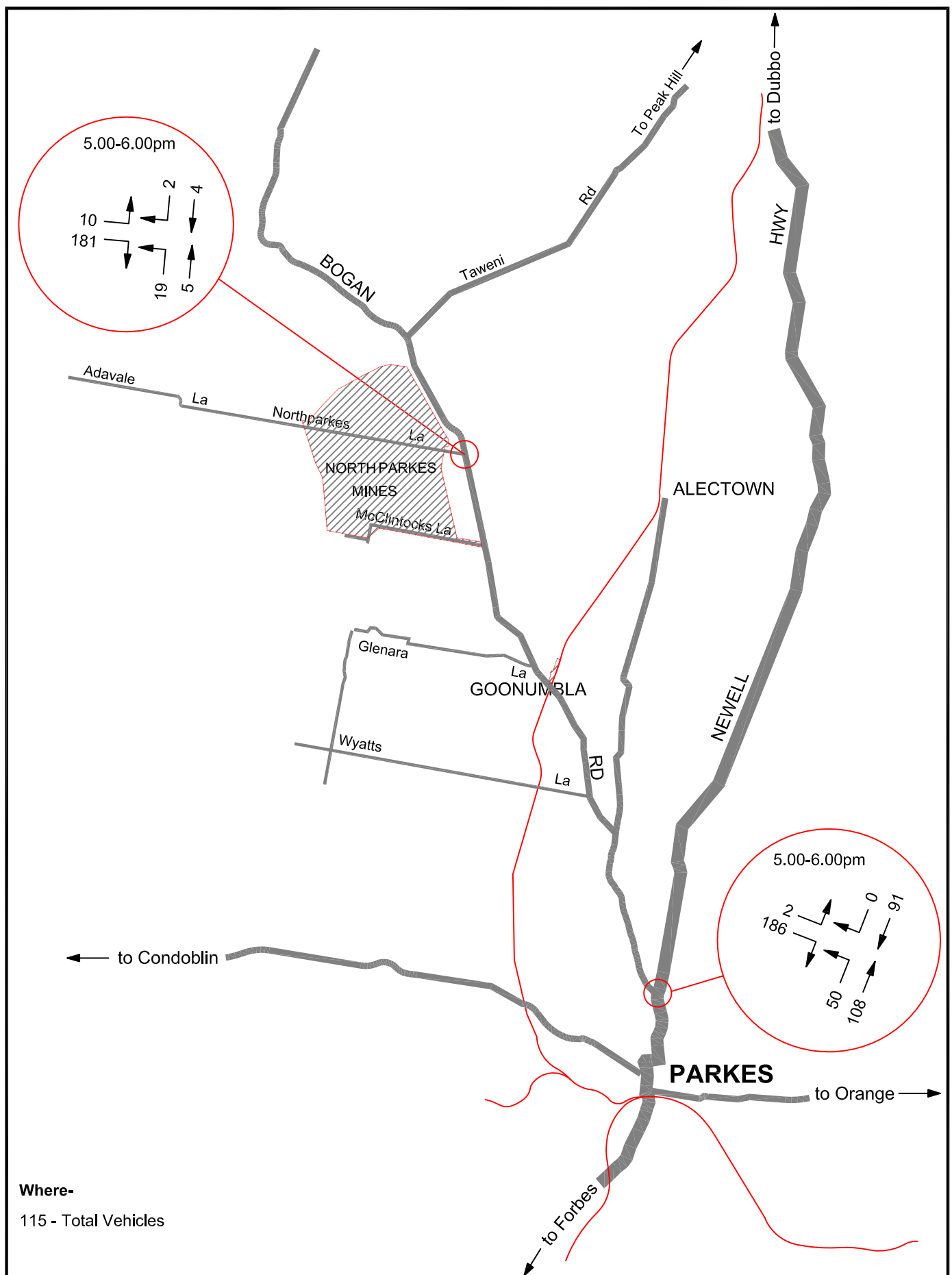
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FIGURE 7B
 NORTH PARKES MINES
 STEP CHANGE PROJECT
EXISTING AM PEAK HOUR VOLUMES
AT PRINCIPAL INTERSECTIONS
DURING SHUTDOWN PERIODS

JOB NO. 12031R2



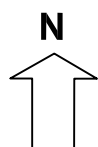
Where-

115 - Total Vehicles

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NOT TO SCALE

FIGURE 7C
 NORTHPARKES MINES
 STEP CHANGE PROJECT
EXISTING PM PEAK HOUR VOLUMES
AT PRINCIPAL INTERSECTIONS
DURING SHUTDOWN PERIODS

JOB NO. 12031R2

TABLE 3.5

**SIDRA MODELLING RESULTS
EXISTING SHUTDOWN AT NPM**

Intersection	AM Mine Peak				PM Peak			
	LS	AVD (secs)	DS	95 th % QUEUE LENGTH	LS	AVD (secs)	DS	95 th % QUEUE LENGTH
Newell Highway/ Bogan Road	A	13.4	0.163	1.0	B	14.7	0.323	11.2
Bogan Road/ Northparkes Lane	A	12.6	0.207	6.9	A	12.9	0.162	4.7

LS – Level of Services

HMD – Highest Average Individual Movement Delay in Seconds

95% Queue Length – 95% Back of Queue in Metres

DS – Degree of Saturation

Heavy Vehicles including Oversize Vehicles

Standard heavy vehicle deliveries to NPM average around 57 vehicles a month. These are typically heavy rigid trucks and 19 metre articulated semi trailer vehicles, as well as some B double vehicles.

Other standard heavy vehicles accessing NPM on a daily basis include smaller rigid trucks associated with ongoing operations.

Oversize vehicles include 8-9 double road train copper concentrate trucks that operate daily between NPM and the Goonumbla rail siding, as well as 1-2 other oversize vehicles per month, bringing equipment and or machinery to NPM.

3.8 Road Safety

3.8.1 Road Safety on the Road Network

Five year road crash data for the period between 2006 and 2010 was obtained from the RMS.

Analysis of this data indicates there was a total of 8 crashes on the road network including in Bogan Road (6), Northparkes Lane (1) and at the intersection of Bogan Road/Newell Highway (1). Four (4) of these were injury accidents, one (1) was a fatal accident and three (3) were property damage accidents. Five (5) of the crashes were single vehicle accidents.

The crash in Northparkes Lane was a rear end accident and an injury accident, which occurred in August 2008.

The crash at the intersection of Bogan Road/Newell Highway was a non injury head on accident (i.e. non intersection type).

The remaining 6 crashes in Bogan Road were made up of run off the road crashes (4 crashes), struck animal (1 crash) and rear end (1 crash) and occurred along the length of Bogan Road between the Newell Highway and 16.0kms north west.

The fatal accident involved a male driver 23 years who ran off the road after losing control at an estimated speed of 140km/h. This occurred on a Sunday afternoon in February 2008 at 14:52 hours (2.52pm), 300 metres south of Goonumbla Lane.

Cars, motorbikes and several light trucks (includes 4 wheel drive vehicles) were involved in the crashes and drivers under 25 years old were involved in 5 of the crashes.

The crash history does not indicate any particular deficiencies with the existing road network.

Vehicle speeds which were recorded as part of the volume and classification counts indicate that 85th percentile vehicle speeds are above the posted 100km/h speed limit as follows:

- Bogan Road, south of Northparkes Lane – 107km/h
- Bogan Road north of Northparkes Lane – 114km/h
- Taweni Road, east of Bogan Road – 112km/h

These vehicle speeds, while higher than the posted speed limit, are not uncommon on lightly trafficked rural roads that have relatively straight and flat alignments and are constructed to a relatively good standard.

NPM generates 8–9 double road train trucks per day carrying copper concentrate material between the mine site and Goonumbla Rail Siding. NPM do not run these trucks during hours that school buses operate in Bogan Road which is 7.30am to 9.00am and 3.00pm to 5.00pm on school days.

The double road train is speed limited to 80km/h. No large trucks including copper concentrate trucks were involved in any of the crashes in Bogan Road during the 5 year period.

3.8.2 Promotion of Road Safety by NPM

NPM encourages and promotes road safety with its workforce and promotes driving safely within its site as well as to and from work.

NPM works with Parkes Shire Council concerning road safety and in 2011 contributed 80% of the cost to upgrade the Bogan Road/Northparkes Lane intersection. NPM also provides funds for road maintenance and reconstruction works in Bogan Road between the mine and Parkes. NPM will continue to provide the relevant contributions for road maintenance on Bogan Road over the life of the Project.

NPM has a complaints management system where complaints from the community are recorded and investigated, including any complaints about unsafe driving practices.

3.9 School Buses

School buses operate along Bogan Road in the morning (7.30am-9.30am) and afternoon (3.00pm–5.00pm) periods during the school term.

These times do not coincide with the shift change time at NPM which are 6.30am and 6.30pm each day.

There is a small overlap with NPM office workers in the AM period who generally work from 8.00am to 5.00pm. NPM employees are mostly from Parkes and surrounding areas (refer to Table 2.2) who are aware that school buses operate along Bogan Road in the mornings and afternoons on school days.

As noted above, NPM does not run their double road train copper concentrate trucks between the mine and Goonumbla Rail Siding between 7.30am–9.00am and 3.00pm to 5.00pm on school days.

3.10 Future Background Traffic Growth

The RMS AADT Traffic volumes have been examined between 1996 and 2005 to determine recent traffic growth on the road network near the NPM Mine. As the mine was commissioned in 1993, therefore 1996 was considered to be the appropriate starting year to measure background traffic growth other than the additional traffic generated by NPM.

Traffic growth over the 9 year period was mixed on the Newell Highway at the 3 counting stations south of Bogan Road, Trewilga and north of Peak Hill on the Parkes Shire boundary, traffic volume increases were 13.2%, 21.95% and 1.92% over the 9 year period with the average lineal growth per year of 1.46%, 2.4% and 0.21% respectively.

On MR348 (road between Peak Hill and Tullamore) the counting station west of Peak Hill recorded no growth over the period with a decrease in traffic volumes of 11% over the 9 years (NB road carries low traffic volumes).

On MR350 (road between Bogan Gate and Tullamore) the counting station recorded a traffic volume increase of 20.62% over the 9 year period, with average lineal growth of 2.2% per year (NB road carries relatively low traffic volumes).

Future background traffic growth is likely to be in same order as what has occurred in the recent past. Based on this, it could be expected that the background traffic growth over the next 20 years could increase on average by up to 2.4% per year.

4.0 ASSESSMENT OF TRAFFIC IMPACTS OF PROJECT

4.1 Proposed Road Network Changes of the Project

As part of the Project it will be necessary to relocate the existing vehicles entrance at Northparkes Lane in Bogan Road to McClintocks Lane and make changes to the internal road network.

These works will include:

- A new seagull intersection in Bogan Road at McClintocks Lane designed to Austroad standards incorporating:
 - A left turn deceleration lane in the southern approach of Bogan Road;
 - Right turn bay in the northern approach of Bogan Road;
 - Right turn acceleration lane for the right turn out of McClintocks Lane together with a southbound through lane;
 - Appropriate widening in McClintocks Lane in the approach and departure to accommodate left turn vehicles.
- The upgrading of McClintocks Lane between Bogan Road and a new internal road to provide a 2 lane sealed road pavement with road shoulders, centre line and edge markings to Austroad standards.
- The construction of a new north south 2 lane internal road linking the existing internal road network to the upgraded McClintocks Lane. This road will be constructed to the same Austroad standards nominated above; and
- The provision of an access control point and a visitors car park for 25 cars at/near the intersection of the new internal road/McClintocks Lane.

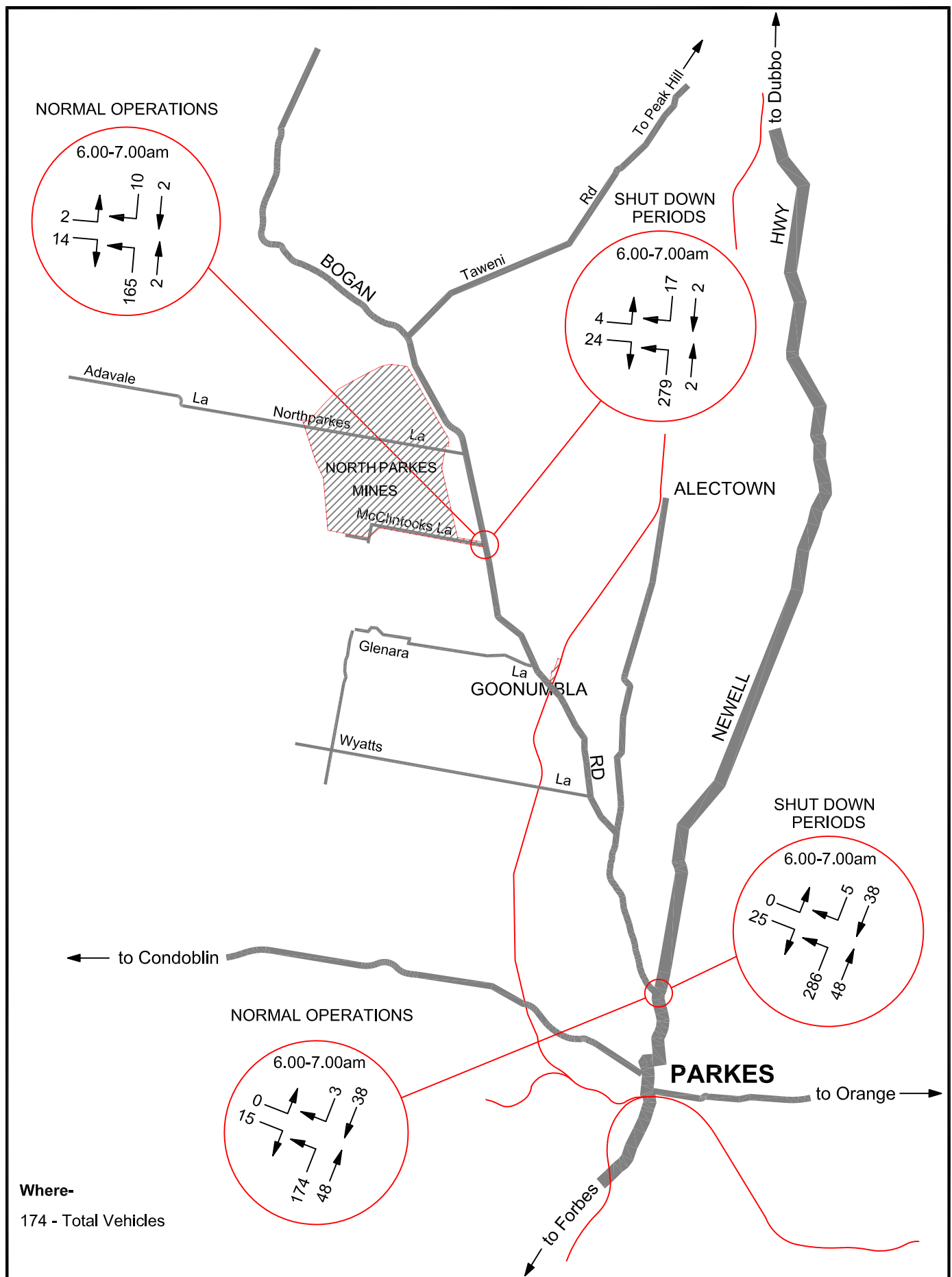
The existing vehicle access at Northparkes Lane will be closed as part of the Project with all NPM traffic utilising McClintocks Lane once commissioned.

Figure 9 shows a conceptual intersection layout for the intersection upgrade to Bogan Road and McClintocks Lane. The design of the intersection will be in accordance with Austroad standards and finalised in consultation with Parkes Shire Council and neighbouring landholders / neighbours as appropriate.

4.2 Assessment of Operational Traffic Impacts

4.2.1 Operational Traffic Generation

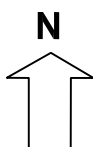
Other than road network changes to the proposed NPM site access road and the extension of the existing mine life from 2025 to 2032 the operational traffic impacts of the Project will be the same as the existing operation. In this regard:



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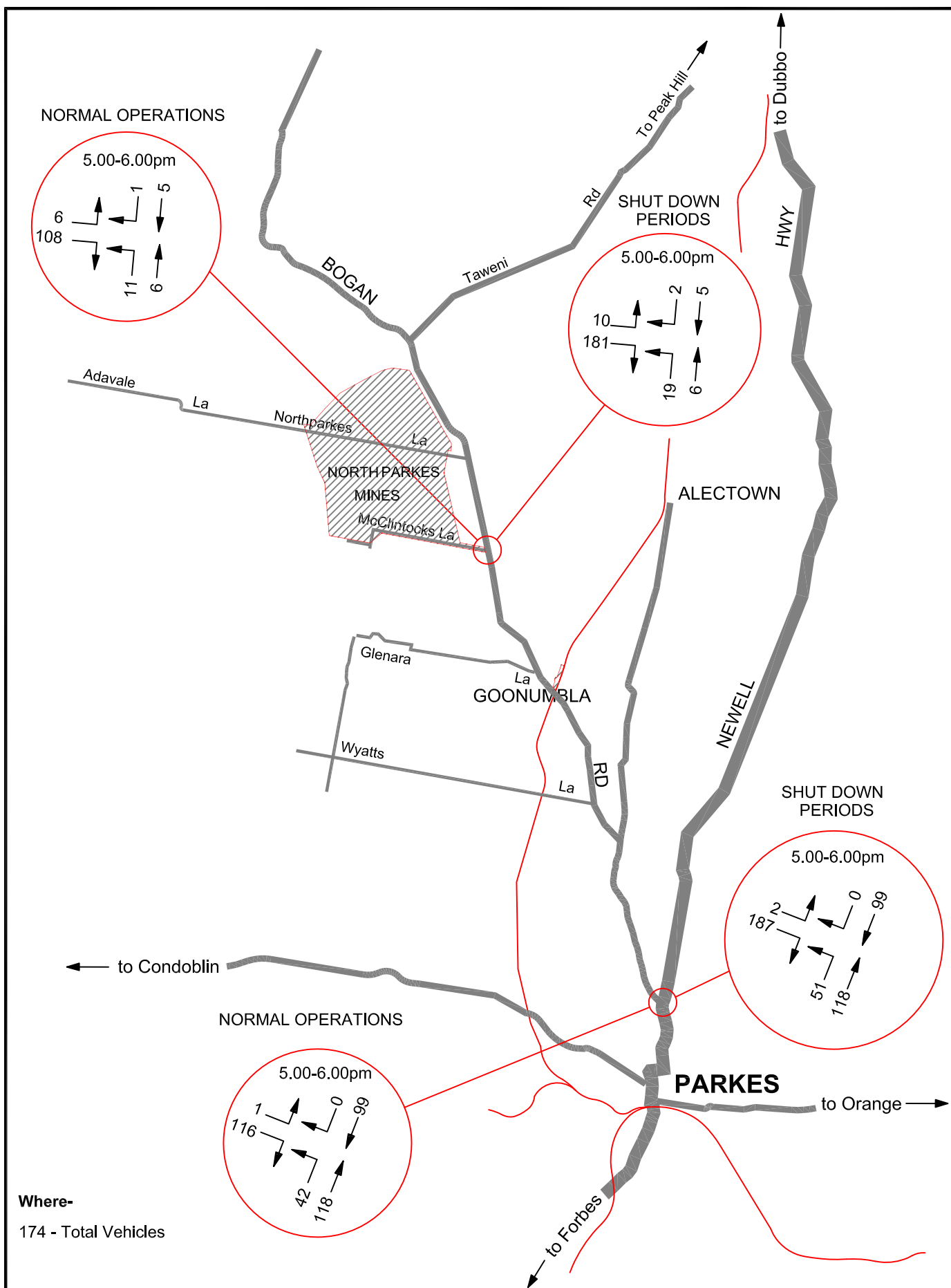
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FIGURE 8A
 NORTH PARKES MINES
 STEP CHANGE PROJECT
2016 AM PEAK HOUR VOLUMES
AT PRINCIPAL INTERSECTIONS
WITH PROJECT

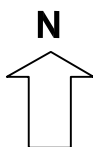
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FIGURE 8B
 NORTH PARKES MINES
 STEP CHANGE PROJECT
2016 PM PEAK HOUR VOLUMES
AT PRINCIPAL INTERSECTIONS
WITH PROJECT

JOB NO. 12031R2

FIGURE 9

NORTHPARKES MINES STEP CHANGE PROJECT TYPICAL INTERSECTION CONCEPT LAYOUT FOR UPGRADE AT McCLINTOCKS LANE

JOB NO. 12031R2



No.	REVISION DETAILS	DRAWN	APP	DATE



PARKES SHIRE COUNCIL
2 Cecilie Street PARKES NSW 2870
Phone: (02) 6861 2333 Fax: (02) 6862 3946
council@parkes.nsw.gov.au www.parkes.nsw.gov.au

SURVEYED	S. JAMES	12-2010	PROJECT	MINES INTERSECTION REDESIGN	PROJECT NO.	2011011
DRAWN	N. KEMP	06-2011	TITLE	GENERAL ARRANGEMENT	DRAWING NO.	1
CHECKED	N. KEMP	06-2011	STATUS	PRELIMINARY	REV.	A
APPROVED	S. JAMES	06-2011	DATUM	A.M.D.	AZIMUTH	MEAN TIME IN
			ORIGINAL SIZE	A3	SCALE	AS SHOWN

- There would be no increase in the approved employment numbers of 700 FTE's. For normal day to day operations some 350 employees/contractors are on site on weekdays and up to 700 employees/contractors can be on site during major shutdowns which occur on 1-2 days per month (which is approximately 7% of the time).
- The hours of operation will remain 24 hours, 7 days per week which is the existing approved hours of operation.
- No increase to the existing road haulage of 8-9 double road train trucks per day carrying copper concentrate material between NPM mine and Goonumbla Rail Siding.

The main change in the traffic impacts during the operational phase of the Project will be a reduction in the volume of traffic using Bogan Road between Northparkes Lane and McClintocks Lane and an associated increase in the use of McClintocks Lane as a result of changes to NPM site access. This will result in a reduced trip length of around 3.6kms in Bogan Road per trip, for those vehicles accessing NPM from the south east from around Parkes, as well as for the road train copper concentrate trucks travelling to the Goonumbla Rail Siding, with a similar increase in trip distance via McClintocks Lane.

Table 4.1 summarises the existing and future traffic generation of NPM with the Project.

Heavy vehicles during normal operation average 86 vehicle trips (i.e. 43 in/43 out) on a weekday. Approximately 50% of these are small rigid trucks with the remainder consisting of large rigid trucks and articulated vehicles, including the double road trains carrying the copper concentrate which account for up to 18 trips (i.e. 9 in/9 out).

TABLE 4.1

**EXISTING AND FUTURE TRAFFIC GENERATION OF
NPM WITH PROJECT**

	Normal Operation	Major Shutdowns
Weekday Traffic* Generation	846 (423 in / 423 out) 100%	1,402 (701 in / 701 out)
Weekday Heavy Vehicles*	86 (43 in / 43 out) 10.1%	116 (58 in / 58 out)
Copper Concentrate Trucks	16-18 (8-9 in / 8-9 out)	16-18 (8-9 in / 8-9 out)
AM Peak Hour Volumes	191 (175 in / 16 out)	324 (296 in / 28 out)
PM Peak Volumes	126 (12 in / 114 out)	212 (21 in / 191 out)

**Includes Copper concentrate trucks*

4.2.2 Assessment of Operational Impacts

The construction phase is expected to take some 12 months to complete and will be undertaken within the first 5-6 years from the approval of the Project.

For the purpose of this assessment, it is assumed that the construction works will be completed in 2015, so the first year of operations, with the Project in place is assumed to be 2016.

To examine traffic conditions at the principal intersections of:

- Bogan Road/McClintocks Lane; and
- Bogan Road/Newell Highway.

SIDRA traffic modelling has been undertaken for the AM and PM peak hours adopting the existing traffic generation of NPM, with allowance for background traffic growth based on a lineal increase of 2.4% per year for background traffic growth. **Figures 8A** and **8B** show the turning volumes at the principal intersections during the AM (6.00am – 7.00am) and PM (5.00pm – 6.00pm) respectively.

For the Bogan Road/McClintocks Lane intersection the traffic management adopted in the modelling is shown on **Figure 9**.

The results of the modelling for the normal operation and with shutdowns for the assumed first year of operation is shown in Tables 4.2 and 4.3.

Reference to these tables show that both intersections will continue to operate at a good level of service for both normal operations and during shutdown periods.

The Bogan Road/McClintocks Lane intersection will continue to operate at a Level of Service A operation in the AM and PM peak hour. The Bogan Road/Newell Highway intersection will operate at Level of Service A operation during NPM mines normal operations and Level of Service A/B operation during shutdowns.

TABLE 4.2

**SIDRA MODELLING RESULTS
2016* NORMAL OPERATIONS AT NPM WITH PROJECT**

Intersection	AM Peak				PM Peak			
	LS	AVD (secs)	DS	95% QUEUE LENGTH	LS	AVD (secs)	DS	95% QUEUE LENGTH
Newell Highway/ Bogan Road	A	12.8	0.100	0.6	A	14.3	0.207	6.1
Bogan Road/ McClintocks Lane	A	12.5	0.122	3.7	A	12.8	0.094	2.5

**Assumed first year of operations*

LS – Level of Services

AVD – Highest Average Individual Movement Delay in Seconds

95% Queue Length – 95% Back of Queue in Metres

DS – Degree of Saturation

TABLE 4.3

**SIDRA MODELLING RESULTS
2016* SHUTDOWN AT NPM WITH PROJECT**

Intersection	AM Peak				PM Peak			
	LS	AVD (secs)	DS	95% QUEUE LENGTH	LS	AVD (secs)	DS	95% QUEUE LENGTH
Newell Highway/ Bogan Road	A	13.6	0.164	0.2	B	15.2	0.336	12.1
Bogan Road/ McClintocks Lane	A	12.6	0.207	6.9	A	12.9	0.162	4.7

*Assumed first year of operations

LS – Level of Services

AVD – Highest Average Individual Movement Delay in Seconds

95% Queue Length – 95% Back of Queue in Metres

DS – Degree of Saturation

No increase in the traffic generation of the Project will occur over the life of the mine, so any traffic increases on the road network would be due to background traffic growth (i.e. other traffic growth not associated with NPM).

For the purposes of examining the effect of future background growth on the principal intersections used by NPM traffic SIDRA traffic modelling has been undertaken for the year 2026, adopting a lineal average of 2.4% per year for the background traffic growth up to 2026. The year 2026 has been chosen as it represents a future time frame of 10 years from the assumed commencement date of operations (ie. 2016). **Figures 10A and 10B**, show the projected 2026 traffic volumes during the AM and PM peak hours for normal operations and with shutdowns.

The results of this modelling are shown in Tables 4.4 and 4.5 and reveal that both intersections are projected to continue to operate at a good level of service in 2026 with a Level of Service A or B operation.

TABLE 4.4

**SIDRA MODELLING RESULTS
2026 NORMAL OPERATIONS AT NPM WITH PROJECT**

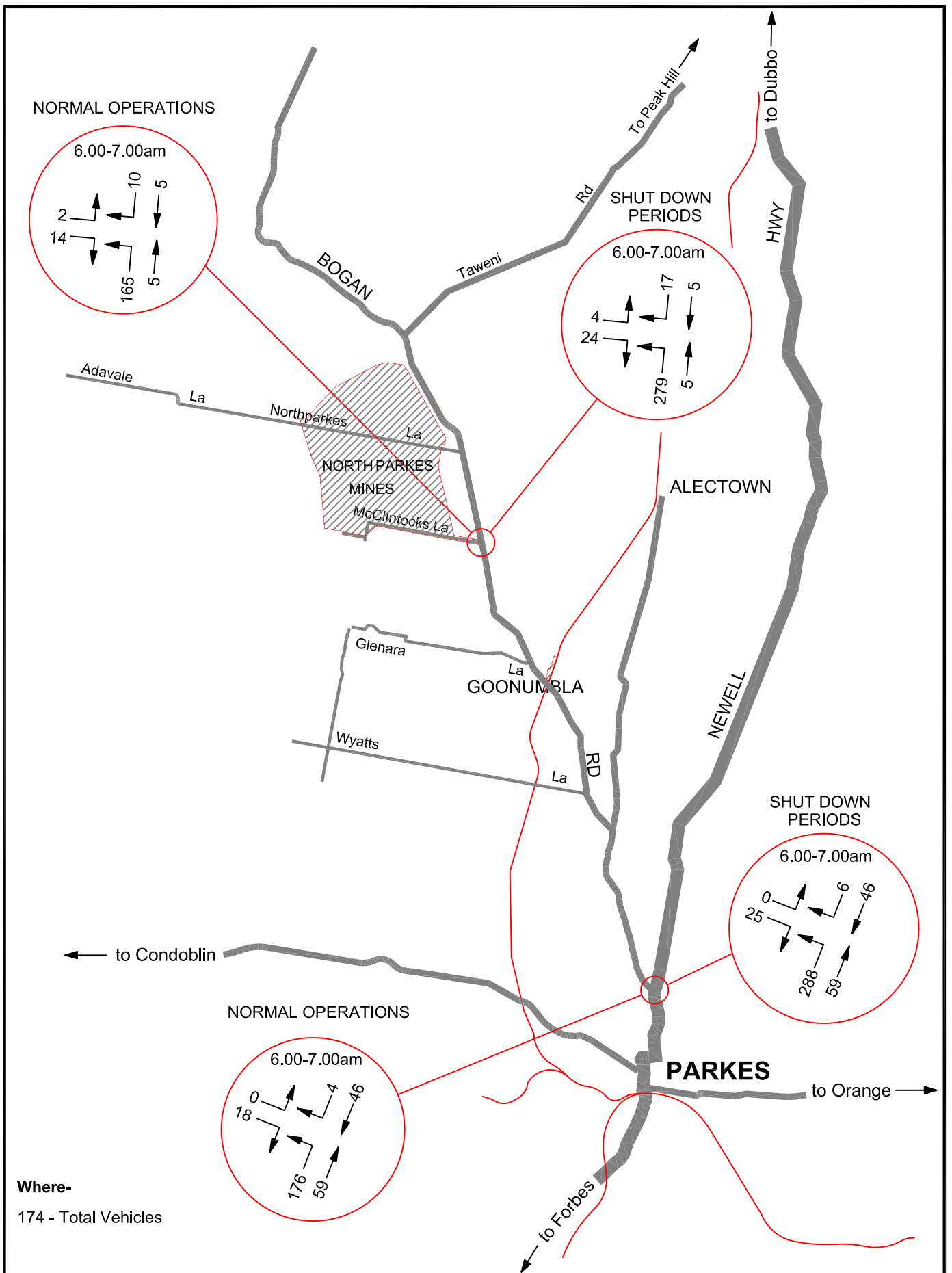
Intersection	AM Peak				PM Peak			
	LS	AVD (secs)	DS	95% QUEUE LENGTH	LS	AVD (secs)	DS	95% QUEUE LENGTH
Newell Highway/ Bogan Road	A	13.1	0.101	0.8	B	15.3	0.230	6.7
Bogan Road/ McClintocks Lane	A	12.5	0.122	3.7	A	12.8	0.094	2.6

LS – Level of Services

AVD – Highest Average Individual Movement Delay in Seconds

95% Queue Length – 95% Back of Queue in Metres

DS – Degree of Saturation



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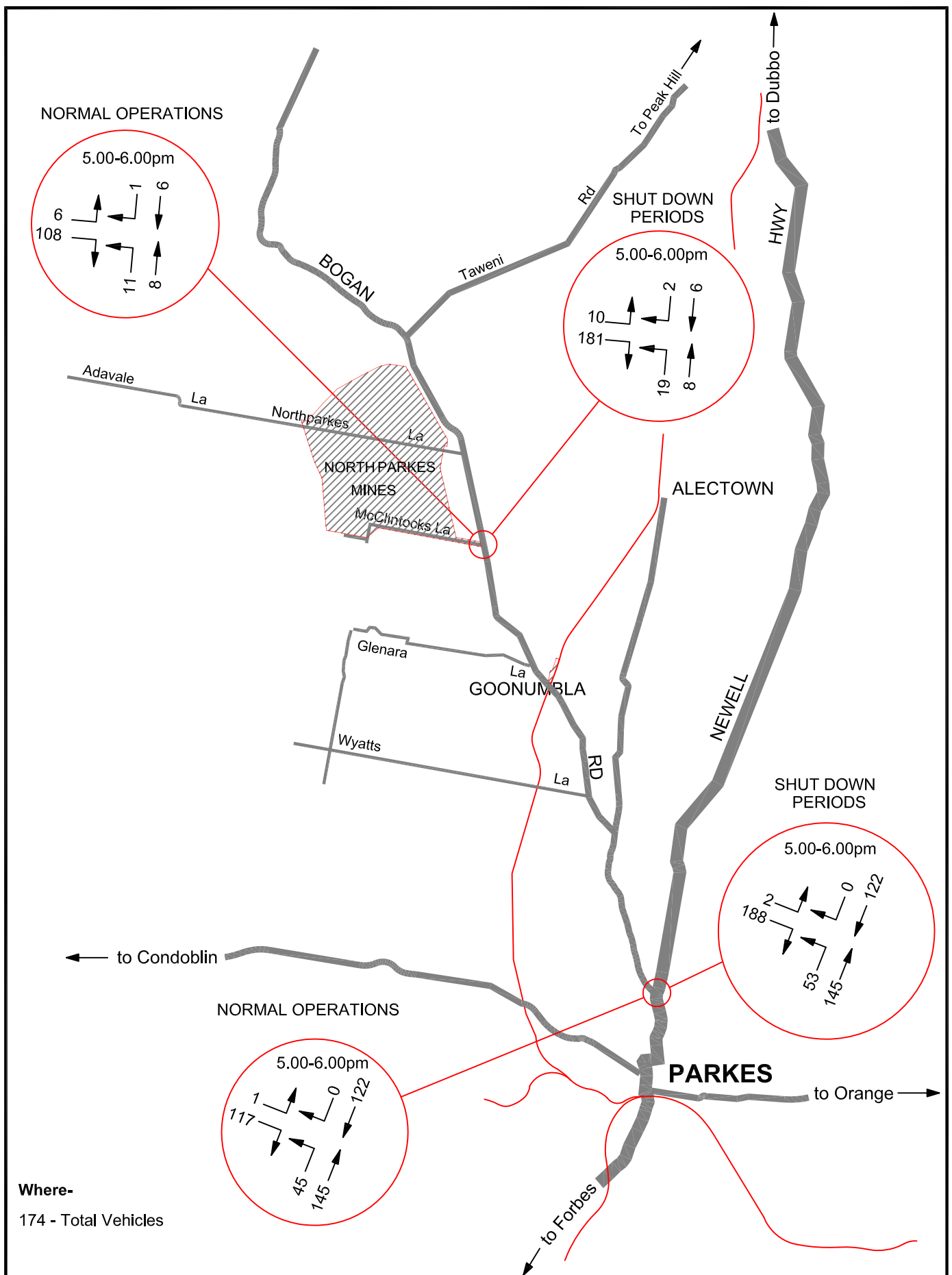
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FIGURE 10A
NORTH PARKES MINES
STEP CHANGE PROJECT
PROJECTED 2026 AM PEAK HOUR
VOLUMES AT PRINCIPAL
INTERSECTIONS WITH PROJECT

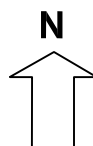
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FIGURE 10B
 NORTHPARKES MINES
 STEP CHANGE PROJECT
PROJECTED 2026 AM PEAK HOUR
VOLUMES AT PRINCIPAL
INTERSECTIONS WITH PROJECT
 JOB NO. 12031R2

TABLE 4.5

**SIDRA MODELLING RESULTS
2026 SHUTDOWN AT NPM WITH PROJECT**

Intersection	AM Peak				PM Peak			
	LS	AVD (secs)	DS	95% QUEUE LENGTH	LS	AVD (secs)	DS	95% QUEUE LENGTH
Newell Highway/ Bogan Road	A	13.9	0.165	1.2	B	16.8	0.372	14.3
Bogan Road/ McClintocks Lane	A	12.6	0.207	6.9	A	12.9	0.162	4.7

LS – Level of Services

AVD – Highest Average Individual Movement Delay in Seconds

95% Queue Length – 95% Back of Queue in Metres

DS – Degree of Saturation

Midblock traffic volumes in Bogan Road will remain at similar levels to existing conditions in the future with the Project in place. Other than a very small increase in background traffic, there will be no increase in traffic volumes from the Project.

Therefore it is concluded that traffic conditions in Bogan Road between the Newell Highway and McClintocks Lane (new NPM Access Road) will remain similar to the exiting traffic conditions, with a good level of service.

North of McClintocks Lane in Bogan Road/Tarweni Road and the route to Peak Hill, traffic volumes will remain low, with no change to the existing traffic conditions.

4.3 Assessment of Construction Impacts

Construction Impacts

Construction will occur in the first 5-6 years following approval. For the purpose of this assessment, construction is assumed to commence in early 2015 and take approximately 12 months to complete.

During the construction period the mine will continue to operate as normal with 350 employees on site over a weekday for normal operations.

NPM intends to employ contractors as it does during shutdowns to undertake most of the construction work. The maximum number of contractors on site over the course of the day will be 350 persons, which retains NPM's total workforce during construction to 700 FTE's (i.e. same number as currently approved).

Construction activities will be undertaken over 24 hours, 7 days per week, based on the existing shift arrangements, which means the construction workforce will be spread over the day and generally arriving and departing at normal shift times of 6.30am and 6.30pm.

In terms of traffic impacts these will be similar to/same as the existing impacts that occur during the weekday AM and PM peak hour periods during shutdown periods. Based on the traffic modelling shown in Table 4.3 the principal intersections of Bogan

Road/NPM Access Road and Bogan Road/Newell Highway will operate at a Level of Service A or B operation, which is a good operation.

A worst case scenario in terms of increased traffic is that the additional 350 construction contractors have a higher driver rate than those who work during shutdowns, resulting in a higher traffic generation.

To test this scenario additional SIDRA modelling has been undertaken for the principal intersections, based on an 85% driver rate for the additional construction contractors, during the AM and PM peak hours. **Figures 11A** and **11B** shows the AM and PM peak hour traffic volumes for the higher driver rate in 2015.

The results of this modelling are shown in Table 4.6 and reveal that both principal intersections will continue to operate at a good level of service (Level of Service A or B operation) with a minimal increase in delays.

TABLE 4.6

**SIDRA MODELLING RESULTS
2015 CONSTRUCTION OF NPM WITH 85% DRIVER RATE FOR
CONSTRUCTION STAFF**

Intersection	AM Peak				PM Peak			
	LS	AVD (secs)	DS	95% QUEUE LENGTH	LS	AVD (secs)	DS	95% QUEUE LENGTH
Newell Highway/ Bogan Road	A	13.6	0.170	1.1	B	15.7	0.360	13.7
Bogan Road/ McClintocks Lane	A	12.6	0.212	7.1	A	12.9	0.168	4.9

LS – Level of Services

AVD – Highest Average Individual Movement Delay in Seconds

95% Queue Length – 95% Back of Queue in Metres

DS – Degree of Saturation

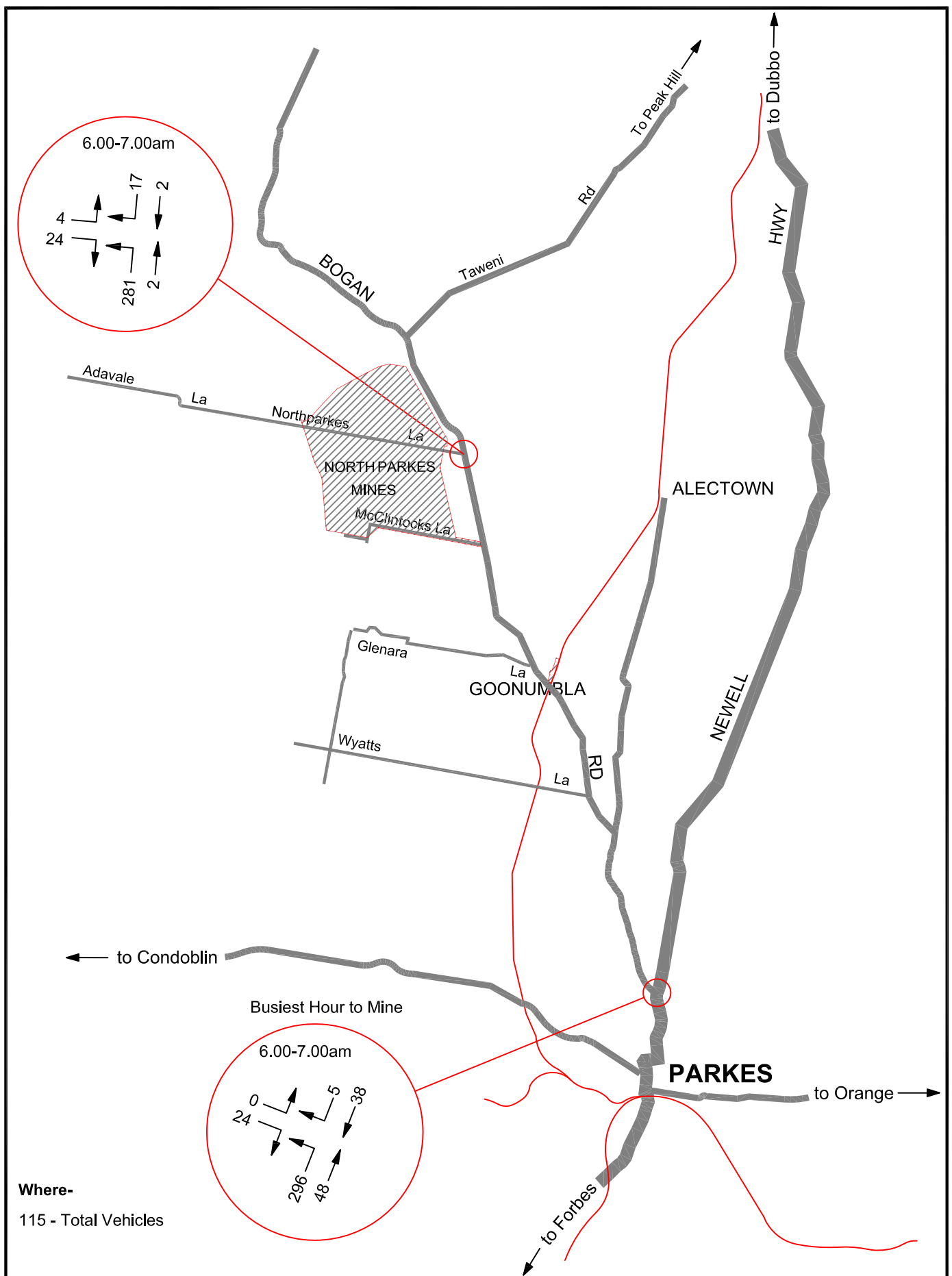
Heavy Vehicles Including Oversize Vehicles

Other than for the construction of the new intersection in Bogan Road at McClintocks Lane and the internal roads, as well as tailing facilities, which will require short periods of higher truck numbers, heavy vehicles generated by the construction are expected to be in the order of 12-15 per day (ie. 24-30 trips) which is similar to existing levels, during major shutdown periods. These will be a mix of rigid trucks and articulated vehicles.

There may also be an increase in oversize vehicles delivering equipment and machinery to NPM associated with construction activities at certain times.

Most heavy vehicles are expected to use Bogan Road from the Newell Highway to access NPM Mine.

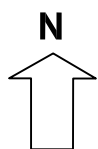
Further details of heavy vehicles including oversize vehicle will be provided in the Construction Traffic Management Plan.



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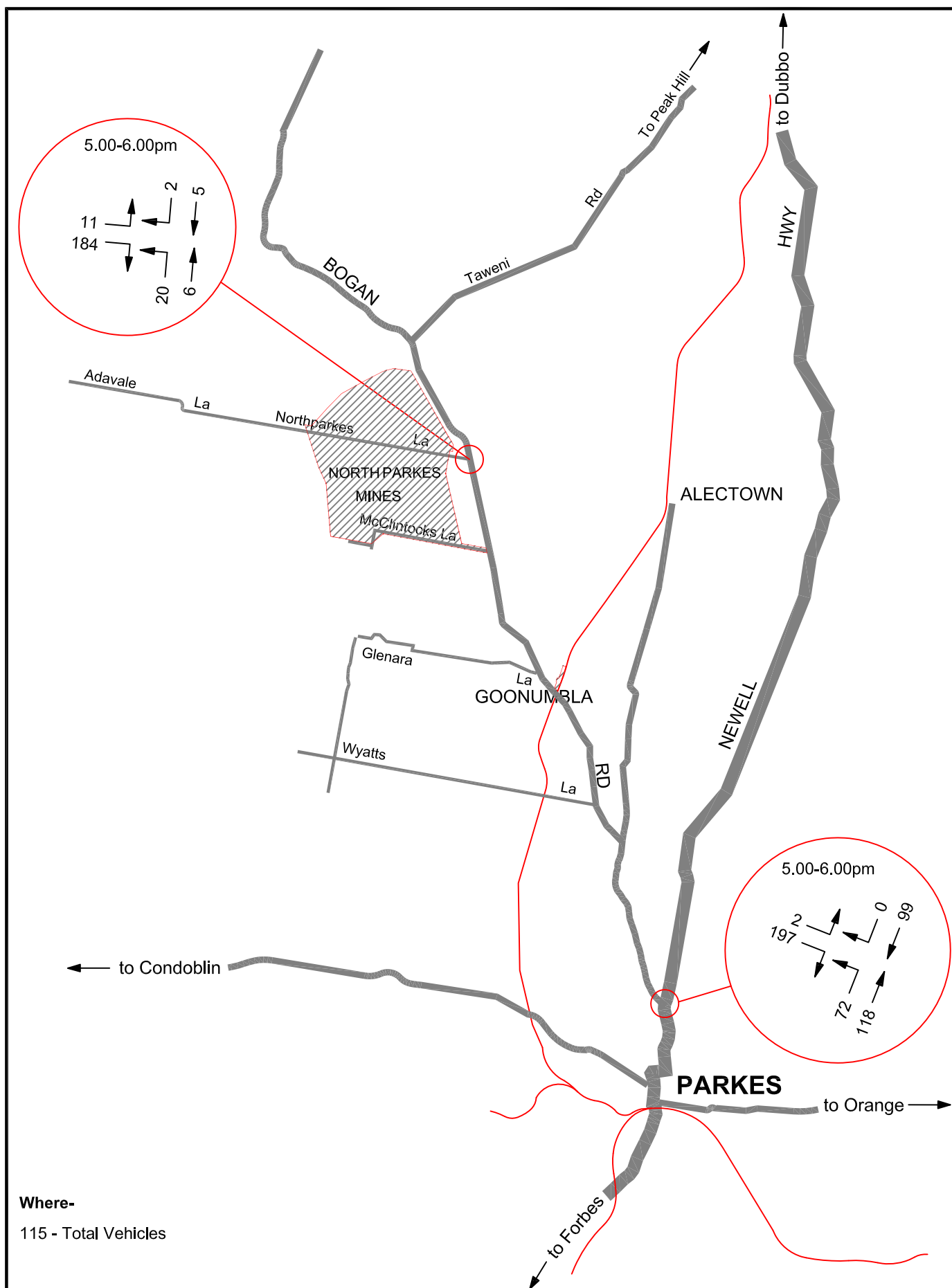
5/90 Toronto Parade, Sutherland NSW 2232
 Phone 02 9545 1411 Fax 02 9545 1556

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NOT TO SCALE

FIGURE 11A
 NORTH PARKES MINES
 STEP CHANGE PROJECT
AM PEAK HOUR CONSTRUCTION
VOLUMES AT PRINCIPAL
INTERSECTIONS WITH
HIGHER DRIVER RATE
 JOB NO. 12031R2



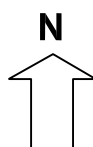
Where-

115 - Total Vehicles

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NOT TO SCALE

FIGURE 11B
 NORTH PARKES MINES
 STEP CHANGE PROJECT
PM PEAK HOUR CONSTRUCTION
VOLUMES AT PRINCIPAL
INTERSECTIONS WITH
HIGHER DRIVER RATE

JOB NO. 12031R2

Construction Traffic Management Plan

Following approval of the Project, NPM will prepare a detailed Construction Traffic Management Plan for the construction period. This will include details of any staging works, construction routes, heavy vehicles including oversize vehicles and details of the traffic management during the construction of the upgraded intersection in Bogan Road at McClintocks Lane.

4.4 Road Safety

The continued operation of NPM associated with the Project is not expected to lead to a deterioration in road safety on the adjacent road network.

There will be no increase in the traffic generation of NPM from existing levels during the operational phase over the life of the Project, including heavy vehicles.

The double road train vehicles carrying the copper concentrate between the NPM mine and the Goonumbla rail siding will continue to operate at the same levels over a shorter distance in Bogan Road, due to the relocation of the mine entrance to McClintocks Lane. The copper concentrate trucks are limited to a speed of 80km/h and do not operate in conjunction with school bus operating times.

McClintocks Lane between NPM and Bogan Road will be upgraded to Austroad standards, so the change of the route and access to the mine is unlikely to result a less safe road environment and or traffic conditions.

The Construction Impacts will be of the same order as the existing traffic impacts during shutdown periods. During the 12 month period of construction, while there will be more days of higher traffic levels, the assessment indicates that traffic conditions on the road network will remain satisfactory. The Construction Traffic Management Plan, which will be prepared by NPM following approval of the Project, will ensure that the impacts of construction are managed appropriately.

NPM will continue to encourage and promote driving safely with its workforce, as well as working closely with Parkes Shire Council about road safety including contributing to road maintenance and reconstruction works in Bogan Road.

5.0 CONCLUSIONS

This report documents the assessment of the traffic impacts of the Step Change Project at NPM, which is located off Bogan Road, approximately 27km north north west of Parkes.

The Project will extend the life of NPM from 2025 to 2032. There will be no change (from the existing approval) in employment levels (currently approved as 700 FTE's), production levels, hours and days of operation, or the number of copper concentrate trucks that transport the copper concentrate material between mine and the rail siding at Goonumbla.

As part of the Project the existing vehicle access to mine in Bogan Road at Northparkes Lane will be relocated to McClintocks Lane. This intersection will be upgraded to provide a seagull channelisation with appropriate turning and auxiliary lanes in Bogan Road designed and constructed to Austroad standards and finalised in consultation with Parkes Shire Council and neighbouring landholders/neighbours as appropriate.

The assessment of the existing and future traffic impacts of NPM's operation on the adjacent road network has found that existing traffic conditions are good and will remain the same in the foreseeable future in the operational phase of the Project.

Construction will occur during the first 5-6 years following approval. For the purpose of this assessment it is assumed to commence in 2015 and be completed within 12 months. The construction and its impacts will be managed through the implementation of a Construction Traffic Management Plan. The traffic levels generated by NPM during the construction period will be of the same order which currently occurs during major shutdown periods and NPM will ensure that the maximum number of employees/contractors on site, over the course of any one day, does not exceed the existing approved employment levels of 700 FTE's.

REFERENCES

1. Austroads Guide to Road Design 2009/2010
2. Austroads Guide to Traffic Management 2007/2008
3. RMS Austroads Guide to Traffic Management Supplements
4. RMS Austroads Guide to Road Design Supplements
5. Guide to Traffic Generating Developments October 2002 – Roads and Maritime Services
6. Traffic Volume Data for Western Region 2005 – Roads and Maritime Services
7. Northparkes Mines Sustainable Development Report 2011 – Rio Tinto

APPENDIX 1

SIDRA Modelling Results

MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
- Ex AM

Bogan Rd & NPM Mine - Ex AM
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	174	0.7	0.122	12.5	LOS A	0.5	3.7	0.06	0.68	64.0
2	T	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		175	0.7	0.122	12.5	NA	0.5	3.7	0.06	0.68	64.2
North: Bogan Rd											
8	T	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	11	0.0	0.007	12.1	LOS A	0.0	0.2	0.01	0.75	64.8
Approach		12	0.0	0.007	11.0	NA	0.0	0.2	0.01	0.68	67.3
West: NPM Access Rd											
10	L	2	0.0	0.003	11.3	LOS A	0.0	0.0	0.18	0.65	57.9
12	R	15	7.1	0.014	11.7	LOS A	0.0	0.4	0.20	0.66	57.8
Approach		17	6.2	0.014	11.6	LOS A	0.0	0.4	0.19	0.66	57.8
All Vehicles		203	1.1	0.122	12.3	NA	0.5	3.7	0.07	0.68	63.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
- Ex PM

Bogan Rd & NPM Mine - Ex PM
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov. ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prob. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	12	9.1	0.008	12.8	LOS A	0.0	0.3	0.01	0.70	64.4
2	T	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		17	6.3	0.008	8.8	LOS A	0.0	0.3	0.01	0.48	73.4
North: Bogan Rd											
8	T	4	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	1	0.0	0.001	12.1	LOS A	0.0	0.0	0.03	0.74	64.7
Approach		5	0.0	0.002	2.4	LOS A	0.0	0.0	0.01	0.15	91.3
West: NPM Access Rd											
10	L	6	0.0	0.010	11.0	LOS A	0.0	0.2	0.05	0.70	58.6
12	R	114	2.0	0.096	11.1	LOS A	0.5	3.3	0.06	0.70	58.6
Approach		120	1.9	0.096	11.1	LOS A	0.5	3.3	0.06	0.70	58.6
All Vehicles		142	2.3	0.096	10.5	NA	0.5	3.3	0.05	0.65	61.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd - Ex
AM Mine Peak

Newell Hwy & Bogan Rd - Ex AM Mine Peak
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	181	1.7	0.099	11.0	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	46	36.4	0.029	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		227	8.8	0.099	8.8	LOS A	0.0	0.0	0.00	0.58	62.3
North: Bogan Rd											
8	T	37	31.4	0.023	1.1	LOS A	0.0	0.0	0.00	0.06	84.3
9	R	3	0.0	0.003	11.7	LOS A	0.0	0.1	0.32	0.64	57.3
Approach		40	28.9	0.023	2.0	LOS A	0.0	0.1	0.03	0.11	81.3
West: Bogan Rd											
10	L	1	0.0	0.002	11.5	LOS A	0.0	0.0	0.24	0.64	57.5
12	R	14	0.0	0.020	12.7	LOS A	0.1	0.7	0.36	0.68	56.4
Approach		15	0.0	0.020	12.6	LOS A	0.1	0.7	0.35	0.68	56.5
All Vehicles		282	11.2	0.099	8.0	NA	0.1	0.7	0.02	0.52	64.1

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd - Ex AM

Newell Hwy & Bogan Rd - Ex AM
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deq Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	86	11.0	0.050	11.4	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	121	22.6	0.071	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		207	17.8	0.071	4.8	LOS A	0.0	0.0	0.00	0.30	69.7
North: Bogan Rd											
8	T	87	15.7	0.049	1.1	LOS A	0.0	0.0	0.00	0.07	84.3
9	R	1	0.0	0.001	11.7	LOS A	0.0	0.0	0.32	0.63	57.3
Approach		88	15.5	0.049	1.2	LOS A	0.0	0.0	0.00	0.07	83.8
West: Bogan Rd											
10	L	1	0.0	0.002	11.7	LOS A	0.0	0.0	0.28	0.63	57.3
12	R	38	5.6	0.065	14.1	LOS A	0.3	2.3	0.45	0.74	54.9
Approach		39	5.4	0.065	14.1	LOS A	0.3	2.3	0.44	0.74	55.0
All Vehicles		335	15.7	0.071	4.9	NA	0.3	2.3	0.05	0.29	70.7

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd - Ex PM

Newell Hwy & Bogan Rd - Ex PM
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	44	7.0	0.025	11.3	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	114	19.4	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		158	15.9	0.066	3.2	LOS A	0.0	0.0	0.00	0.20	72.8
North: Bogan Rd											
8	T	96	19.8	0.055	1.1	LOS A	0.0	0.0	0.00	0.07	84.3
9	R	1	0.0	0.001	11.4	LOS A	0.0	0.0	0.27	0.63	57.5
Approach		97	19.6	0.055	1.2	LOS A	0.0	0.0	0.00	0.07	83.9
West: Bogan Rd											
10	L	1	0.0	0.002	11.5	LOS A	0.0	0.0	0.25	0.64	57.5
12	R	121	0.9	0.198	14.0	LOS A	1.0	7.3	0.47	0.77	54.8
Approach		122	0.9	0.198	14.0	LOS A	1.0	7.3	0.47	0.77	54.9
All Vehicles		377	12.0	0.198	6.2	NA	1.0	7.3	0.15	0.35	68.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
- Ex AM with Shutdown

Bogan Rd & NPM Mine - Ex AM with Shutdown
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	294	0.7	0.207	12.6	LOS A	1.0	6.9	0.08	0.67	63.8
2	T	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		295	0.7	0.207	12.5	NA	1.0	6.9	0.08	0.67	63.9
North: Bogan Rd											
8	T	1	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	18	0.0	0.012	12.1	LOS A	0.0	0.3	0.01	0.75	64.8
Approach		19	0.0	0.012	11.4	NA	0.0	0.3	0.01	0.71	66.4
West: NPM Access Rd											
10	L	4	0.0	0.007	11.5	LOS A	0.0	0.1	0.24	0.65	57.5
12	R	25	7.1	0.026	12.0	LOS A	0.1	0.7	0.27	0.67	57.4
Approach		29	6.1	0.026	12.0	LOS A	0.1	0.7	0.26	0.67	57.4
All Vehicles		343	1.1	0.207	12.4	NA	1.0	6.9	0.10	0.67	63.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
- Ex PM with Shutdown

Bogan Rd & NPM Mine - Ex PM with Shutdown
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	20	9.1	0.014	12.9	LOS A	0.1	0.4	0.02	0.70	64.3
2	T	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		25	7.2	0.014	10.2	NA	0.1	0.4	0.02	0.55	70.2
North: Bogan Rd											
8	T	4	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	2	0.0	0.001	12.1	LOS A	0.0	0.0	0.03	0.74	64.7
Approach		6	0.0	0.002	4.0	NA	0.0	0.0	0.01	0.25	86.0
West: NPM Access Rd											
10	L	11	0.0	0.016	11.0	LOS A	0.0	0.2	0.06	0.69	58.5
12	R	191	2.0	0.162	11.1	LOS A	0.7	4.7	0.08	0.69	58.4
Approach		201	1.9	0.162	11.1	LOS A	0.7	4.7	0.08	0.69	58.4
All Vehicles		233	2.4	0.162	10.8	NA	0.7	4.7	0.07	0.66	60.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd - Ex
AM Mine Peak with Shutdown

Newell Hwy & Bogan Rd - Ex AM Mine Peak with Shutdown
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deq Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	299	1.7	0.163	11.0	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	46	36.4	0.029	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		345	6.4	0.163	9.5	NA	0.0	0.0	0.00	0.63	61.1
North: Bogan Rd											
8	T	37	31.4	0.023	1.1	LOS A	0.0	0.0	0.00	0.06	84.3
9	R	5	0.0	0.005	12.2	LOS A	0.0	0.1	0.39	0.66	56.9
Approach		42	27.5	0.023	2.5	NA	0.0	0.1	0.05	0.14	79.6
West: Bogan Rd											
10	L	1	0.0	0.002	11.8	LOS A	0.0	0.0	0.29	0.63	57.2
12	R	24	0.0	0.039	13.4	LOS A	0.1	1.0	0.42	0.71	55.5
Approach		25	0.0	0.039	13.4	LOS A	0.1	1.0	0.41	0.71	55.6
All Vehicles		413	8.1	0.163	9.0	NA	0.1	1.0	0.03	0.58	62.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd - Ex
PM with Shutdown

Newell Hwy & Bogan Rd - Ex PM with Shutdown
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Sam v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	53	7.0	0.030	11.3	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	114	19.4	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		166	15.5	0.066	3.6	NA	0.0	0.0	0.00	0.23	72.0
North: Bogan Rd											
8	T	96	19.8	0.055	1.1	LOS A	0.0	0.0	0.00	0.07	84.3
9	R	1	0.0	0.001	11.5	LOS A	0.0	0.0	0.28	0.63	57.5
Approach		97	19.6	0.055	1.2	NA	0.0	0.0	0.00	0.07	83.9
West: Bogan Rd											
10	L	2	0.0	0.004	11.6	LOS A	0.0	0.1	0.25	0.64	57.5
12	R	196	0.9	0.323	14.7	LOS B	1.6	11.2	0.52	0.81	54.0
Approach		198	0.9	0.323	14.7	LOS B	1.6	11.2	0.52	0.81	54.1
All Vehicles		461	10.1	0.323	7.8	NA	1.6	11.2	0.22	0.45	64.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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INTERSECTION

MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
(McC L) - 2016 AM Operations
with Step Change

Bogan Rd & NPM Mine (McC L) -2016 AM Operations with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	174	0.7	0.122	12.5	LOS A	0.5	3.7	0.06	0.68	64.0
2	T	2	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		176	0.7	0.122	12.4	NA	0.5	3.7	0.06	0.68	64.3
North: Bogan Rd											
8	T	2	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	11	0.0	0.007	12.1	LOS A	0.0	0.2	0.02	0.74	64.8
Approach		13	0.0	0.007	10.1	NA	0.0	0.2	0.02	0.62	69.5
West: NPM Access Rd											
10	L	2	0.0	0.003	11.3	LOS A	0.0	0.0	0.18	0.65	57.9
12	R	15	7.1	0.014	11.7	LOS A	0.0	0.4	0.20	0.66	57.8
Approach		17	6.2	0.014	11.6	LOS A	0.0	0.4	0.20	0.66	57.8
All Vehicles		205	1.1	0.122	12.2	NA	0.5	3.7	0.07	0.67	64.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Tuesday, 26 March 2013 9:42:30 AM

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INTERSECTION

MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
(McC L) - 2016 PM - Operations
with Step Change

Bogan Rd & NPM Mine (McC L) - 2016 PM Operations with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov-ID	Turn	Demand Flow veh/h	HV %	Seg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	12	9.1	0.008	12.8	LOS A	0.0	0.2	0.01	0.70	64.4
2	T	6	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		18	5.9	0.008	8.3	NA	0.0	0.2	0.01	0.45	74.7
North: Bogan Rd											
8	T	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	1	0.0	0.001	12.1	LOS A	0.0	0.0	0.04	0.73	64.7
Approach		6	0.0	0.003	2.0	NA	0.0	0.0	0.01	0.12	92.7
West: NPM Access Rd											
10	L	6	0.0	0.010	11.0	LOS A	0.0	0.1	0.06	0.70	58.6
12	R	112	2.0	0.094	11.1	LOS A	0.4	2.5	0.06	0.70	58.5
Approach		118	1.9	0.094	11.1	LOS A	0.4	2.5	0.06	0.70	58.5
All Vehicles		142	2.3	0.094	10.3	NA	0.4	2.5	0.05	0.64	61.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Tuesday, 26 March 2013 9:40:11 AM

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MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
McC L) - 2016 AM Shutdown
with Step Change

Bogan Rd & NPM Mine (McC L) - 2016 AM Shutdown with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Seg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	294	0.7	0.207	12.6	LOS A	1.0	6.9	0.08	0.67	63.8
2	T	2	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		296	0.7	0.207	12.5	NA	1.0	6.9	0.08	0.67	64.0
North: Bogan Rd											
8	T	2	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	18	0.0	0.012	12.1	LOS A	0.0	0.3	0.02	0.74	64.8
Approach		20	0.0	0.012	10.8	NA	0.0	0.3	0.02	0.67	67.7
West: NPM Access Rd											
10	L	4	0.0	0.007	11.5	LOS A	0.0	0.1	0.25	0.65	57.5
12	R	25	7.1	0.026	12.0	LOS A	0.1	0.7	0.27	0.67	57.4
Approach		29	6.1	0.026	12.0	LOS A	0.1	0.7	0.26	0.67	57.4
All Vehicles		345	1.1	0.207	12.3	NA	1.0	6.9	0.10	0.67	63.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
(McC L) - 2016 PM - Shutdown
with Step Change

Bogan Rd & NPM Mine (McC L) - 2016 PM Shutdown with Step Change
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	20	9.1	0.014	12.9	LOS A	0.1	0.4	0.02	0.70	64.3
2	T	6	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		26	6.9	0.014	9.8	NA	0.1	0.4	0.02	0.53	71.1
North: Bogan Rd											
8	T	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	2	0.0	0.001	12.1	LOS A	0.0	0.0	0.04	0.73	64.7
Approach		7	0.0	0.003	3.5	NA	0.0	0.0	0.01	0.21	87.9
West: NPM Access Rd											
10	L	11	0.0	0.016	11.0	LOS A	0.0	0.2	0.07	0.69	58.5
12	R	191	2.0	0.162	11.1	LOS A	0.7	4.7	0.08	0.69	58.4
Approach		201	1.9	0.162	11.1	LOS A	0.7	4.7	0.08	0.69	58.4
All Vehicles		235	2.4	0.162	10.7	NA	0.7	4.7	0.07	0.66	60.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Tuesday, 26 March 2013 9:56:26 AM

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2016 AM Mine Peak - Operations -
Step Change

Newell Hwy & Bogan Rd - 2016 Operations with Step Change in AM Mine Peak

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	183	1.7	0.100	11.0	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	51	36.4	0.032	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		234	9.2	0.100	8.6	NA	0.0	0.0	0.00	0.57	62.5
North: Bogan Rd											
8	T	40	31.4	0.025	1.1	LOS A	0.0	0.0	0.00	0.06	84.3
9	R	3	0.0	0.003	11.7	LOS A	0.0	0.1	0.32	0.64	57.3
Approach		43	29.1	0.025	1.9	NA	0.0	0.1	0.02	0.10	81.5
West: Bogan Rd											
10	L	1	0.0	0.002	11.6	LOS A	0.0	0.0	0.25	0.64	57.5
12	R	16	0.0	0.024	12.8	LOS A	0.1	0.6	0.37	0.69	56.3
Approach		17	0.0	0.024	12.8	LOS A	0.1	0.6	0.36	0.68	56.4
All Vehicles		294	11.6	0.100	7.9	NA	0.1	0.6	0.02	0.51	64.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 25 March 2013 5:33:02 PM

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2016 PM Operations with Step
Change

Newell Hwy & Bogan Rd - 2016 PM Operations with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	45	7.0	0.026	11.3	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	124	19.4	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		169	16.1	0.072	3.0	NA	0.0	0.0	0.00	0.19	73.1
North: Bogan Rd											
8	T	104	19.8	0.060	1.1	LOS A	0.0	0.0	0.00	0.07	84.3
9	R	1	0.0	0.001	11.5	LOS A	0.0	0.0	0.28	0.63	57.5
Approach		105	19.6	0.060	1.2	NA	0.0	0.0	0.00	0.07	83.9
West: Bogan Rd											
10	L	1	0.0	0.002	11.6	LOS A	0.0	0.0	0.26	0.63	57.4
12	R	122	0.9	0.207	14.3	LOS A	0.9	6.1	0.49	0.79	54.4
Approach		123	0.9	0.207	14.3	LOS A	0.9	6.1	0.49	0.79	54.5
All Vehicles		398	12.3	0.207	6.0	NA	0.9	6.1	0.15	0.35	68.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 25 March 2013 5:36:41 PM

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2016 AM Mine Peak - Shutdown -
Step Change

Newell Hwy & Bogan Rd - 2016 Shutdown with Step Change in AM Mine Peak

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Reg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	301	1.7	0.164	11.0	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	51	36.4	0.032	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		352	6.7	0.164	9.4	NA	0.0	0.0	0.00	0.62	61.3
North: Bogan Rd											
8	T	40	31.4	0.025	1.1	LOS A	0.0	0.0	0.00	0.06	84.3
9	R	5	0.0	0.005	12.2	LOS A	0.0	0.1	0.40	0.66	56.9
Approach		45	27.7	0.025	2.4	NA	0.0	0.1	0.05	0.13	79.9
West: Bogan Rd											
10	L	1	0.0	0.002	11.8	LOS A	0.0	0.0	0.30	0.63	57.2
12	R	26	0.0	0.043	13.6	LOS A	0.2	1.1	0.43	0.72	55.3
Approach		27	0.0	0.043	13.5	LOS A	0.2	1.1	0.42	0.72	55.4
All Vehicles		424	8.5	0.164	8.9	NA	0.2	1.1	0.03	0.58	62.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 25 March 2013 5:41:22 PM

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INTERSECTION

MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2016 PM Shutdown with Step
Change

Newell Hwy & Bogan Rd - 2016 PM Shutdown with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	54	7.0	0.030	11.3	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	124	19.4	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		178	15.7	0.072	3.4	NA	0.0	0.0	0.00	0.22	72.3
North: Bogan Rd											
8	T	104	19.8	0.060	1.1	LOS A	0.0	0.0	0.00	0.07	84.3
9	R	1	0.0	0.001	11.5	LOS A	0.0	0.0	0.29	0.63	57.4
Approach		105	19.6	0.060	1.2	NA	0.0	0.0	0.00	0.07	83.9
West: Bogan Rd											
10	L	2	0.0	0.004	11.6	LOS A	0.0	0.1	0.26	0.64	57.4
12	R	197	0.9	0.336	15.2	LOS B	1.7	12.1	0.54	0.84	53.4
Approach		199	0.9	0.336	15.2	LOS B	1.7	12.1	0.54	0.84	53.4
All Vehicles		482	10.4	0.336	7.8	NA	1.7	12.1	0.22	0.44	64.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Monday, 25 March 2013 5:44:52 PM
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INTERSECTION

MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
(McC L) - 2026 AM Operations
with Step Change

Bogan Rd & NPM Mine (McC L) -2026 AM Operations with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Sat'n v/p	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	174	0.7	0.122	12.5	LOS A	0.5	3.7	0.06	0.68	64.0
2	T	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		179	0.7	0.122	12.2	NA	0.5	3.7	0.06	0.66	64.8
North: Bogan Rd											
8	T	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	11	0.0	0.007	12.1	LOS A	0.0	0.2	0.03	0.74	64.7
Approach		16	0.0	0.007	8.1	NA	0.0	0.2	0.02	0.49	74.5
West: NPM Access Rd											
10	L	2	0.0	0.003	11.3	LOS A	0.0	0.0	0.19	0.65	57.8
12	R	15	7.1	0.014	11.7	LOS A	0.0	0.4	0.20	0.66	57.8
Approach		17	6.2	0.014	11.7	LOS A	0.0	0.4	0.20	0.66	57.8
All Vehicles		212	1.1	0.122	11.8	NA	0.5	3.7	0.06	0.65	64.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

Processed: Tuesday, 26 March 2013 10:09:58 AM

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INTERSECTION

MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
(McC L) - 2026 PM - Operations
with Step Change

Bogan Rd & NPM Mine (McC L) - 2026 PM Operations with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	12	9.1	0.008	12.8	LOS A	0.0	0.2	0.01	0.70	64.4
2	T	8	0.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		20	5.3	0.008	7.4	NA	0.0	0.2	0.01	0.41	77.0
North: Bogan Rd											
8	T	6	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	1	0.0	0.001	12.1	LOS A	0.0	0.0	0.04	0.73	64.6
Approach		7	0.0	0.003	1.7	NA	0.0	0.0	0.01	0.10	93.7
West: NPM Access Rd											
10	L	6	0.0	0.010	11.0	LOS A	0.0	0.1	0.06	0.69	58.5
12	R	112	2.0	0.094	11.1	LOS A	0.4	2.6	0.07	0.69	58.5
Approach		118	1.9	0.094	11.1	LOS A	0.4	2.6	0.07	0.69	58.5
All Vehicles		145	2.3	0.094	10.1	NA	0.4	2.6	0.06	0.62	62.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
McC L) - 2026 AM Shutdown
with Step Change

Bogan Rd & NPM Mine (McC L) - 2026 AM Shutdown with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/s	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	294	0.7	0.207	12.6	LOS A	1.0	6.9	0.08	0.67	63.8
2	T	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		299	0.7	0.207	12.4	NA	1.0	6.9	0.08	0.66	64.2
North: Bogan Rd											
8	T	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	18	0.0	0.012	12.1	LOS A	0.0	0.3	0.03	0.74	64.7
Approach		23	0.0	0.012	9.4	NA	0.0	0.3	0.03	0.57	71.2
West: NPM Access Rd											
10	L	4	0.0	0.007	11.6	LOS A	0.0	0.1	0.25	0.65	57.5
12	R	25	7.1	0.026	12.1	LOS A	0.1	0.7	0.27	0.67	57.4
Approach		29	6.1	0.026	12.0	LOS A	0.1	0.7	0.27	0.67	57.4
All Vehicles		352	1.1	0.207	12.1	NA	1.0	6.9	0.10	0.66	64.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
(McC L) - 2026 PM - Shutdown
with Step Change

Bogan Rd & NPM Mine (McC L) - 2026 PM Shutdown with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	20	9.1	0.014	12.9	LOS A	0.1	0.4	0.02	0.70	64.3
2	T	8	0.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		28	6.4	0.014	9.0	NA	0.1	0.4	0.01	0.49	72.9
North: Bogan Rd											
8	T	6	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	2	0.0	0.001	12.1	LOS A	0.0	0.0	0.04	0.73	64.6
Approach		8	0.0	0.003	3.0	NA	0.0	0.0	0.01	0.18	89.3
West: NPM Access Rd											
10	L	11	0.0	0.016	11.0	LOS A	0.0	0.2	0.07	0.69	58.5
12	R	191	2.0	0.162	11.1	LOS A	0.7	4.7	0.09	0.69	58.4
Approach		201	1.9	0.162	11.1	LOS A	0.7	4.7	0.09	0.69	58.4
All Vehicles		238	2.4	0.162	10.6	NA	0.7	4.7	0.08	0.65	60.7

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2026 AM Mine Peak - Operations -
Step Change

Newell Hwy & Bogan Rd - 2026 Operations with Step Change in AM Mine Peak

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	185	1.7	0.101	11.0	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	61	36.4	0.039	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		246	10.3	0.101	8.3	NA	0.0	0.0	0.00	0.55	63.1
North: Bogan Rd											
8	T	48	31.4	0.030	1.1	LOS A	0.0	0.0	0.00	0.06	84.3
9	R	4	0.0	0.004	11.8	LOS A	0.0	0.1	0.34	0.65	57.2
Approach		53	28.9	0.030	2.0	NA	0.0	0.1	0.03	0.11	81.3
West: Bogan Rd											
10	L	2	0.0	0.004	11.6	LOS A	0.0	0.1	0.26	0.64	57.4
12	R	19	0.0	0.030	13.1	LOS A	0.1	0.8	0.40	0.70	55.9
Approach		21	0.0	0.030	13.0	LOS A	0.1	0.8	0.38	0.69	56.0
All Vehicles		320	12.7	0.101	7.5	NA	0.1	0.8	0.03	0.48	65.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2026 PM Operations with Step
Change

Newell Hwy & Bogan Rd - 2026 PM Operations with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	47	7.0	0.027	11.3	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	153	19.4	0.088	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		200	16.5	0.088	2.7	NA	0.0	0.0	0.00	0.17	73.8
North: Bogan Rd											
8	T	128	19.8	0.074	1.1	LOS A	0.0	0.0	0.00	0.07	84.3
9	R	1	0.0	0.001	11.6	LOS A	0.0	0.0	0.31	0.63	57.3
Approach		129	19.6	0.074	1.2	NA	0.0	0.0	0.00	0.07	84.0
West: Bogan Rd											
10	L	1	0.0	0.002	11.8	LOS A	0.0	0.0	0.29	0.63	57.3
12	R	123	0.9	0.230	15.3	LOS B	1.0	6.7	0.54	0.83	53.3
Approach		124	0.9	0.230	15.3	LOS B	1.0	6.7	0.54	0.83	53.3
All Vehicles		454	13.1	0.230	5.7	NA	1.0	6.7	0.15	0.32	69.1

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2026 AM Mine Peak - Shutdown -
Step Change

Newell Hwy & Bogan Rd - 2026 Shutdown with Step Change in AM Mine Peak

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	303	1.7	0.165	11.0	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	62	36.4	0.039	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		365	7.6	0.165	9.1	NA	0.0	0.0	0.00	0.60	61.7
North: Bogan Rd											
8	T	48	31.4	0.030	1.1	LOS A	0.0	0.0	0.00	0.06	84.3
9	R	6	0.0	0.006	12.3	LOS A	0.0	0.2	0.41	0.67	56.8
Approach		55	27.8	0.030	2.4	NA	0.0	0.2	0.05	0.13	79.9
West: Bogan Rd											
10	L	1	0.0	0.002	11.9	LOS A	0.0	0.0	0.31	0.63	57.1
12	R	26	0.0	0.045	13.9	LOS A	0.2	1.2	0.45	0.73	54.9
Approach		27	0.0	0.045	13.8	LOS A	0.2	1.2	0.44	0.73	55.0
All Vehicles		447	9.6	0.165	8.6	NA	0.2	1.2	0.03	0.55	63.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2026 PM Shutdown with Step
Change

Newell Hwy & Bogan Rd - 2026 PM Shutdown with Step Change
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	56	7.0	0.032	11.3	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	153	19.4	0.088	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		208	16.1	0.088	3.0	NA	0.0	0.0	0.00	0.19	73.1
North: Bogan Rd											
8	T	128	19.8	0.074	1.1	LOS A	0.0	0.0	0.00	0.07	84.3
9	R	1	0.0	0.001	11.7	LOS A	0.0	0.0	0.31	0.63	57.3
Approach		129	19.6	0.074	1.2	NA	0.0	0.0	0.00	0.07	84.0
West: Bogan Rd											
10	L	2	0.0	0.004	11.8	LOS A	0.0	0.1	0.29	0.64	57.2
12	R	198	0.9	0.372	16.8	LOS B	2.0	14.3	0.59	0.91	51.6
Approach		200	0.9	0.372	16.7	LOS B	2.0	14.3	0.59	0.91	51.7
All Vehicles		538	11.3	0.372	7.7	NA	2.0	14.3	0.22	0.43	65.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
- 2015 AM Construction with 85%
Driver Rate

Bogan Rd & NPM Mine - 2015 AM Construction wit 85% Driver Rate
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov-ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	300	0.7	0.212	12.6	LOS A	1.0	7.1	0.09	0.67	63.7
2	T	2	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		302	0.7	0.212	12.5	NA	1.0	7.1	0.09	0.67	63.9
North: Bogan Rd											
8	T	2	0.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	19	0.0	0.013	12.1	LOS A	0.1	0.4	0.02	0.74	64.8
Approach		21	0.0	0.013	10.9	NA	0.1	0.4	0.02	0.67	67.6
West: NPM Access Rd											
10	L	5	0.0	0.009	11.6	LOS A	0.0	0.1	0.25	0.65	57.5
12	R	27	7.1	0.028	12.1	LOS A	0.1	0.7	0.27	0.67	57.4
Approach		33	6.0	0.028	12.0	LOS A	0.1	0.7	0.27	0.67	57.4
All Vehicles		356	1.1	0.212	12.4	NA	1.0	7.1	0.10	0.67	63.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Bogan Rd & NPM Access Rd
- 2015 PM - Construction with with
85 % Driver Rate

Bogan Rd & NPM Mine - 2015 PM Construction with 85% Driver Rate
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn y/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bogan Rd											
1	L	22	9.1	0.016	12.9	LOS A	0.1	0.5	0.03	0.70	64.3
2	T	6	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		28	7.1	0.016	10.0	NA	0.1	0.5	0.02	0.54	70.6
North: Bogan Rd											
8	T	5	0.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
9	R	3	0.0	0.002	12.1	LOS A	0.0	0.1	0.04	0.73	64.7
Approach		8	0.0	0.003	4.6	NA	0.0	0.1	0.01	0.27	84.5
West: NPM Access Rd											
10	L	12	0.0	0.018	11.0	LOS A	0.0	0.2	0.07	0.69	58.5
12	R	198	2.0	0.168	11.1	LOS A	0.7	4.9	0.09	0.69	58.4
Approach		209	1.9	0.168	11.1	LOS A	0.7	4.9	0.09	0.69	58.4
All Vehicles		246	2.4	0.168	10.8	NA	0.7	4.9	0.08	0.66	60.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2015 AM Mine Peak - Construction
- 85% Driver Rate

Newell Hwy & Bogan Rd - 2015 Construction with 85 % Driver Rate in AM Mine Peak

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	312	1.7	0.170	11.0	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	51	36.4	0.032	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		362	6.5	0.170	9.5	NA	0.0	0.0	0.00	0.63	61.2
North: Bogan Rd											
8	T	40	31.4	0.025	1.1	LOS A	0.0	0.0	0.00	0.06	84.3
9	R	5	0.0	0.005	12.3	LOS A	0.0	0.1	0.41	0.66	56.8
Approach		45	27.7	0.025	2.4	NA	0.0	0.1	0.05	0.13	79.9
West: Bogan Rd											
10	L	1	0.0	0.002	11.8	LOS A	0.0	0.0	0.30	0.63	57.2
12	R	26	0.0	0.044	13.6	LOS A	0.2	1.1	0.43	0.72	55.3
Approach		27	0.0	0.044	13.6	LOS A	0.2	1.1	0.43	0.72	55.3
All Vehicles		435	8.3	0.170	9.0	NA	0.2	1.1	0.03	0.58	62.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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MOVEMENT SUMMARY

Site: Newell Hwy & Bogan Rd -
2015 PM Construction with 85%
Driver Rate

Newell Hwy & Bogan Rd - 2015 PM Construction with 85% Driver Rate
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg Satn v/s	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newell Hwy											
1	L	76	7.0	0.043	11.3	LOS A	0.0	0.0	0.00	0.73	58.9
2	T	124	19.4	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		200	14.7	0.072	4.3	NA	0.0	0.0	0.00	0.28	70.6
North: Bogan Rd											
8	T	104	19.8	0.060	1.1	LOS A	0.0	0.0	0.00	0.07	84.3
9	R	1	0.0	0.001	11.6	LOS A	0.0	0.0	0.30	0.63	57.4
Approach		105	19.6	0.060	1.2	NA	0.0	0.0	0.00	0.07	83.9
West: Bogan Rd											
10	L	2	0.0	0.004	11.7	LOS A	0.0	0.1	0.27	0.64	57.4
12	R	207	0.9	0.360	15.7	LOS B	1.9	13.7	0.56	0.86	52.8
Approach		209	0.9	0.360	15.7	LOS B	1.9	13.7	0.56	0.86	52.9
All Vehicles		515	10.1	0.360	8.3	NA	1.9	13.7	0.23	0.47	64.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

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SIDRA INTERSECTION 5.1.12.2089

Project: C:\Users\Terry\Documents\12031-2 NPM.sip

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