Parkes Bypass

Traffic and transport assessment

Roads and Maritime Services | October 2018

NSW GOVERNMENT

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Roads and Maritime Services

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October 2018

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1 Introduction

1.1 Proposal identification

Roads and Maritime Services (Roads and Maritime) proposes to build a new 10.5-kilometre bypass about 1.5 to 2.0 kilometres west of the existing Newell Highway in Parkes, NSW (the proposal).

The proposal's key features include:

- A new two-lane bypass (one lane in each direction) with four key intersections comprising:
  - T-intersections where the new bypass connects to the existing highway near Barkers Road (south) and Maguire Road (north)
  - A staggered T-intersection at London Road
  - A four-way roundabout at Condobolin Road
- A bridge over the Broken Hill and Parkes to Narromine rail lines and Hartigan Avenue and a shared pedestrian/cycleway bridge over the Parkes Bypass connecting Victoria Street and Back Trundle Road
- An extension of Hartigan Avenue that would connect to Brolgan Road (west of the bypass) and Condobolin Road
- Changes to local roads to tie in with the new bypass.

Parkes is a strategic freight transportation location in NSW, situated at the intersection of the Newell Highway and the rail lines connecting Broken Hill and Parkes to Narromine. These rail lines run between Parkes and Perth and are suitable for long and double stacked freight trains. The Newell Highway within the Parkes town centre becomes a local road and is also known as Forbes Road and Bogan Street. Between the Hartigan Avenue level railway crossing and the Parkes town centre, there are four 90-degree bends along this section of the Newell Highway which impede the passage of heavy vehicles including Performance-Based Standard 3a (PBS3a) vehicles up to 36.5 metres in length. In addition, the level railway crossings near Welcome Road and the busier Hartigan Avenue crossing contribute to delay for vehicles travelling along the Newell Highway.

The proposal, by diverting the movement of heavy vehicles away from Parkes town centre, would avoid the heavy vehicle constraints in Parkes town centre and improve the interstate movement of freight.

1.2 Location of the proposal

Parkes is a strategic freight transportation location in NSW, Forbes is located approximately 30 kilometres south of the proposal via the Newell Highway. To the east of the proposal is the urban settlement of Orange, located over 90 kilometres via the Henry Parkes Way. To the north of the proposal lies Dubbo, the main urban centre of the Orana Region.

The southern end of the proposal begins south of Barkers Road, about 3 kilometres south of Parkes, whilst the northern end of the proposal reconnects with the Newell Highway near the Maguire Road intersection, around 4 kilometres north of Parkes.

From the southern end, the proposal branches off from the existing highway in the northerly direction whilst the existing highway continues in the north-easterly direction. Moving along in the northerly direction, the proposal intersects with London Road, where the proposal becomes parallel with the existing highway. At the proposed Condobolin Road intersection, the alignment begins to gradually move in the easterly direction until it reconnects with the existing Newell Highway.

Figure 1-1 below shows the location of the proposal.

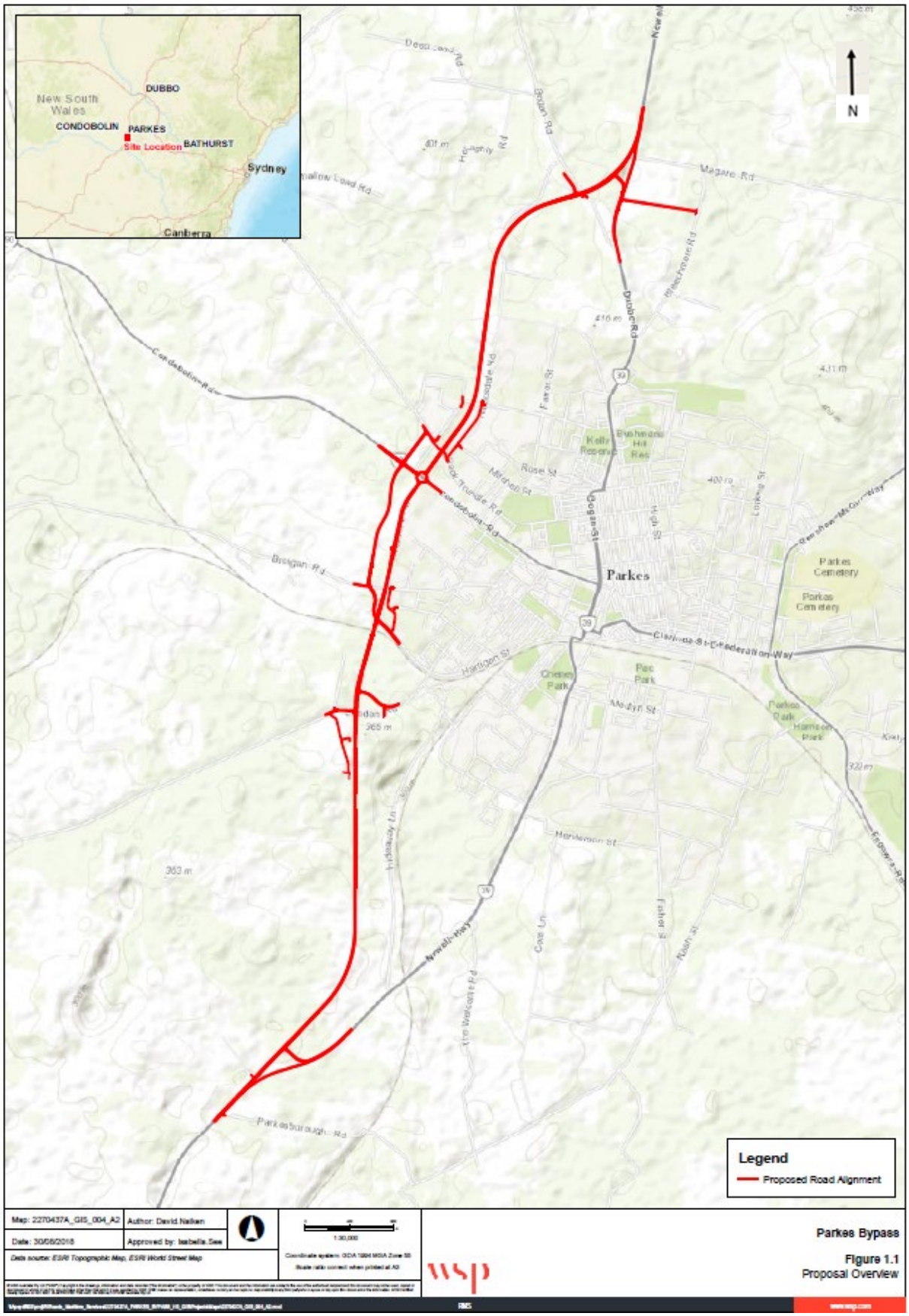


Figure 1-1 Proposed Parkes Bypass alignment

1.3 Purpose of the report

The main purpose of this report is to:

- Describe the existing traffic and transport conditions surrounding the proposal
- Assess the traffic and transport related impacts of the proposal during construction
- Assess the traffic and transport related impacts and benefits of the proposal during operation.

1.4 Report methodology

This traffic and transport assessment has been prepared with the data made available and does not include any intersection, microsimulation or mesoscopic traffic modelling. Spreadsheet modelling was undertaken to ascertain the redistribution of traffic on the road network with and without the proposed bypass. Origin-destination (OD) surveys undertaken in 2014 provided by Roads and Maritime were utilised to forecast likely bypass traffic use. This is further explained in section 3.3 of the report.

No site inspection was undertaken for this assessment with the report prepared via desktop analyses in consultation with the Roads and Maritime project team primarily relating to traffic volumes and traffic redistribution due to the bypass.

The methodology for undertaking this traffic and transport assessment includes:

- Undertaking a review of the concept design of the proposal
- Forecasting future road traffic likely to utilise the proposal
- Assessing the impacts of the proposal on traffic and transport during the construction and operation stages
- Assessing the cumulative traffic impacts of other proposed developments
- Obtaining traffic count and origin-destination (OD) data
- Estimating the impacts to travel times for road users with and without the proposal
- Assessing the impacts on active and public transport during the construction and operation stages
- Determining mitigation measures to remove or ameliorate any proposal related impacts.

2 Existing conditions

This section describes the existing conditions including the road network, public transport, active transport and road crash history in the study area.

2.1 Road network

The Newell Highway is a key arterial road serving not only the township of Parkes but also extensive rural areas of Victoria, New South Wales and Queensland. It is an essential road connection for the Central West region of NSW and is part of the Federal National Land Transport Network providing interstate travel, a regional link between towns and city centres, and a key link to domestic and export markets for agricultural products.

The total length of the Newell Highway is 1,058 kilometres south to north through NSW. The section of focus for the Parkes region is the Newell Highway between Hideaway Lane (south of Parkes) and Bogan Road (north of Parkes) as outlined in red in Figure 2-1.

Vehicles using the Newell Highway also encounter two level crossings near Welcome Road and Hartigan Avenue as shown with dashed orange lines in Figure 2-1. Currently there are approximately 28 daily rail services that traverse the level crossing at Hartigan Avenue with approximately seven daily services using the southernmost level crossing near Welcome Road. The level crossing at Hartigan Avenue crosses the Parkes–Narromine and Parkes–Broken Hill railway lines.

The existing road network that intersects the Newell Highway and the proposed bypass alignment are further described below.

Figure 2-1 Road network within Parkes

Table 2-1 Key intersecting roads along the existing Newell Highway

Road	Description
Newell Highway (A39)	• A key arterial road that travels between Victoria, New South Wales and Queensland. • It is the longest highway in NSW with 1,058 km length from south to north through the state inland. • Is part of the Federal National Land Transport Network. • Heavy vehicles account for more than 20% of the traffic.
Key intersecting roads along the existing Newell Highway (including Forbes Road and Bogan Street)	
Hartigan Avenue (refer to Figure 2-2)	• This intersection is an S-bend priority intersection with two sharp turns which cannot be safely navigated by PBS3a vehicles. Priority is given to northbound vehicles approaching from Forbes Road. Westbound vehicles must give way and have a dedicated left turn lane as well as a single through lane. Eastbound vehicles also need to give way and they have a dedicated right turn lane as well as a single through lane. There is no entry to the northern approach with a stop sign from the northern approach permitting vehicles to make a left turn only onto Hartigan Avenue.
Cecile Street (refer to Figure 2-3)	• There is a shared central turning lane on the approach to Cecile Street giving drivers access to residential driveways. The Cecile Street and Bogan Street intersection is a four-way priority intersection with priority given to movements on Bogan Street. There are dedicated right turn lanes for northbound and southbound vehicles on Bogan Street wanting to turn into Cecile Street. Turns from Cecile Street are dictated by give way conditions and allow both left, through and right movements.
Dalton Street (refer to Figure 2-4)	• This intersection is a priority-controlled seagull intersection with priority given to the movements along Bogan Street. The northbound vehicles have left and through movements available while southbound traffic has dedicated left, through and right turn lanes. Eastbound vehicles can turn left through a high angle slip lane or right and westbound vehicles are only able to turn left on to Bogan Street.
Mitchell Street and Clarinda Street (refer to Figure 2-5)	• This intersection is an S-bend priority intersection with two sharp turns which cannot be safely navigated by PBS3a vehicles. Priority is given to northbound vehicles moving from Bogan Street to Clarinda Street through the low angle continuous slip lane, while vehicles moving eastbound to Mitchell Street are controlled by a give way. Northbound vehicles can move left to Mitchell Street, right to Mitchell Street or continue through on Clarinda Street. Westbound and southbound vehicles have a dedicated right lane to Mitchell Street and a single lane continuing to Bogan Street. Eastbound vehicles from Mitchell Street can turn left or right from a give way.
Grenfell Street (MR61)	• This intersection is a priority controlled four-way cross intersection with priority given to the movements along Bogan Street. Grenfell Street connects with Parkes railway station, with links to Parkes town centre and further east joins Welcome Street, Short Street, Clarinda Street and Henry Parkes Way for travel to Orange.
Bushman Street	• This intersection is a priority controlled four-way cross intersection with priority given to the movements along Bogan Street. Bushman Street is an approved B-double road between Bogan Street and the Condobolin Road/Dalton Street intersection.

Figure 2-2 Forbes Road/Hartigan Avenue and Hartigan Avenue/Bogan Street

Figure 2-3 Bogan Street and Cecile Street

Figure 2-4 Bogan Street and Dalton Street

Figure 2-5 Bogan Street and Mitchell Street

Table 2-2 summarises the key roads for the proposal alignment.

Table 2-2 Key intersecting roads along the proposal alignment

Road	Description
Newell Highway (A39)	• A key arterial road that travels between Victoria, New South Wales and Queensland. • It is the longest highway in NSW with 1,058 km length from south to north through the state inland. • Is part of the Federal National Land Transport Network. • Heavy vehicles account for more than 20% of the traffic.
Key intersecting roads along the proposal alignment	
Barkers Lane (refer to Figure 2-6)	• A local unsealed 'no through road' providing access to local agricultural properties. • Intersects with the Newell Highway to the south of Parkes.
London Road (refer to Figure 2-8)	• Undivided two-lane two-way sealed road. • Provides east-west access across the bypass for Westlime Quarry, farming and rural properties, Parkes Golf Course and Parkes town centre.
Hartigan Avenue	• A classified road that runs perpendicular for part and parallel for part of the bypass. • Generally, a two-lane two-way road including a seven-metre-wide spray seal road surface and one metre wide gravel shoulder on both sides. • Includes a level railway crossing with boom barriers and flashing signals where it intersections the Newell Highway.
Brolgan Road	• A classified road that runs perpendicular to and intersects with the bypass. • Provides access to the proposed Parkes National Logistics Hub (PNLH) and Parkes town centre.
Condobolin Road	• A classified road that intersects the proposed bypass as a roundabout. • Generally, a two-lane two-way road including a seven-metre-wide spray seal road surface and a gravel shoulder on both sides.
Moulden Street	• A local road that would be realigned to connect Back Trundle Road and Condobolin Road • Connects with the newly created four-way intersection with Condobolin Road and Hartigan Avenue Extension • Two-lane two-way road that runs parallel to the proposed bypass.
Back Trundle Road	• A local road that provides access to Parkes Christian School, the residents of Shallow Rush and other western Parkes areas. • Runs perpendicular to is bisected by the proposed bypass (however a pedestrian/cycle bridge will be constructed at this location over the bypass). • Two-lane two-way including a six-metre-wide spray seal road surface and two metre gravel shoulders on both sides.
Victoria Street (refer to Figure 2-9)	• Runs perpendicular to and is bisected by the proposed bypass (however a shared pedestrian/cycleway bridge would be constructed at this location over the bypass). • Two-lane two-way including a six-metre-wide spray seal road surface and two metre gravel shoulders on both sides. • Connects with Back Trundle Road.
Henry Parkes Way	• Connects the Escort Way near Orange to Condobolin, intersecting the Newell Highway at Parkes. • Generally, a two-lane two-way road including a seven-metre-wide spray seal road surface and a gravel shoulder on both sides.

Road	Description
Thomas Street	• A local road that runs perpendicular to and is bisected by the proposed bypass. • Two-lane-two way with a spray seal road surface width of 3.8 metres and gravel shoulders on both sides.
Bogan Road	• A local road that runs to Northparkes mine. • Two-lane two-way with a seven-metre-wide spray seal road surface and 1.5-metre-wide gravel shoulders on both sides.

Figure 2-6 to Figure 2-10 shows the current types of road infrastructure and landscape along the proposed new road alignment.

Figure 2-6 Barkers Lane intersection with the existing Newell Highway, 6 kilometres south of Parkes

Figure 2-7 Local access road along the Travelling Stock Route (TSR) north of Brolgan Road

Figure 2-8 Heavy vehicle travelling along London Road towards Hartigan Avenue. The proposed road would be designed to accommodate this type of vehicle

Figure 2-9 Victoria Street, Parkes, looking south. Photo demonstrates types of existing local roads and steep gradient of existing road

Figure 2-10 Northern section of the proposed route of the new road. Existing TSR facing north

2.1.1 Intersection performance

There are several priority-controlled intersections along the existing Newell Highway through the Parkes town centre. Traffic volumes on the Newell Highway and the intersecting side streets are relatively low and it is anticipated that these intersections would have little or minimal delay. The performance of these intersections were not assessed as part of this study, however are anticipated to operate at good levels of service, with minimal vehicle delay and queueing.

2.1.2 Level rail crossings on the Newell Highway

Welcome Road level crossing

The Welcome Road level crossing bisects the Newell Highway approximately 4.5 kilometres south of Parkes as shown in Figure 2-11. The level crossing is located within a 110 km/h speed zone. A rail crossing warning sign is provided 500 metres before the level crossing with additional flashing signals and hazard sign located 250 metres before the level crossing. The crossing itself has stop lines, a flashing signal (no boom barriers) to warn road users of approaching trains. This level crossing has approximately seven rail movements daily. During the rail crossings, road traffic experience delays of a few minutes at a time depending on train lengths and road traffic volumes at that time of the day.

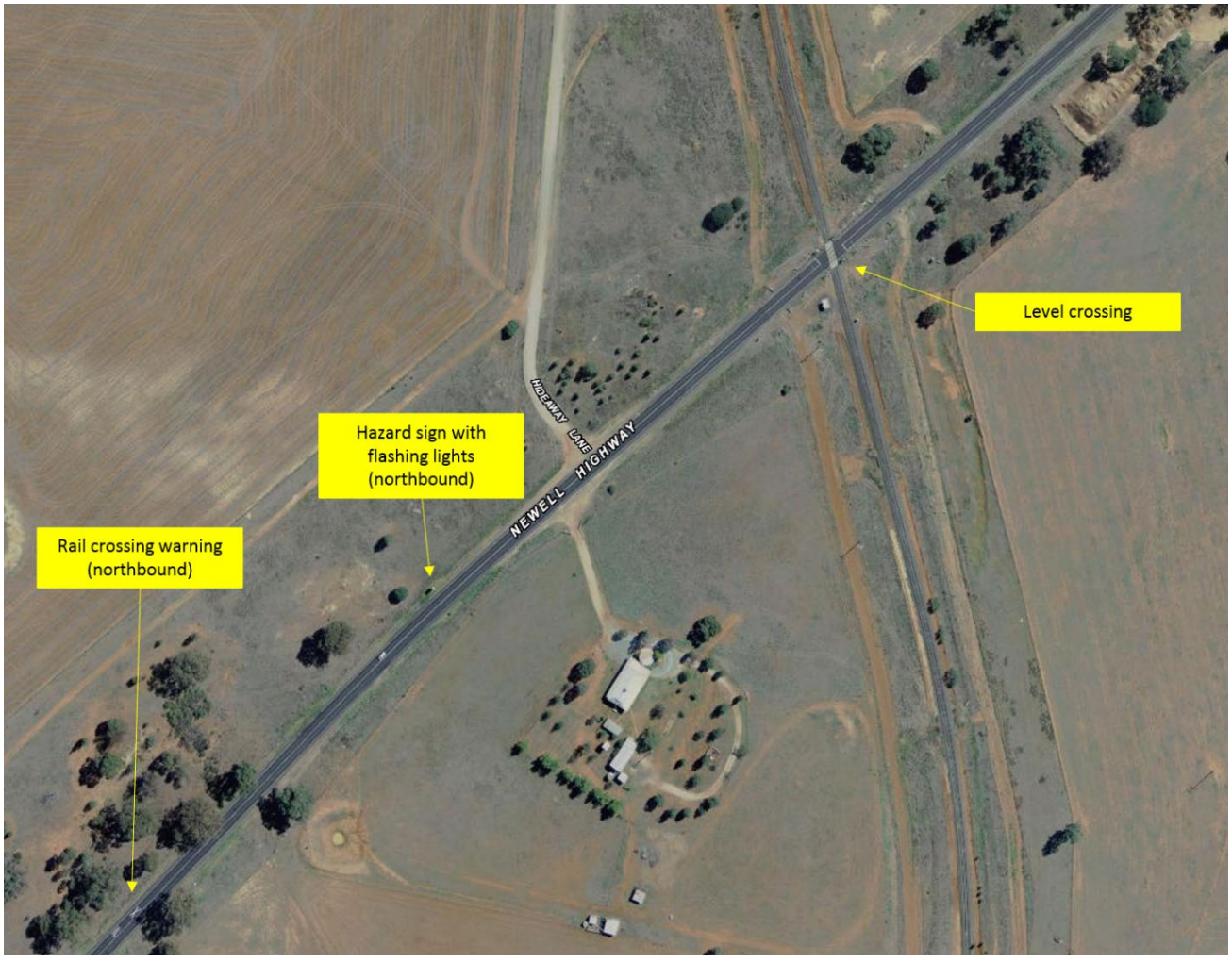


Figure 2-11 Welcome Road level crossing (crossing the Newell Highway)

Hartigan Avenue level crossing

The Hartigan Avenue level crossing is located 200 metres west of Parkes Train Station as shown in Figure 2-12. A rail crossing warning is provided approximately 100 metres from the level crossing in the northbound direction and 60 metres prior in the southbound direction. The speed limit on Forbes Road at this location is 50 km/h. The crossing itself has stop lines, flashing signals and boom barriers to warn road users of approaching trains. This level crossing has approximately 28 rail movements daily and during the rail crossings, road traffic experience with an average delay to vehicular traffic of approximately 2.5 minutes per train movement resulting in an average total delay of 70 minutes per day.

Figure 2-12 Hartigan Avenue level crossing (crossing Newell Highway)

2.1.3 Vehicle types

The existing road network in Parkes is dominated by the Newell Highway which bisects the town centre. A high proportion of vehicles through Parkes are heavy vehicles including High Productivity Vehicles (HPVs) which are generally longer heavy vehicles. The HPVs, consisting of 36.5 metres long road trains, B-triples and AB-triples, have insufficient capability to navigate three of the four tight 90 degree turns within the town. Heavy vehicles account for approximately 20 percent of road traffic on the Newell Highway in Parkes.

2.1.4 Regional freight

For over half a century, Parkes has been recognised as having significant potential as a major transport hub. Due to key transport infrastructure intersecting within Parkes, it is a strategic transport hub where the Newell Highway, connecting Melbourne and Brisbane by road crosses the Transcontinental Railway which connects the eastern seaboard to Perth by rail. Because of this strategic location, the Parkes Shire Council and State Government have rezoned 516 hectares of land on the western edge of town for the development of the PNLH. The PNLH site has been designed for 24 hour, seven days a week operation of a multi-modal transport facility.

2.2 Public transport

Parkes being a regional district does not have a significant public transportation network but does operate some public transport services in the study area.

2.2.1 Bus

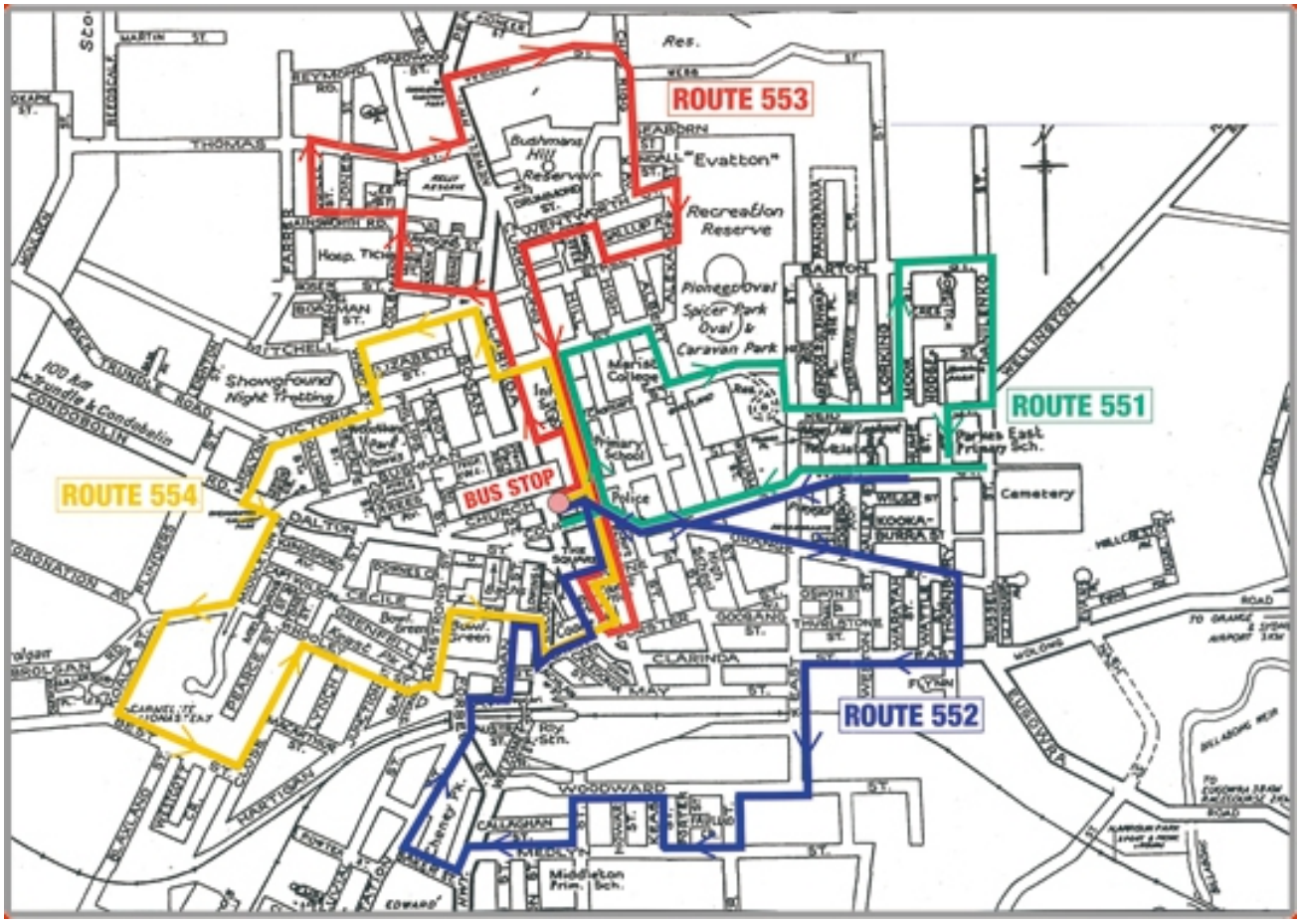
The main bus operator in the region is Western Road Liners which operates school services, town services and regional coach services.

There are 22 regular school services operated by Western Road Liners:

- Five services cover the town centre of Parkes and service all Parkes schools
- Eleven are dedicated to rural schools within the shire of Parkes and service all Parkes schools
- Six services are dedicated to Red Bend Catholic College Forbes and Forbes High School.

There are four town services running within Parkes all starting and ending at the Church Street bus stop as shown in Figure 2-13. The four routes – 551, 552, 553 and 554 – each have three services operating throughout the day totalling 12 services daily.

In addition to local and rural services, Western Road Liners is partnered with Transport for NSW TrainLink providing regional services connecting Parkes to Sydney, Dubbo and Lithgow. There is a total of five coach services operating daily between Parkes and these cities with one coach service passing through but not stopping in Parkes.



Source: Western Road Liners Website

Figure 2-13 Western Road Liners bus routes in Parkes

2.2.2 Rail

Parkes is an essential node for rail movements, particularly because it supports the transfer of freight from Sydney to Perth. Currently there are two passenger services per week operating to/from Parkes Station, one on Monday at 12.48 pm to Broken Hill and one on Tuesday at 2.43 pm to Sydney (Central). Additionally, there are two passenger services operating through the station, without stopping, on the way to or from Broken Hill. The remaining rail services are freight services.

Therefore, it is expected that the majority of the services passing through the level crossing will be freight trains and this is reflected in the extent of average delay figures. Assuming 24 of the 28 services are freight trains, there is approximately one freight train every hour over a daily period.

Additional level railway crossings are also located on London Road (Blaxland Street), Brolgan Road and Henry Parkes Way (west of Parkes).

2.3 Active transport

The Parkes Shire Council is actively seeking to promote the use of active transport through their Pedestrian and Cycling Strategy 2016 (Parkes Shire Council). This strategy focuses on providing safer methods of travel for pedestrians including pedestrian crossings, kerbs, refuges and stairs. In addition, Council is promoting the use of cycle ways by conducting studies on potential locations to add to their existing cycleway network. Figure 2-14 below shows the existing and proposed footpaths, shared paths and regular walking and cycling routes within Parkes.

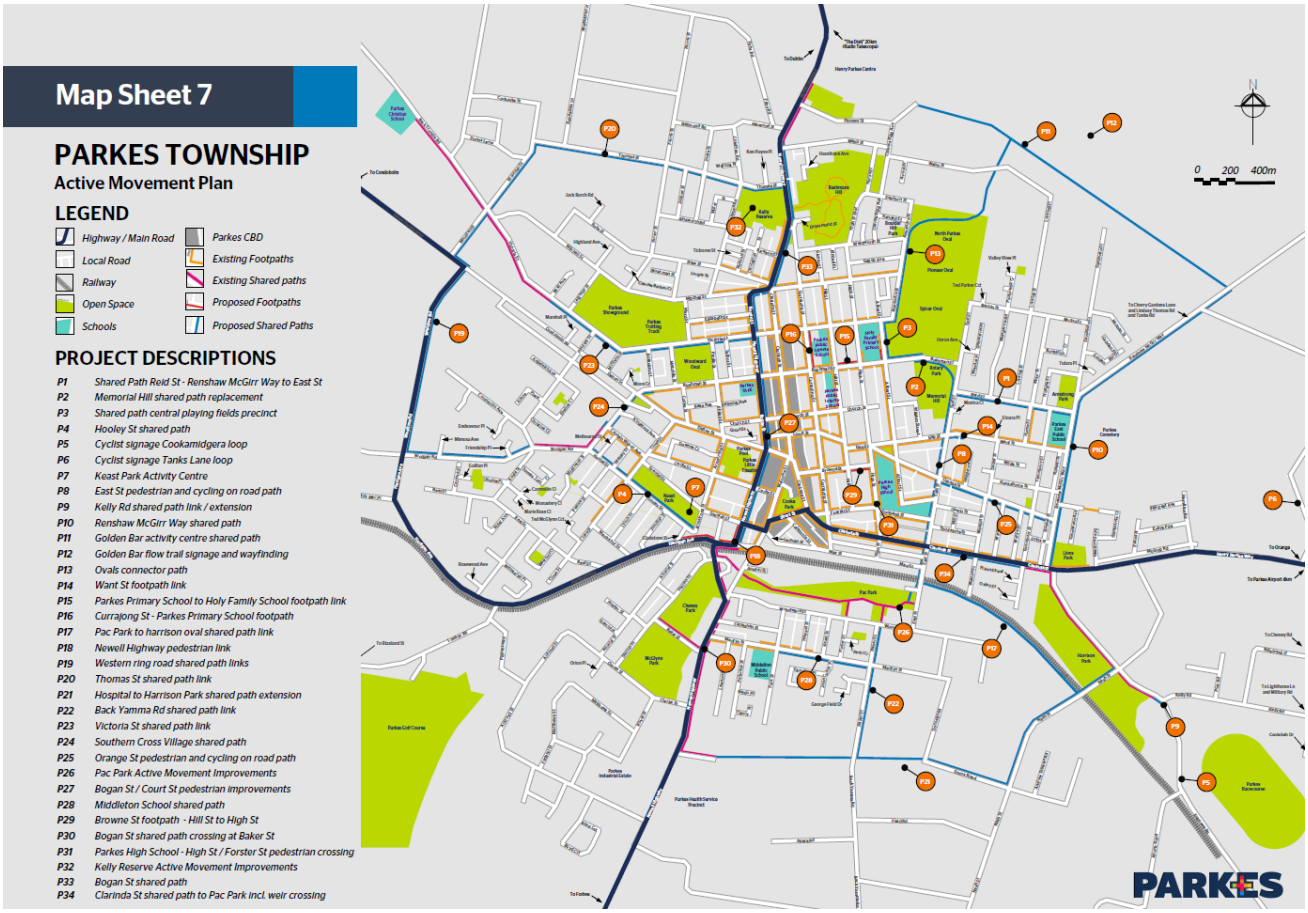


Figure 2-14 Active movement plan within Parkes Source: Parkes Pedestrian and Cycling Strategy (Parkes Shire Council, 2016)

The existing coverage of pedestrian footpaths and promotion of active movement is substantial across the Parkes region, particularly along the Newell Highway and local residential streets that connect with the Newell Highway. Existing footpaths are shown as orange lines in Figure 2-14 above.

Existing cycling access is not as extensive but there are shared pedestrian and cycle paths for some segments of the Newell Highway, particularly at either end of the suburban region. There are shared paths on the Newell Highway from Clarke Street to Hartigan Avenue and another from Webb Street to Pioneer Street both on the eastern side of the road. A shared path is also located on Back Trundle Road and Victoria Street on the southern side of the road. Existing shared paths are shown as pink lines in Figure 2-14 above.

2.4 Traffic volumes

This section describes the traffic volumes on the road network from the following sourced or collected counts:

- Traffic counts collected on behalf of WSP at 10 mid-block locations on the Newell Highway in December 2016
- Roads and Maritime and Parkes Shire Council traffic count data at various locations as documented in Table 2-4.

2.4.1 Mid-block traffic counts undertaken in December 2016

Traffic counts were undertaken for WSP from 6 to 12 December 2016 at 10 mid-block locations as shown in Figure 2-15.

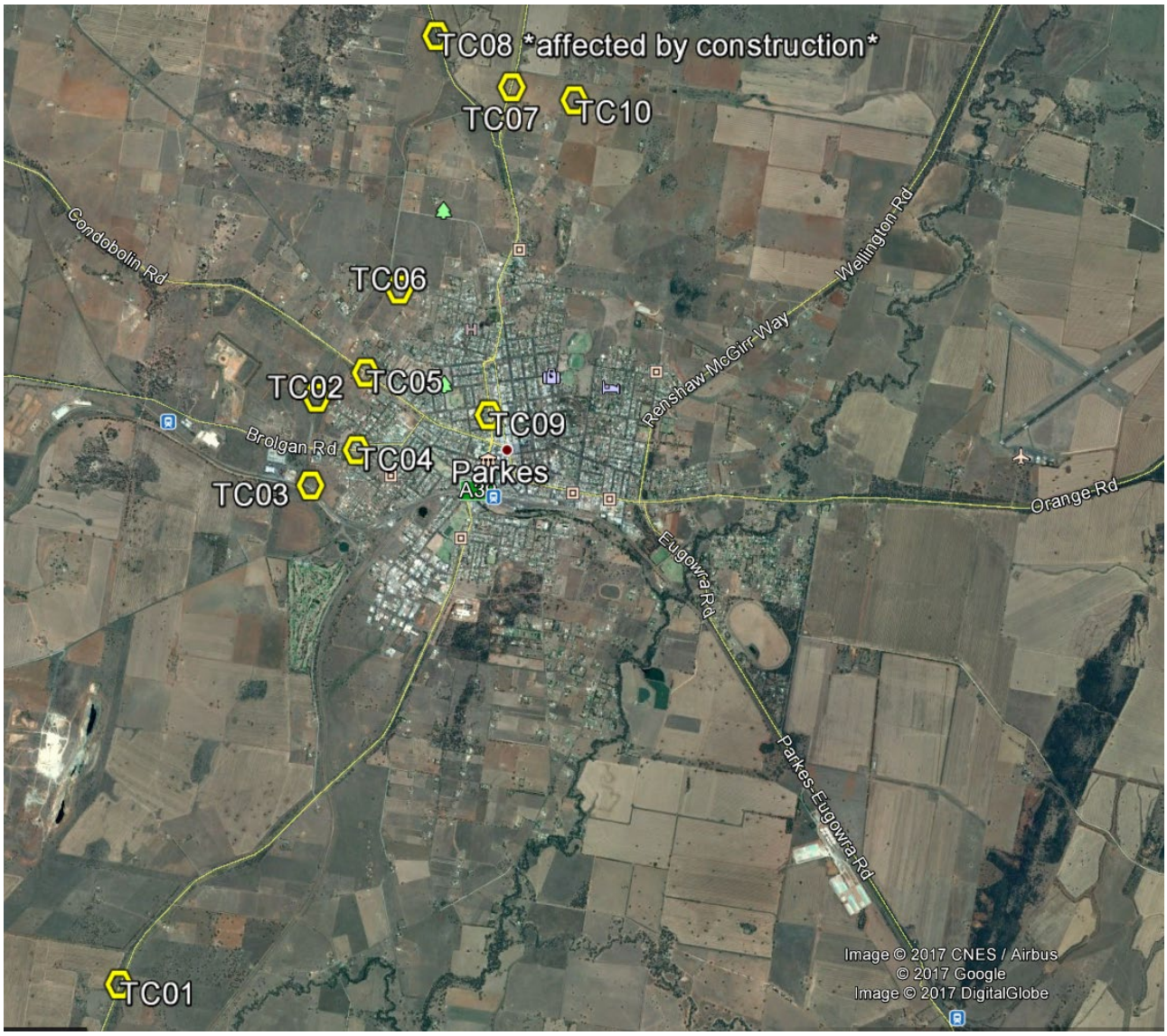


Figure 2-15 Mid-block traffic count locations in Parkes (December 2016)

The count results are summarised in Table 2-3. The table shows the following features:

- Average daily traffic volumes during the weekday are higher than average volume during the weekend.
- The average daily traffic volume on the Newell Highway observed on a weekday is between 4,000 and 5,000 vehicles per day with around 19 percent heavy vehicles. Bogan Road (TC08) demonstrated a similar heavy vehicle proportion despite traffic volumes being abnormally low, affected by road construction activity.
- Comparing two survey locations on Newell Highway, the northern site (TC07) and the southern site (TC01) have traffic volumes of 4,000 to 5,000 vehicles per weekday, respectively. The heavy vehicle volume at the southern site (TC01) is also around 20 percent higher than in the northern site (TC07). More heavy vehicles are recorded on the southern section of the Newell Highway.

- All intersecting roads of the Newell Highway have traffic volume no more than daily 2,000 vehicles per weekday, and have a heavy vehicle proportion of no more than 21 percent.

Table 2-3 Traffic count summary for existing conditions (December 2016)

Survey site			Average weekday traffic volume (Veh/Day)			Average weekly traffic volume (Veh/Day)		
Site	Road	Location	All vehicles	Heavy vehicles	Heavy vehicle %	All vehicles	Heavy vehicles	Heavy vehicle %
TC 01	Newell Highway	North of Grey Dove Lane	5,042	982	19%	4,792	918	19%
TC 02	Westlime Road	South of Coronation Avenue	943	194	21%	846	160	19%
TC 03	Hartigan Avenue	South of Billy Mac Place	1,182	205	17%	1,032	175	17%
TC 04	Brolgan Road	West of Friendship Place	1,369	115	8%	1,289	97	8%
TC 05	Condobolin Road	Between Westlime Road and Flinders Street	1,684	182	11%	1,559	155	10%
TC 06	Thomas Street	East of Reedsdale Road	497	78	16%	459	71	16%
TC 07	Newell Highway	Between Maguire Road and Nock Road	4,020	818	20%	3,892	753	19%
TC 08	Bogan Road	Between Deep Lead Road and Reedsdale Road	1,294	261	20%	1,117	213	19%
TC 09	Bogan Street	Outside Property 60	10,132	926	9%	9,364	848	9%
TC 10	Bleechmore Road	Between Maguire Road and Nock Road	173	11	7%	164	10	6%

2.4.2 Traffic counts from other sources

Traffic counts from other sources include:

- In August 2012, Roads and Maritime conducted a cross-boundary traffic counts survey in Parkes. The survey sites included the Newell Highway to Forbes and Dubbo, as well as Henry Parkes Way to Orange.
- In July to September 2014, Roads and Maritime undertook an Origin-Destination (OD) survey in Parkes, which covered the major travel routes through Parkes.
- From 5 March to 15 May 2014, Parkes Shire Council performed continuous tube counts on Brolgan Road and Westlime Road.
- In April and May 2017, Roads and Maritime carried out a three-week survey on Back Trundle Road and Condobolin Road.

Additional traffic counts from other sources are shown in Figure 2-16 and Table 2-4 and further explained and documented in **Appendix A**.

Traffic counts from other sources are summarised in Table 2-4 and location shown in Figure 2-16.

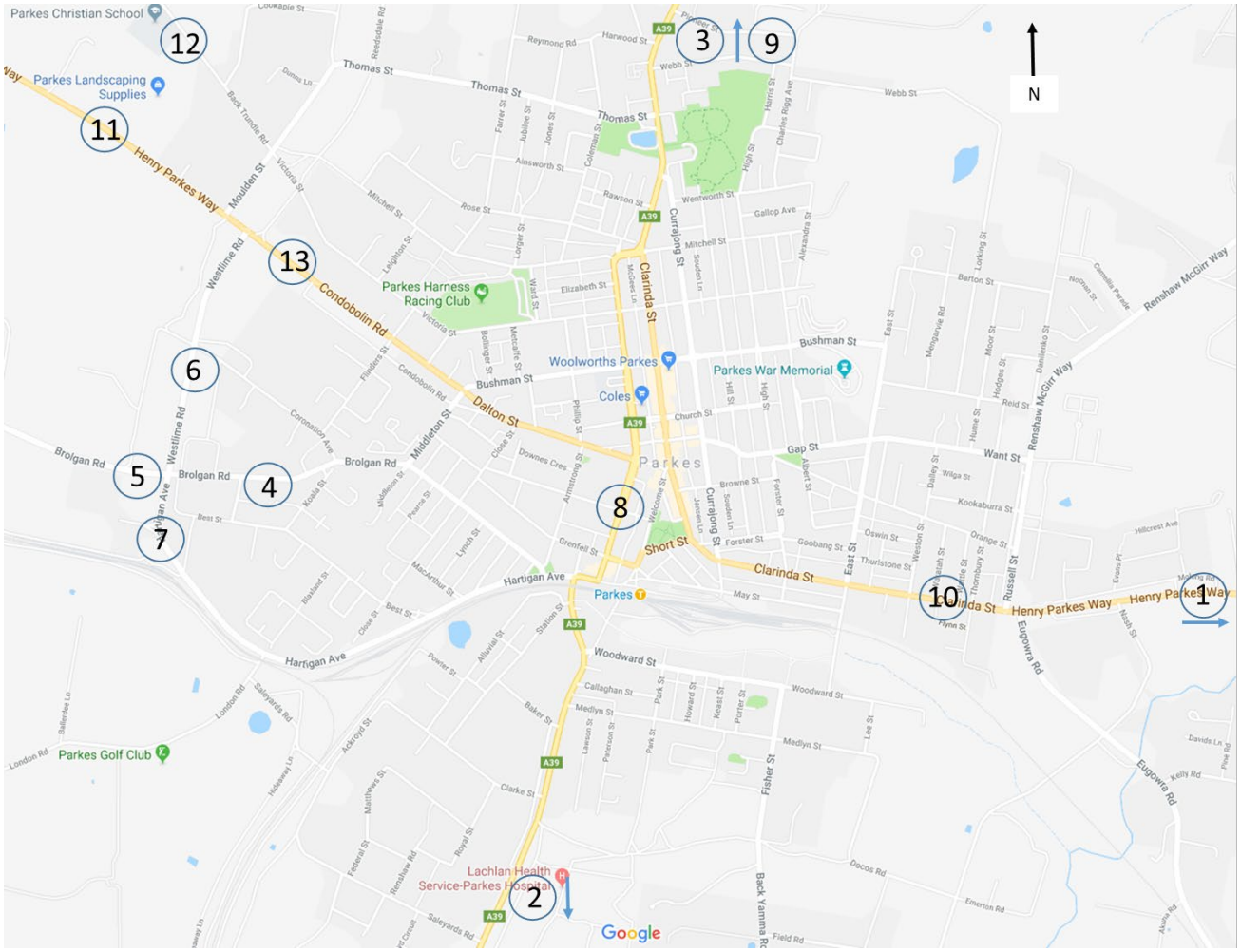


Figure 2-16 Mid-block traffic count locations in Parkes sourced from Roads and Maritime and Parkes Shire Council (various dates)

Table 2-4 Traffic count summary from various sources

No.	Road name	Location	Average weekday traffic volume (Veh/Day)			Average weekly traffic volume (Veh/Day)			Survey time
			All vehicle	Heavy vehicle	Heavy vehicle%	All vehicle	Heavy vehicle	Heavy vehicle %	
1	Henry Parkes Way	10 m west of Billabong Creek, east Parkes	2,175	413	19%	1,998	336	17%	2 August to 20 August 2012
2	Newell Highway	Forbes/Parkes LGA Boundary	4,004	1,039	26%	3,689	923	25%	31 March to 24 April 2012
3	Newell Highway	Narromine/Parkes LGA Boundary	2,902	949	33%	2,731	857	31%	31 March to 24 April 2012
4	Brolgan Road	East of Westlime Road	737	106	14%	696	90	13%	5 March to 15 May 2014

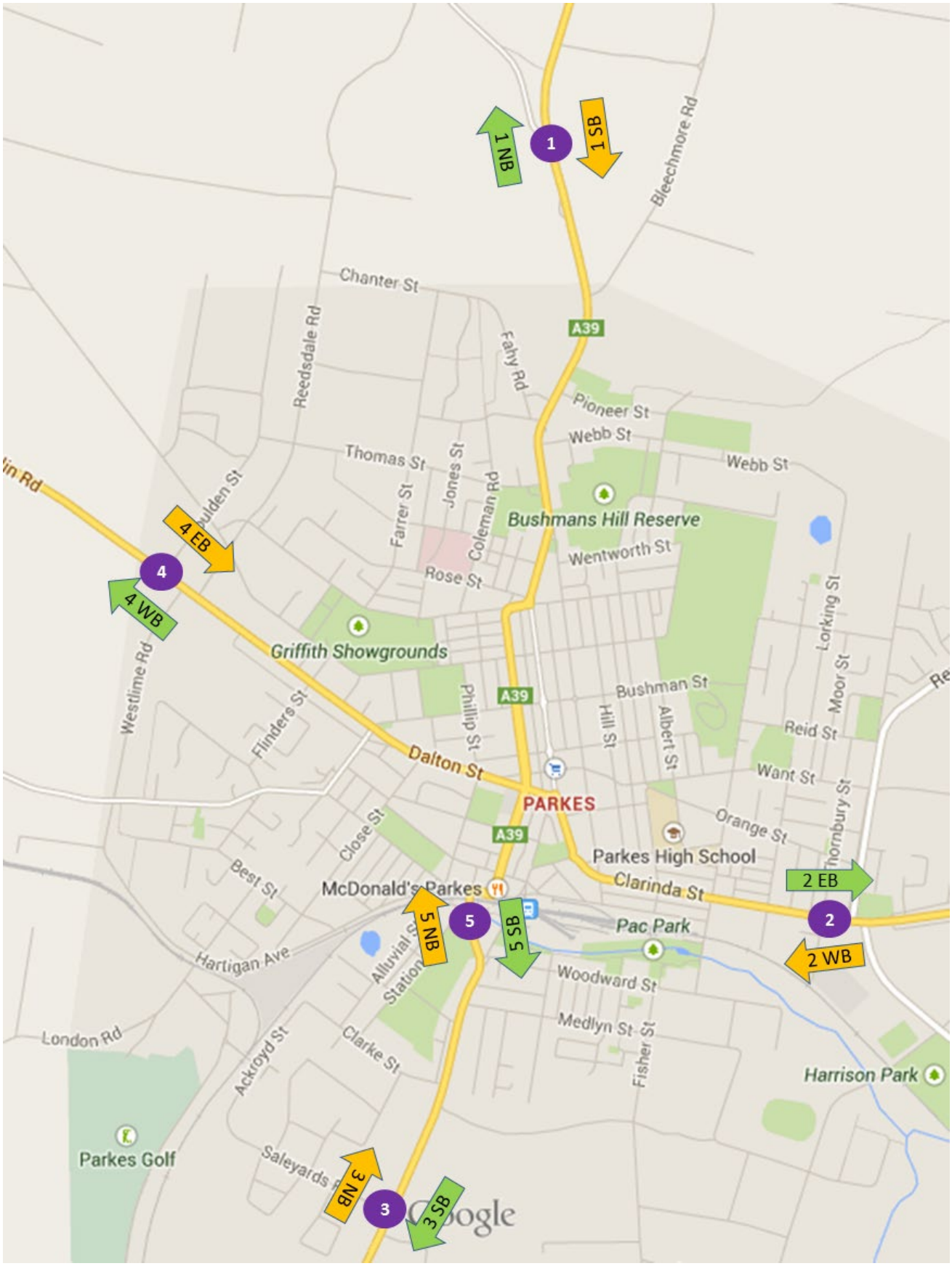
No.	Road name	Location	Average weekday traffic volume (Veh/Day)			Average weekly traffic volume (Veh/Day)			Survey time
			All vehicle	Heavy vehicle	Heavy vehicle%	All vehicle	Heavy vehicle	Heavy vehicle %	
5	Brolgan Road	West of Westlime Road	833	190	23%	791	155	20%	5 March to 15 May 2014
6	Westlime Road	North of Brolgan Road	556	139	25%	510	112	22%	5 March to 15 May 2014
7	Westlime Road	South of Brolgan Road	652	231	35%	564	184	33%	5 March to 15 May 2014
8	Newell Highway	100 m north of Cecile Street	9,286	1,275	14%	8,446	1,127	13%	15 August to 11 September 2014
9	Newell Highway	5 km north of Parkes	3,782	899	24%	3,608	837	23%	20 August to 11 September 2014
10	Henry Parkes Way	West of Russell Street	5,440	767	14%	5,260	656	12%	20 August to 10 September 2014
11	Condobolin Road	West of Moulden Street	1,334	233	17%	1,274	214	17%	20 August to 2 September 2014
12	Back Trundle Road	Eastern 40 km/h school zone approach to Christian School	810	70	9%	695	60	9%	May 2017
13	Condobolin Road	East of Moulden Street	1,493	283	19%	1,387	230	17%	May 2017

2.5 Origin-Destination surveys

An origin-destination (OD) survey was undertaken by Skyhigh Traffic Surveys on behalf of Roads and Maritime in 2014. Five OD survey locations were nominated with the aim of determining vehicle route choice to and from key travel routes within Parkes. Count stations were located at the following locations and as shown in Figure 2-17 below:

- OD1: Newell Highway at Bogan Road intersection
- OD2: Clarinda Street west of Renshaw McGirr Way
- OD3: Newell Highway at Saleyards Road intersection
- OD4: Condobolin Road west of Westlime Road
- OD5: Newell Highway south the Hartigan Avenue level crossing.

The OD survey data has been utilised for this assessment to forecast likely bypass traffic volumes.



Source: Roads and Maritime (2014)

Figure 2-17 Origin-destination survey locations

The OD survey indicated the following results during the weekday AM peak (8.00–10.00 am) as shown in Table 2-5.

Table 2-5 2014 Origin-destination survey results weekday AM peak (8.00–10.00 am)

OD station to OD station	All vehicles (lv and hv)	Light vehicles (lv)	Heavy vehicles (hv)	Total from OD station	From OD station 1 to 3 & 3 to 1 (%)	Average from OD station 1 to 3 & 3 to 1 (%)
From 1 to 1	89	87	2	1 to 1, 2, 3 & 4: 213 (all vehicles) 1 to 1, 2, 3 & 4: 181 (light vehicles) 1 to 1, 2, 3 & 4: 32 (heavy vehicles)	1 to 3: 42% (all vehicles) 1 to 3: 37% (light vehicles) 1 to 3: 71% (heavy vehicles)	43% (all vehicles) 35% (light vehicles) 82% (heavy vehicles)
From 1 to 2	25	20	5			
From 1 to 3	89	66	23			
From 1 to 4	10	8	2			
From 3 to 1	108	64	44	3 to 1, 2, 3 & 4: 243 (all vehicles) 3 to 1, 2, 3 & 4: 195 (light vehicles) 3 to 1, 2, 3 & 4: 48 (heavy vehicles)	3 to 1: 45% (all vehicles) 3 to 1: 33% (light vehicles) 3 to 1: 92% (heavy vehicles)	
From 3 to 2	0	0	0			
From 3 to 3	125	122	3			
From 3 to 4	9	8	1			

Source: Roads and Maritime (2014)

Table 2-5 indicates that on average 43 percent of all vehicles captured at selected OD station travel to and from or vice versa between OD Station 1 (Newell Highway at Bogan Road intersection) and OD Station 3 (Newell Highway at Saleyards Road intersection) during the 2 hour AM peak.

The OD survey indicated the following results during the weekday PM peak (4.00–6.00 pm).as shown in Table 2-6.

Table 2-6 2014 Origin-destination survey results weekday PM peak (4.00–6.00 pm)

OD station to OD station	All vehicles (lv and hv)	Light vehicles (lv)	Heavy vehicles (hv)	Total from OD station	From OD station 1 to 3 & 3 to 1 (%)	Average from OD station 1 to 3 & 3 to 1 (%)
From 1 to 1	14	14	0	1 to 1, 2, 3 & 4: 117(all vehicles) 1 to 1, 2, 3 & 4: 90 (light vehicles) 1 to 1, 2, 3 & 4: 26 (heavy vehicles)	1 to 3: 56% (all vehicles) 1 to 3: 46% (light vehicles) 1 to 3: 91% (heavy vehicles)	62% (all vehicles) 54% (light vehicles) 91% (heavy vehicles)
From 1 to 2	34	32	2			
From 1 to 3	65	41	24			
From 1 to 4	3	3	0			
From 3 to 1	90	59	31	3 to 1, 2, 3 & 4: 130 (all vehicles) 3 to 1, 2, 3 & 4: 96 (light vehicles) 3 to 1, 2, 3 & 4: 34 (heavy vehicles)	3 to 1: 69% (all vehicles) 3 to 1: 62% (light vehicles) 3 to 1: 90% (heavy vehicles)	
From 3 to 2	0	0	0			
From 3 to 3	34	32	2			
From 3 to 4	6	5	1			

Source: Roads and Maritime (2014)

Table 2-6 indicates that on average 62 percent of all vehicles captured at selected OD station travel to and from or vice versa between OD Station 1 (Newell Highway at Bogan Road intersection) and OD Station 3 (Newell Highway at Saleyards Road intersection) during the during the 2-hour PM peak.

The OD survey indicated the following results over a 24-hour weekday period as shown in Table 2-7.

Table 2-7 2014 Origin-destination survey results weekday 24-hour period

OD station to OD station	All vehicles (lv and hv)	Light vehicles (lv)	Heavy vehicles (hv)	Total from OD station	From Od station 1 to 3 & 3 to 1 (%)	Average from od station 1 to 3 & 3 to 1 (%)
From 1 to 1	262	254	8	1 to 1, 2, 3 & 4: 1,090 (all vehicles) 1 to 1, 2, 3 & 4: 793 (light vehicles) 1 to 1, 2, 3 & 4: 297 (heavy vehicles)	1 to 3: 56% (all vehicles) 1 to 3: 45% (light vehicles) 1 to 3: 83% (heavy vehicles)	58% (all vehicles) 47% (light vehicles) 87% (heavy vehicles)
From 1 to 2	182	149	33			
From 1 to 3	607	359	247			
From 1 to 4	39	30	9			
From 3 to 1	854	511	343	3 to 1, 2, 3 & 4: 1,410 (all vehicles) 3 to 1, 2, 3 & 4: 1,032 (light vehicles) 3 to 1, 2, 3 & 4: 378 (heavy vehicles)	3 to 1: 61% (all vehicles) 3 to 1: 49% (light vehicles) 3 to 1: 91% (heavy vehicles)	
From 3 to 2	0	0	0			
From 3 to 3	504	478	27			
From 3 to 4	51	44	7			

Source: Roads and Maritime (2014)

Table 2-7 indicates that on average 58 percent of all vehicles captured at selected OD station travel to and from or vice versa between OD Station 1 (Newell Highway at Bogan Road intersection) and OD Station 3 (Newell Highway at Saleyards Road intersection) daily.

Traffic counts undertaken at OD stations as shown in Table 2-8 indicate that a capture rate of the OD traffic survey was approximately 60–80 percent for the AM peak period, 30–40 percent for the PM peak period and 50–60 percent daily. The capture rate is the percentage of all vehicles that are captured from the OD survey from one OD count station to another OD count station compared to the total of all vehicles that travel through the OD count station which are not necessarily captured at another OD count station.

Table 2-8 2014 traffic volumes over a weekday 24-hour period at OD station locations

Time	Traffic volumes (all vehicles)							
	Site OD1 nb	Site OD1 sb	Combined OD1 nb and sb	Od count OD1 (Capture rate %)	Site OD3 nb	Site OD3 sb	Combined OD3 nb and sb	Od count OD3 (Capture rate %)
AM peak (8.00–10.00 am)	289	293	582	To OD1 NB: 230 (79%) From OD1 SB: 213 (73%)	409	386	795	To OD3 NB: 264 (65%) From OD3 SB: 243 (63%)
PM peak (4.00–6.00 pm)	325	297	622	To OD1 NB: 134 (41%) From OD1 SB: 117 (39%)	404	376	780	To OD3 NB: 121 (30%) From OD3 SB: 130 (35%)
Daily (24 hours)	2,290	1,789	4,079	To OD1 NB: 1,306 (57%) From OD1 SB: 1,090 (61%)	2,785	2,476	5,261	To OD3 NB: 1,336 (48%) From OD3 SB: 1,410 (57%)

Source: Roads and Maritime (2014)

2.6 Travel time surveys

Travel time surveys were conducted at the same time as the origin-destination (OD) surveys undertaken by Skyhigh Traffic Surveys on behalf of Roads and Maritime in 2014. Timings were recorded at the same five OD survey locations as shown in Figure 2-17. Table 2-9 summarises the travel time findings on key travel routes between OD1 and OD3 which are likely to be road users which bypass Parkes utilising the Newell Highway to the north and south of Parkes. Average travel times were also sourced from Google Maps for comparative purposes between the same OD count stations. This distance is approximately 5.5 kilometres in length travelled on road between the two OD count stations.

Table 2-9 2014 Travel times from OD surveys and Google Maps

From	To	OD survey min travel time (minutes)	OD survey max travel time (minutes)	OD survey Avg travel time (minutes)	Google maps Avg travel time (minutes)	Direction of travel
OD1 Newell Highway at Bogan Road	OD3 Newell Highway at Saleyards Road	5	17	7	7	N–S
OD3 Newell Highway at Saleyards Road	OD1 Newell Highway at Bogan Road	3	18	6	7	S–N

Source: Roads and Maritime (2014)

Travel times for northbound traffic recorded between the Newell Highway at Saleyards Road intersection (OD3 station) and the Bogan Road intersection (OD1 station) indicates an average travel time of seven minutes (which is approximately 0.8 kilometres travelled in one minute which equates to a travel speed of 47 km/h). Travel times for southbound traffic from station OD1 to OD3 was similar at an average of six minutes (which is approximately 0.9 kilometres travelled in one minute at a travel speed of 55 km/h). Longer travel times of 17–18 minutes were also recorded and these are likely due to vehicles stopping within Parkes or vehicles being delayed due the level railway crossing at Hartigan Avenue.

2.7 Crash data review

Crash data for the Newell Highway in Parkes was obtained from the Roads and Maritime for a 5-year period between January 2012 and December 2016 to understand existing crash history.

The location and severity of crashes recorded on the Newell Highway between Parkesborough Road and Maguire Road is presented in Figure 2-18.

2.7.1 Newell Highway

The number and severity of crashes recorded over the latest 5-year period along the Newell Highway between Parkesborough Road and Maguire Road is shown in Figure 2-18.

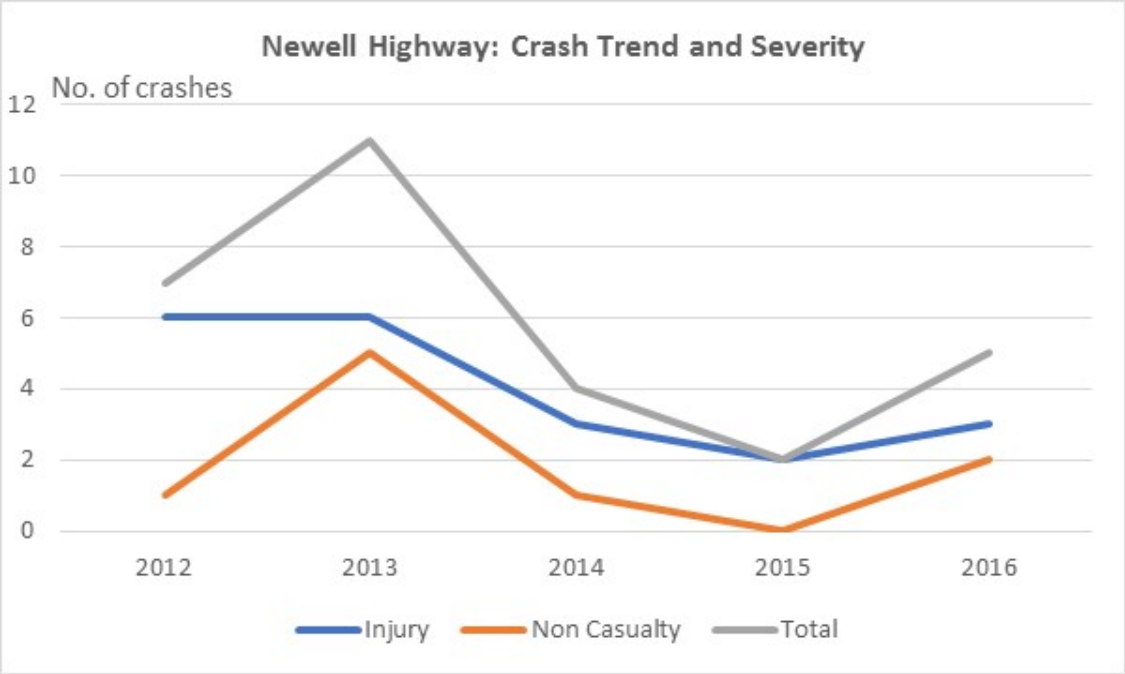


Figure 2-18 Newell Highway between Parkesborough Road and Maguire Road: Crash Trend and Severity (2012–2016)

The key findings from the analysis of the crash statistics for the Newell Highway are summarised below:

- In total, 29 crashes were recorded on this section of the Newell Highway during this period.
- There were no fatal crashes. 20 (69 percent) crashes resulted in an injury and 9 (31 percent) resulted in only property damage. The number of injury crashes peaked at six in 2012/2013 and fell to three in 2016. The number of non-casualty crashes has remained relatively stable at one or two per year over the 5-year period with the exception of five in 2013.

- Over the five-year analysis period 13 (45 percent) crashes involved a heavy vehicle. Heavy vehicle represented 9 percent of the traffic mix on Newell Highway within Parkes city centre and 19–20 percent along rural sections to the south and north of Parkes city centre in 2016.
- Four crashes led to serious injury, three of which involved heavy vehicles
- 86 percent of crashes occurred during daylight hours and 79 percent under dry weather conditions.
- 21 percent of crashes occurred during 4.00 pm–5.00 pm and 24 percent during 8.00 am–10.00 am, which shows a strong relationship between peak traffic volumes and crashes.

Historical traffic data supplied by the Roads and Maritime indicates that the total traffic volume is likely to increase on the Newell Highway. However, despite growth in traffic volumes, the total number of crashes overall shows a falling trend from a high of 11 crashes in 2013 to five crashes in 2016. This could be due to road safety measures or strategies implemented aiding to reduce crashes in this area or section of road.

Roads and Maritime crash data supplied for the Newell Highway is summarised below.

- Six crashes occurred along the Newell Highway south of Hartigan Avenue between the southern starting point of the bypass and Woodward Street during the five-year period.
- Six crashes occurred along the Newell Highway north of Mitchell Street between the northern stating point of the bypass and Mitchell Street during the five-year period.
- The remaining 17 crashes (58 percent) were distributed along the Newell Highway within Parkes town centre between Mitchell Street and Woodward Street all of which happened at intersections.

3 Proposal details

3.1 Proposal description

The proposal involves building the Parkes Bypass, which is a new 10.5 kilometres long bypass that would divert heavy vehicle traffic out of Parkes town centre. It would be built about 1.5 kilometres to 2.0 kilometres west of the existing Newell Highway and include one lane in each direction. The bypass would depart from the existing Newell Highway alignment to the south of Barkers Road and would re-join the existing Newell Highway alignment to the north of Parkes near Maguire Road. Figure 3-1 shows the key features of the proposal.

Key features of the proposal would include:

- A new two-lane bypass (one lane in each direction) with four key intersections comprising:
  - T-intersections where the new bypass connects to the existing highway near Barkers Road (south) and Maguire Road (north)
  - A staggered T-intersection at London Road
  - A four-way roundabout at Condobolin Road
- A bridge over the Broken Hill and Parkes to Narromine rail lines and Hartigan Avenue and a shared pedestrian/cycleway bridge over the Parkes Bypass connecting Victoria Street and Back Trundle Road
- An extension of Hartigan Avenue that would connect to Brolgan Road (west of the bypass) and Condobolin Road
- Changes to local roads to tie in with the new bypass.

Figure 3-1 Parkes Bypass proposal

3.2 Objectives and benefits

The objectives and benefits of the proposal are to:

- 1. Enable safe access for PBS3a freight vehicles through Parkes to improve freight efficiency and productivity
- 2. Improve safety of the railway level crossings and reduce or eliminate the travel delays caused by railway operations
- 3. Facilitate future connectivity improvements to Parkes Logistics Hub as and when the traffic demand warrants
- 4. Improve the amenity and pedestrian access in Parkes in the vicinity of the existing Newell Highway alignment (secondary objective).

3.3 Traffic on the bypass and local road network

3.3.1 Proposal timing and background traffic growth

The proposed opening year of the bypass is 2023 and the design year is 2033.

A yearly traffic growth rate of 2 percent per annum for light vehicles and 2.4 percent per annum for heavy vehicles has been applied for this assessment. This equates to 12 percent growth for light vehicles and 14.4 percent growth for heavy vehicles from 2017 to 2023 and 32 percent growth for light vehicles and 38.4 percent growth for heavy vehicles from 2017 to 2033.

3.3.2 Forecast bypass traffic

Utilising the OD survey data discussed in section 2.5, traffic forecasted to utilise the proposed Bypass based upon the OD surveys as follows:

- 32 percent of **all vehicle traffic** including 24 percent of **all light vehicle traffic** and 67 percent of **all heavy vehicle traffic** would utilise the Bypass based upon external to external travel daily.
- 29 percent of **all vehicle traffic** including 23 percent of **all light vehicle traffic** and 54 percent of **all heavy vehicle traffic** would utilise the Bypass based upon external to external travel during the weekday AM peak (8.00–10.00 am).
- 22 percent of **all vehicle traffic** including 16 percent of **all light vehicle traffic** and 72 percent of **all heavy vehicle traffic** would utilise the Bypass based upon external to external travel during the weekday PM peak (4.00–6.00 pm).
- 46 percent of **all vehicle traffic** including 39 percent of **all light vehicle traffic** and 74 percent of **all heavy vehicle traffic** would utilise the Bypass based upon 25 percent of Parkes traffic utilising the Bypass instead of the existing Newell Highway to access Parkes via Condobolin Road intersection daily.

Figure 3-2 and Figure 3-3 show the forecast traffic distribution and traffic volumes schematically with the inclusion of the bypass in 2023 and 2033.

Table 3-1 provides the daily traffic summary for the existing Newell Highway under 2017 traffic volumes.

Table 3-2 and Table 3-3 provide daily forecast traffic volumes under 2023 and 2033 traffic volumes respectively.

Tables 3-2 and 3-3 indicate that:

- 46 percent of **all vehicles** will utilise the Bypass and the remaining 54 percent the existing Newell Highway
- 31 percent (of the 46 percent) of **all vehicles** on the Bypass would be light vehicles
- 15 percent (of the 46 percent) of **all vehicles** on the Bypass would be heavy vehicles
- 39 percent of **all light vehicles** will utilise the Bypass and the remaining 61 percent the existing Newell Highway
- 74 percent of **all heavy vehicles** will utilise the Bypass and the remaining 26 percent the existing Newell Highway.

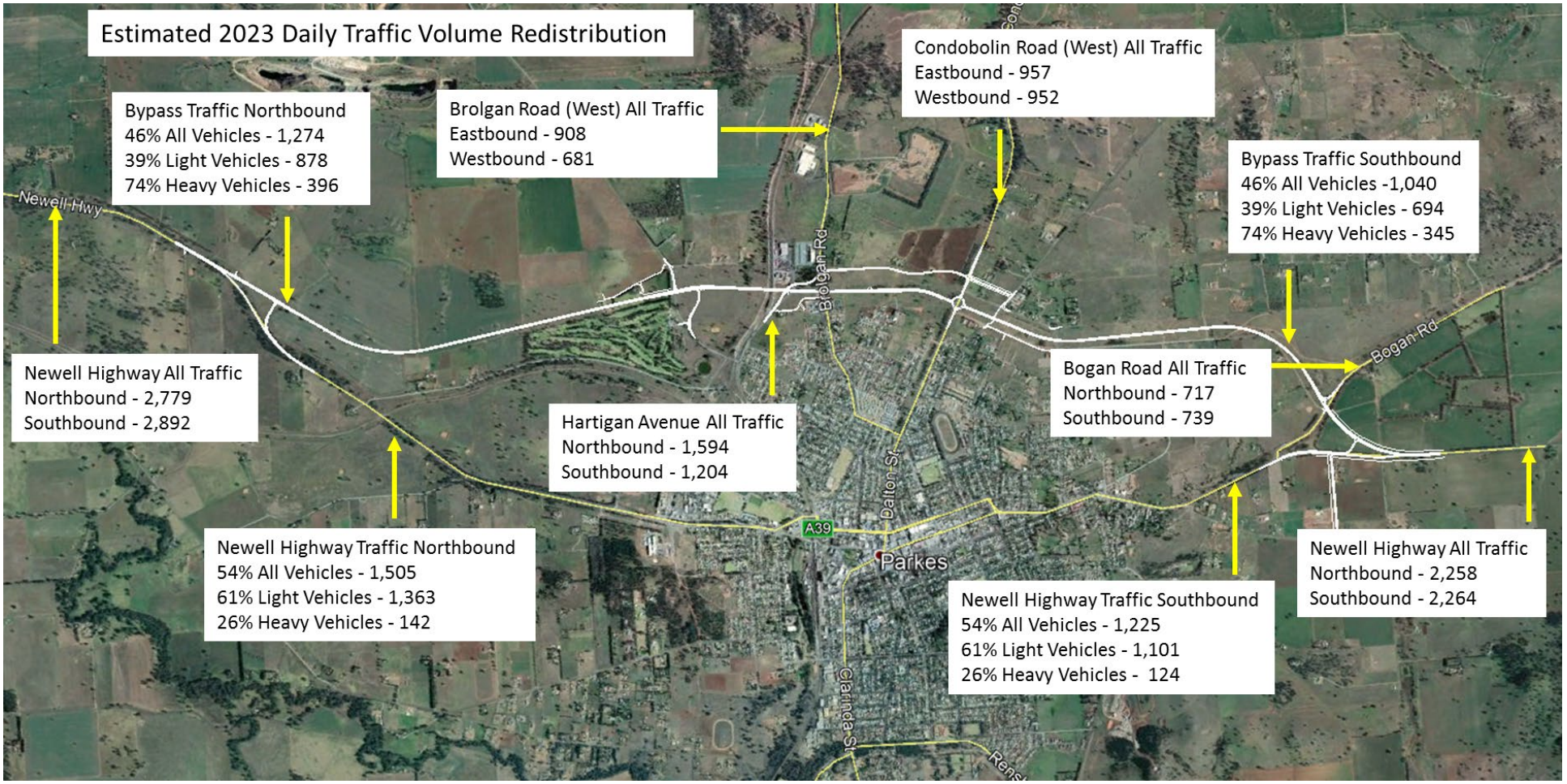


Figure 3-2 Forecast daily traffic distributions with the inclusion of the Parkes Bypass – 2023

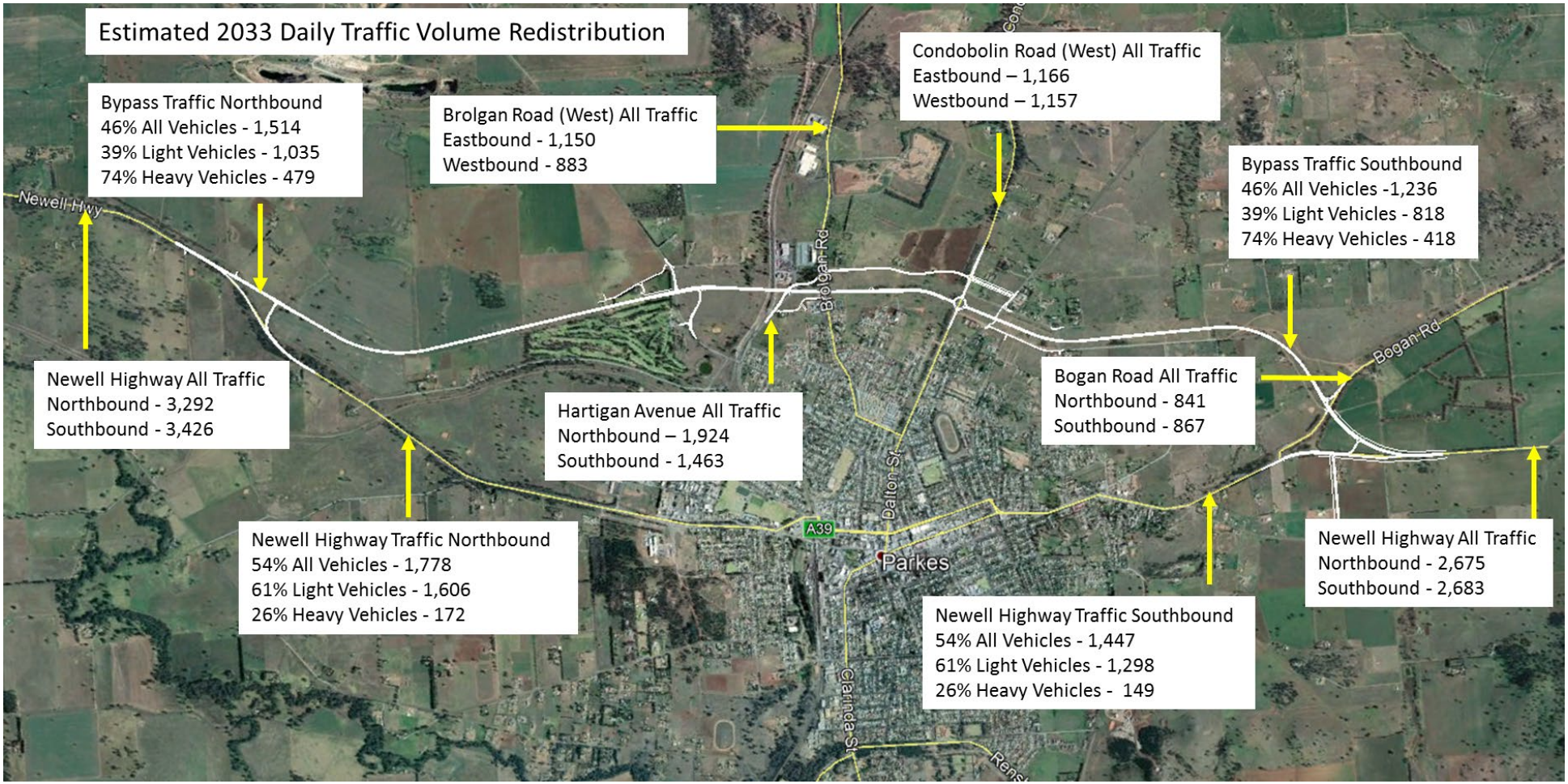


Figure 3-3 Forecast daily traffic distributions with the inclusion of the Parkes Bypass – 2033

Table 3-1 Newell Highway Daily Traffic Volume Summary (2017)

Traffic Count Location		Northbound			Southbound		
		Existing Newell Highway Traffic Volumes (No Bypass)					
		Average weekday traffic volume (Vehicles/Day)					
Road	**Location**	**All vehicles**	**Light vehicles**	**Heavy vehicles**	**All vehicles**	**Light vehicles**	**Heavy vehicles**
Newell Highway	Near Bogan Road	2,007	1,599	408	2,013	1,603	410
Newell Highway	Near Barkers Road	2,471	2,001	470	2,571	2,071	500

Table 3-2 Newell Highway and Proposed Bypass Daily Traffic Volume Summary (2023)

Traffic Count Location		Northbound													Southbound										
		Existing Newell Highway Traffic Volumes (No Bypass)			Existing Newell Highway Traffic Volumes with Proposed Bypass					Proposed Bypass Traffic Volumes					Existing Newell Highway Traffic Volumes (No Bypass)			Existing Newell Highway Traffic Volumes with Proposed Bypass					Proposed Bypass Traffic Volumes				
		Average weekday traffic volume (Vehicles/Day)																								
Road	**Location**	**All vehicles**	**Light vehicles**	**Heavy vehicles**	**All vehicles**	**Light vehicles**	**Light vehicles (%)**	**Heavy vehicles**	**Heavy vehicles (%)**	**All vehicles**	**Light vehicles**	**Light vehicles (%)**	**Heavy vehicles**	**Heavy vehicles (%)**	**All vehicles**	**Light vehicles**	**Heavy vehicles**	**All vehicles**	**Light vehicles**	**Light vehicles (%)**	**Heavy vehicles**	**Heavy vehicles (%)**	**All vehicles**	**Light vehicles**	**Light vehicles (%)**	**Heavy vehicles**	**Heavy vehicles (%)**
Newell Highway	Near Bogan Road	2,258	1,791	467	1,215 (54%)	1,146	64%	69	15%	1,043 (46%)	645	36%	398	85%	2,264	1,795	469	1,225 (54%)	1,101	61%	124	26%	1,039 (46%)	694	39%	345	74%
Newell Highway	Near Barkers Road	2,779	2,241	538	1,505 (54%)	1,363	61%	142	26%	1,274 (46%)	878	39%	396	74%	2,892	2,320	572	1,338 (46%)	1,285	55%	53	9%	1,554 (54%)	1,035	45%	519	91%

Table 3-3 Newell Highway and Proposed Bypass Daily Traffic Volume Summary (2033)

Traffic Count Location		Northbound													Southbound										
		Existing Newell Highway Traffic Volumes (No Bypass)			Existing Newell Highway Traffic Volumes with Proposed Bypass					Proposed Bypass Traffic Volumes					Existing Newell Highway Traffic Volumes (No Bypass)			Existing Newell Highway Traffic Volumes with Proposed Bypass					Proposed Bypass Traffic Volumes				
		Average weekday traffic volume (Vehicles/Day)																								
Road	**Location**	**All vehicles**	**Light vehicles**	**Heavy vehicles**	**All vehicles**	**Light vehicles**	**Light vehicles (%)**	**Heavy vehicles**	**Heavy vehicles (%)**	**All vehicles**	**Light vehicles**	**Light vehicles (%)**	**Heavy vehicles**	**Heavy vehicles (%)**	**All vehicles**	**Light vehicles**	**Heavy vehicles**	**All vehicles**	**Light vehicles**	**Light vehicles (%)**	**Heavy vehicles**	**Heavy vehicles (%)**	**All vehicles**	**Light vehicles**	**Light vehicles (%)**	**Heavy vehicles**	**Heavy vehicles (%)**
Newell Highway	Near Bogan Road	2,675	2,111	565	1,426 (54%)	1,349	64%	77	14%	1,250 (46%)	762	36%	488	86%	2,683	2,116	567	1,447 (54%)	1,298	61%	149	26%	1,236 (46%)	818	39%	418	74%
Newell Highway	Near Barkers Road	3,292	2,641	650	1,778 (54%)	1,606	61%	172	26%	1,514 (46%)	1,035	39%	479	74%	3,426	2,734	692	1,560 (46%)	1,508	55%	52	8%	1,865 (54%)	1,225	45%	640	92%

3.3.3 Road network changes

Table 3-5 lists the new linking roads that would be built and the local road changes that would be carried out for the proposal to support the operation of the Parkes Bypass.

Table 3-4 Road network changes

Road network changes	Description
Road adjustments/realignments	• A realignment of Moulden Street would be done between Back Trundle Road and Henry Parkes Way (Condobolin Road). • The section of London Road west of the bypass would be relocated to the north. • The section of London Road east of the bypass would be relocated to the south. • Billy Mac Place intersection with Hartigan Avenue to be upgraded.
Link roads	• Hartigan Avenue would be extended under the bypass through to Condobolin Road and Moulden Street. Access to the bypass would be via the four-way roundabout. • A local road connection between Back Trundle Road, Thomas Street and Mitchell Street would be constructed • A local road connection between Hartigan Avenue, Best Street and Brolgan Road would be constructed
Road and access closures	• Brolgan Road will be split forming two separate roads, Brolgan Road and Brolgan Road West. • Closure of Thomas Street on both sides. • Closure of private access routes that currently cross the TSR. • Closure of Maguire Road at the western end with Nock Street used as an alternate route

3.4 Construction stage

This section provides a summary of the likely methodology, staging, work hours, plant and equipment, and associated activities that would be used to build the proposal. For the purpose of this assessment, an indicative construction methodology is provided.

The detailed construction staging plans and methods would be determined by the contractor after completion of the detailed design. The actual method may vary from the description in this section due to:

- Identification and location of underground utilities and services
- On-site conditions identified during pre-construction activities
- Ongoing refinement of the detailed design
- Outcomes of community consultation including submissions on the REF.

3.4.1 Work methodology

Staging

The proposal would be likely built in sections and stages to reflect contractor, material and equipment availability. The staging process would also allow for effective site and environmental management from the point of not placing too much demand on the ancillary facilities and haul routes. It is also possible that certain sections of the bypass would be built at the same time.

Proposal work activities

Table 3-5 summarises the likely construction activities and their sequencing for the construction of the Parkes Bypass, as well as the plant and equipment that would be likely used to build the proposal. The plant and equipment needed to build the proposal would be typical to any major road construction site. It would vary depending on the construction activity. The construction activities and plant and equipment list would be finalised by the contractor following detailed design.

Table 3-5 Indicative construction activities

Activity	Associated work	Indicative plant and equipment	
Preparation and enabling	• Obtain leases and licences • Complete property acquisition • Survey the construction site • Relocate fencing • Notify the community and stakeholders before work starts • Establish the site compounds and access routes • Fence the site boundaries and areas to be used for stockpile sites • Protect sensitive areas as defined by the REF and the construction environmental management plan • Install temporary erosion, sediment and water quality controls, including silt fences, and stormwater diversion drains • Mark trees that would need to be removed or trimmed, and mark any 'no-go' areas • Install traffic management controls including any road closures and diversions • Install noise mitigation measures and safeguards.	• Light vehicles • Trucks • Excavators • Generators • Graders • Site sheds	• Back hoes • Water carts • Cranes • Hand tools • Low loaders
Utilities	• Adjust/relocate utility infrastructure (water, Gas, electricity and telecommunications) where required.	• Light vehicles • Trucks • Hand tools • Concrete saws	• Generators • Back hoes • Water carts • Elevated work platforms (EWP)
Surface preparation	• Remove and mulch vegetation in stages along the new road alignment • Strip and stockpile topsoil in stages • Prepare the surface using graders, dozers and other equipment.	• Light vehicles • Trucks • Excavators • Chainsaws • Mulchers • Rollers	• Generators • Back hoes • Water carts • Cranes • Hand tools
Blasting	• Blasting of hard rock material • Removal of spoil material	• Drill rig • Trucks	• Light vehicles • Hand tools

Activity	Associated work	Indicative plant and equipment	
Earthworks	• Excavate cuttings • Create fill embankments • Place select materials • Construct roadside cuts and fill batters • Prepare batter treatments • Erect batters for rail overpass • Dispose of unsuitable and/or surplus material from the proposal site.	• Excavators • Dump trucks • Compactors • Graders • Front-end loaders • Rollers	• Water carts • Profilers • Bulldozers • Vibratory rollers • Rock breakers
Site construction of bridges	• Site preparation • Construction of abutments • Place bridge girders using crane • Construct bridge deck and kerbs • Complete road approaches for new bridge.	• Concrete trucks • Concrete pumps • Generators • Hand tools	• Trucks • Cherry pickers • Welding equipment • Cranes
Drainage	• Install/extend culverts • Install catch drains • Install scour protection.	• Excavators • Concrete pumps • Concrete trucks • Graders	• Trucks • Bulldozers • Cranes
Road surface	• Gravel base/sub-base layers and asphaltic concrete paving • Apply spray-seal.	• Concrete trucks • Concrete pumps • Vibratory rollers • Compactors • Concrete saws • Compressors • Bitumen sprayers	• Generators • Milling machines • Trucks • Asphalt paving machines • Asphalt trucks • Rollers • Batch plants
Tie in and road markings	• Remove section of old road surface at each intersection and complete road widening and tie-in the new road to existing roads.	• Light vehicles • Trucks • Hand tools	• Generators • Line marking machines
Finishing works	• Conclude property access • Complete tie-ins • Install safety barriers • Install kerbs, gutters and verges • Rehabilitate disturbed areas and landscape in accordance with the landscaping planting strategy • Install line marking, signs and guide posts • Decommission temporary facilities (e.g. compound sites) • Clean-up the site and dispose of all surplus waste materials • Installation of street lighting and signage.	• Generators • Trucks	• Cranes • Light vehicles

3.4.2 Construction hours and duration

It is anticipated that construction would start in 2020 and would take about three years to complete. This duration would be subject to funding, weather, securing the necessary access to build over the railway

line and coordinating with other activities and events in Parkes. Construction would be largely carried out in accordance with standard construction working hours:

- Monday to Friday: 7.00 am to 6.00 pm
- Saturday: 8.00 am to 1.00 pm
- Sundays and public holidays: no work.

To minimise disruption to daily traffic and disturbance to surrounding land owners and businesses, it would be necessary to carry out some work outside of these hours. The following activities are likely to be carried out outside standard construction working hours:

- Placement of asphalt
- Intersection and tie-in activities
- Deliveries of oversized materials or equipment
- Delivery and installation of bridge girders
- Line marking
- Installation and adjustment of barriers and signage for construction zones during each construction stage
- Work within the rail corridor.

Workforce

While about 300 to 400 people would be needed to carry out the main construction activities, it is expected that there would be about 100 people onsite at any time depending on the staging.

3.4.3 Source and quantity of materials

Various standard construction materials that are readily available across NSW would be needed to build the proposal. They would be either transported to site as prefabricated units, ready for installation, or the materials would be held at one of the site compounds. The main material needed to build the proposal in addition to the imported fill would comprise:

- Top soil and subsoil, including general and select fill
- Cement, bitumen, and asphalt, including spray seals, for the road pavement
- Prefabricated concrete units and infrastructure for kerbing, drainage infrastructure (pipes, pits and culverts), barriers, paving and signage footings
- Stone, aggregate, quarried materials for the road base and sub-base road surface materials
- Steel for bridge girders and barrier railings
- Prefabricated steel infrastructure in the form of signage, lighting posts, fencing and other road infrastructure
- Trees, seedlings, chippings and turf to support revegetation
- Additional materials such as relatively small quantities of paint, oils, fuels and other materials.

All excavated materials would be managed under the following hierarchy:

- Reuse as engineering fill onsite
- Transfer to another Roads and Maritime project for use as engineering fill
- Storage at a Roads and Maritime stockpile site to allow for its future reuse

- Transfer to another construction site for use as engineering fill
- Transfer to a licenced waste recovery site where reasonable
- Disposal at a licenced facility.

3.4.4 Traffic management and access

Traffic management and access controls would be developed during the detailed design and implemented under a construction traffic management plan.

Staging and traffic management

The purpose of building the proposal in stages is to reduce any impacts on operational traffic on the Newell Highway and surrounding local roads. The staging process will be confirmed by the construction contractor. Certain work activities would also likely take place at night to minimise any traffic-related impacts.

A traffic management plan would be prepared in accordance with the *Traffic Control at Work Sites Manual Version 4* (RTA, 2010) and approved by Roads and Maritime before implementation. The traffic management plan would provide details of the traffic management to be implemented during construction to ensure traffic flow on the surrounding network is maintained where possible.

Property access

Property accesses would be maintained as far as practicable throughout construction and there would be no disruption to bus services. Heavy vehicle movements on local roads would be minimised as far as possible and restricted to designated transport routes.

Construction and delivery traffic and workforce vehicles

The proposal would generate heavy vehicle movements at regular intervals during the construction period. These heavy vehicle movements would mainly be associated with:

- Delivery of construction materials
- Site compound construction
- Water delivery
- Spoil and waste removal
- Delivery and removal of construction equipment and machinery.

Table 3-6 provides the indicative number and timing of construction traffic movements. These numbers would be confirmed during the detailed design.

Table 3-6 Indicative construction traffic movements

Vehicle types and association	Use	Vehicle daily numbers		Typical movement pattern
		Average	Maximum	
Rigid trucks 12.5 metres 30 tonnes general mass limit (GML)	Earthworks (cut and fill) Aggregate delivery Road base delivery Sand delivery Asphalt delivery Cement delivery Fly ash delivery Precast concrete delivery	95	130	Spaced throughout the day
Semi-trailers 19 metres 42 tonnes GML	Steel Prefabricated units Oversized units	Occasional: potentially up to 50 over the course of the construction program.		
Incidental deliveries	Various	2	5	
Light vehicles				
Workforce	N/A	100	300	Typically, at the start and end of the end of the working day between 6.00 am and 7.00 am, and 6.00 pm and 7.00 pm
Incidental deliveries	Various	2	5	Spaced throughout the day

Parking

The contractor would be required to include off-road parking provisions within the proposal footprint. Construction workers would be prevented from parking on public roads during construction.

3.5 Operation stage

3.5.1 Design

The Bypass has been designed to the following criteria as shown in Table 3-7 and Figure 3-4.

Table 3-7 Bypass design characteristics

Criteria	Description
Speed limit	Design speed limit: • 120 km/h north of Back Trundle Road and south of London Road • 90 km/h in the middle section of the bypass • 60 km/h on the extension of Hartigan Avenue to Moulden Street. Posted speed limit: • 110 km/h north of Back Trundle Road and south of London Road • 80 km/h in the middle section of the bypass • 50 km/h on the extension of Hartigan Avenue to Moulden Street.
Cross section	• Lane width – 3.5 m (minimum). • Shoulder width – 2 m (one shoulder on each side). • Centreline – 1 m median (may be of varying width). • Verge – 1 m. • Reserve fence lines – 60 m (30 m each way from the centreline). • Provision of a standard clear zone with any plantings outside of this. • The slope of the fill batters varies from 6:1 to 2:1. • The slope of the cut batters – 2:1.
Design vehicle	PBS3a vehicles up to 36.5 m in length.
Grade	Maximum of 2.5% grade for the bridge over the rail lines and Hartigan Avenue.
Road surface type	Spray-seal in the north and south section and asphalt in the middle section
Cycle and pedestrian facility	• No formal facilities provided for the new bypass road. • Cyclist/pedestrian access along the new bypass road would be via the widened shoulders. • Provision for a 2.5 m wide shared pedestrian/cycleway on the bridge linking Victoria Street and Back Trundle Road.

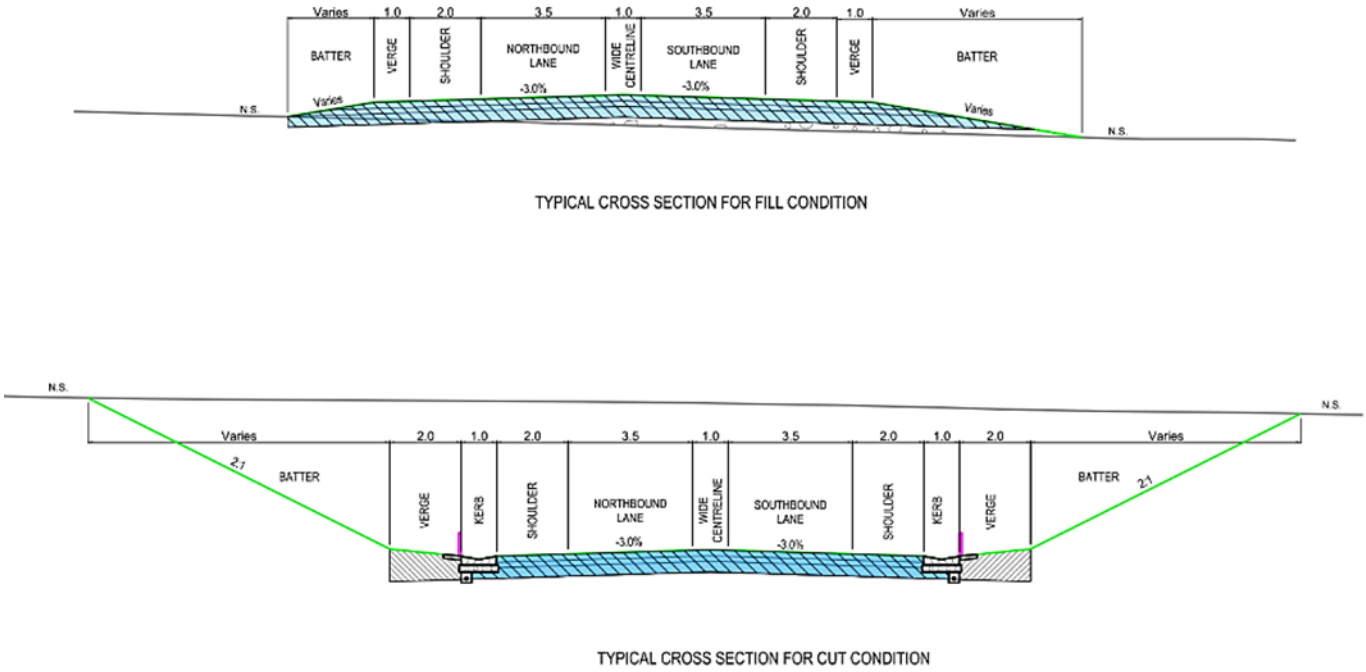


Figure 3-4 Typical project cross section of the bypass roadway

4 Proposal impacts and benefits

4.1 Introduction

This section discusses the impacts and benefits of the proposed Parkes Bypass as well as the cumulative traffic impacts from the proposed Parkes Logistics Terminal and Inland Rail projects on the surrounding road network in future years.

4.2 Proposal traffic and transport Impacts

The proposed Parkes Bypass would introduce the following traffic and transport impacts during the construction and operation periods.

4.2.1 Construction Traffic impacts

The construction impacts are documented in Table 4-1.

Table 4-1 Proposal impacts during construction

Category	Impact	Mitigation Measure	Impact rating
Road	• Increased vehicle traffic (on average about 200 vehicles per day up to 450 vehicles per day) due to construction vehicle and construction staff traffic on the road network including roads such as the Newell Highway, Hartigan Avenue, Westlime Street, Brolgan Road, London Road, Condobolin Road and Bogan Road. • Construction traffic (excluding workforce traffic) would be staged throughout the day and would enter and leave the site via the designated haul routes. This equates to no more than about 10–20 vehicles arriving and leaving per hour on average. • The workforce would arrive and leave site at the start and end of each day. They would use the haul routes. This means there may be up to 300 vehicles travelling in on the local roads during this period, however the average would be likely lower at 100 vehicles. While the increase in construction workforce traffic would be notable, it would travel on designated roads that have sufficient capacity so that local traffic performance would not be affected.	• Existing traffic volumes on the road network within Parkes are relatively low, the vehicles would be spaced throughout the day and both the road network and intersections would have ample capacity to temporarily accommodate increased vehicle traffic due to construction.	• Low
	• Diversions of local road traffic due to construction to alternative routes would cause increased congestion	• The existing road network allows for local road diversions if and when required for construction purposes.	• Low

Category	Impact	Mitigation Measure	Impact rating
	elsewhere and likely increased travel times for general traffic.	• Impacted land uses along the diversion routes will be identified and associated impacts.	
	• Damage to the local road network by construction related traffic.	• Increased traffic and heavy vehicle movement on key access and haulage routes to construction sites may damage local roads.	• Low
Parking	• Parking for construction staff will be provided on site and therefore no impact is anticipated on the local road network.	• All construction staff and vehicle parking to be provided at one of the site compounds. This would include enough space for up to 100 vehicles, equivalent to the maximum number of people onsite at any one time.	• Nil
Local access	• Disruptions and reduced access due to construction of the bridge over Hartigan Avenue and the rail lines, re-alignment of Moulden Street, extension of Hartigan Avenue, the Condobolin Road roundabout and the Back Trundle to Victoria Street shared pedestrian/cycleway bridge. • Increased travel times due to construction works where road or lane closures are required.	• Construction works will be planned and staged to minimise impact to local road access where possible for road users. • Private property access would be maintained through provision of alternate temporary access routes where required	• Low
Rail	• Disruptions to rail services including the Parkes to Broken Hill and Parkes to Narromine railway lines due to the construction of the bridge over the rail lines and the need for rail possessions.	• Construction works will be planned and staged to minimise impact where possible to the rail network and occur outside of peak rail periods.	• Low
Bus	• Disruptions to bus services due to proposed construction vehicle traffic travelling along the same roads as local bus routes.	• Bus routes including 551, 552, 553 and 554 are likely to be impacted by construction traffic. Route 554 is likely to be most impacted as it is positioned the closest to the proposal and likely construction access routes. Most construction staff traffic will only make vehicle trips at the start and end of their shifts. Construction traffic will be spread across a working day and therefore be limited during peak bus service periods.	• Low
Pedestrians	• Given the low volume of pedestrian activity and low volumes of construction traffic anticipated, minimal impact is expected to pedestrians.	• Suitable alternate detours will be provided for pedestrians if required for existing and proposed footpaths.	• Low
Cyclists	• Given the low volume of cyclist activity and low volumes of construction traffic anticipated,	• Suitable alternate detours will be provided for pedestrians and cyclists if required for existing and	• Low

Category	Impact	Mitigation Measure	Impact rating
	minimal impact is expected to cyclists.	proposed shared pedestrian/cycleways.	

4.2.2 Operational Traffic impacts

The operational impacts are documented in Table 4-2.

Redistribution of traffic due to the proposed bypass and associated local road and access closures

To determine the impacts of traffic redistribution due to the proposed bypass and associated local road and access closures, the following assumptions have been applied:

- 25 percent of Parkes only traffic (utilising the existing Newell Highway) to use the Bypass and enter town via the Condobolin Road intersection.
- 75 percent of exiting traffic on the Bypass via the Condobolin Road and the Southern Junction intersections will exit to the east.
- 25 percent of exiting traffic on the Bypass via the Condobolin Road and London Road intersections will exit to the west.
- Of the northbound traffic exiting to the east of the Bypass, 50 percent the Condobolin Road intersection, 40 percent the Southern Junction, 5 percent the London Road intersection and 5 percent the Northern Junction.
- Of the southbound traffic exiting to the east of the Bypass, 50 percent the Condobolin Road intersection and 50 percent the Northern Junction.
- Of the northbound and southbound traffic exiting to the west of the Bypass, 80 percent the Condobolin Road intersection, 10 percent the Maguire Road intersection and 10 percent the London Road intersection.
- 100 percent of traffic on Hartigan Avenue near Brolgan Road to use the Bypass via the Condobolin Road intersection.
- 100 percent of traffic on Westlime Road to use the Bypass via the Condobolin Road intersection.
- 50 percent of traffic on Brolgan Road travelling eastbound west of Hartigan Avenue and Westlime Road to use the Bypass via the Condobolin Road intersection, with 20 percent (of the 50 percent totalling 10 percent) travelling westbound on Condobolin Road and 80 percent (of the 50 percent totalling 40 percent) travelling eastbound on Condobolin Road to the Bypass. At the Bypass, 75 percent (of the 40 percent totalling 30 percent) would travel north and 25 percent (of the 40 percent totalling 10 percent) would travel south. The remaining 50 percent of traffic on Brolgan Road travelling eastbound to use Hartigan Avenue to the south and east.
- 75 percent of traffic on Brolgan Road travelling westbound to use Brolgan Road to the west of the Bypass and the remaining 25 percent of traffic to use Hartigan Avenue to the south and east.
- 100 percent of traffic on Back Trundle Road eastbound and Victoria Street westbound to connect with realigned Moulden Street and link with Condobolin Road.
- 10 percent of light vehicle traffic on Back Trundle Road travelling eastbound west of the Bypass and westbound east of the Bypass on Victoria Street to travel northbound on the Bypass.
- 60 percent of light vehicle traffic on Back Trundle Road travelling eastbound west of the Bypass to travel east into Parkes and westbound east of the Bypass on Victoria Street to travel west towards Condobolin.

- 30% of light vehicle traffic on Back Trundle Road travelling eastbound west of the Bypass and westbound east of the Bypass on Victoria Street to travel southbound on the Bypass.
- 10 percent of light vehicle traffic on Condobolin Road travelling eastbound west of the Bypass and westbound east of the Bypass to travel northbound on the Bypass.
- 60 percent of light vehicle traffic on Condobolin Road travelling eastbound west of the Bypass to travel east into Parkes and westbound east of the Bypass to travel west towards Condobolin.
- 30 percent of light vehicle traffic on Condobolin Road travelling eastbound west of the Bypass and westbound east of the Bypass to travel southbound on the Bypass.
- 10 percent of heavy vehicle traffic on Condobolin Road travelling eastbound west of the Bypass and westbound east of the Bypass to travel northbound on the Bypass.
- 40 percent of heavy vehicle traffic on Condobolin Road travelling eastbound west of the Bypass to travel east into Parkes and westbound east of the Bypass to travel west towards Condobolin.
- 50 percent of heavy vehicle traffic on Condobolin Road travelling eastbound west of the Bypass and westbound east of the Bypass to travel southbound on the Bypass.
- 75 percent of traffic on Bogan Road to access Parkes via Northern Junction and 25 percent of traffic via Condobolin Road.
- In 2023, Parkes National Logistics Hub is anticipated to have 40 light vehicle and 200 heavy vehicle trips daily which will utilise Brolgan Road.
- In 2033, Parkes National Logistics Hub is anticipated to have 40 light vehicle and 400 heavy vehicle trips daily which will utilise Brolgan Road.

The anticipated impacts of the proposed design of the bypass are listed in Table 4-2.

Table 4-2 Proposed design impacts and benefits of the Parkes Bypass to traffic and transport

Design change	Impact	Mitigation	Rating
Closure of Thomas Street at its western end	Reduced vehicle accessibility for residents to Moulden Street and Back Trundle Road and potentially increased travel times. May impact on access to Parkes Christian School for staff and students.	Additional connecting road provided between Thomas Street and Mitchell Street which runs parallel to the proposed bypass with access to Victoria Street.	Low

Design change	Impact	Mitigation	Rating
Re-aligning Moulden Street south of Back Trundle Road to an intersection with Condobolin Road and the Hartigan Avenue extension	This section of Moulden Road would be used by heavy vehicles to access Back Trundle Road to/from Condobolin Road and Hartigan Avenue as it is approved for PBS3a vehicles. Increased vehicle movements and potential congestion on Moulden Street due to the new intersection with Condobolin Road and the Hartigan Avenue extension. Introduction of a new four-way priority-controlled intersection with increase vehicle conflicts. Less direct route along Moulden Street due to the introduction of new road curves. Greater potential for cyclist, pedestrian and vehicle interactivity and risk of collisions due to the shared pedestrian/ cycleway bridge joining onto Moulden Street.	Upgraded road section between Back Trundle Road and Condobolin Road. Provides light and heavy vehicle link between Back Trundle Road and Condobolin Road	Moderate
Hartigan Avenue extension and the new four-way intersection of Condobolin Road, realigned Moulden Street and Hartigan Avenue extension	Potential for occasional queuing on Condobolin Road or Hartigan Avenue at the intersection. Introduction of a new four-way priority-controlled intersection with increase vehicle conflicts. Changed property access for residents near the proposed Hartigan Avenue extension	This intersection has been designed to be appropriate for PBS3a vehicles Provides connectivity between Condobolin Road, Moulden Street and Hartigan Avenue for light and vehicle vehicles	Low
A shared pedestrian/ cycleway bridge over the bypass connecting Victoria Street and Back Trundle Road.	Removal of direct access for vehicles between Back Trundle Road and Victoria Street. This is approximately 700 vehicles per day that would be redirected via Moulden Street and Condobolin Road. This would impact local residents in Shallow Rush as well as staff and students of Parkes Christian School. Slight increase in travel times expected for traffic wanting to access Victoria Street or Condobolin Road east of the bypass. Slight detour and increased in travel times for heavy vehicles.	Continued direct access for cyclists and pedestrians to cross over proposed bypass.	Moderate
A four-way roundabout at Condobolin Road with the proposed bypass	At grade intersection built along bypass will require bypass traffic to slow and stop	Creates an effective gateway to access Parkes whilst reserving the possibility of	Moderate

Design change	Impact	Mitigation	Rating
	at roundabout. This will impact on traffic flow and also require vehicles travelling at 80 km/h to slow in a high-speed environment. A major reduction in vehicle speed and increased vehicle conflict introduces additional safety risks with the implementation of an intersection along a bypass.	building a grade separate interchange in the future if traffic volumes significantly increase. Improved vehicle access to the Newell Highway north and south of Parkes via this roundabout and along bypass. Improved intersection safety due to existing four-way priority-controlled intersection becoming a four-leg roundabout. Roundabout would operate within capacity with forecast traffic volumes. Roundabout to be designed to accommodate PBS3a vehicles.	
T-intersections connecting the bypass with Bogan Road and the Newell Highway	Increased travel times anticipated for northbound travel from the Newell Highway to Bogan Road and vice versa from Bogan Road to the Newell Highway for southbound travel due to staggered T-intersections. Travel to Parkes town centre like existing conditions albeit an additional intersection needs to be negotiated.	Improved vehicle accessibility and route choice for motorists using Bogan Road as they can utilise the bypass for travel to/from the south of Parkes without having to travel through the Parkes town centre.	Low
Closure of Brolgan Road at Hartigan Avenue and Westlime Road. Brolgan Road east would be connected to Hartigan Avenue with new road link. Brolgan Road west connected to the Hartigan Avenue extension as a T-intersection	Reduced vehicle accessibility to Brolgan Road west of the bypass from Brolgan Road east with slightly increased travel times for cross traffic. Increased traffic on Hartigan Avenue. This closure will impact vehicle distribution, accessibility and slightly increased travel times.	Removal of the existing four-way priority-controlled intersection at Brolgan Road, Hartigan Avenue and Westlime Road and implementation of a T-intersection at Hartigan Avenue will improve safety due to reduction in conflicting vehicle movements. Improved access to the Newell Highway north and south of Parkes. Removal of heavy vehicle traffic from Brolgan Road east of the bypass.	Low
A bridge over Hartigan Avenue and the rail lines	Potential for increased noise traffic due to elevated roadway.	Provides a continuous grade separated flow route for road traffic across the railway line removing road and rail conflict. Reduces road traffic at existing level railway crossing at Hartigan Avenue on Newell Highway.	Low
Two staggered T-intersections at London Road	Increased delay for through traffic along London Road as they would be required to stop twice at bypass intersections for east-west travel.	Improved accessibility to the Newell Highway north and south of Parkes due to the proposed direct connections with the bypass and therefore	Low

Design change	Impact	Mitigation	Rating
	Introduction of new intersections along the bypass, which increases vehicle conflicts and the potential for crashes. Travel to north and south of Parkes town centre improved albeit an additional intersection needs to be negotiated.	improved travel times for travel towards Parkes and Dubbo without having to travel through Parkes town centre. Anticipated reduced road traffic at existing London Road (Blaxland Street) level railway crossing.	
T-intersections connecting the bypass with Barkers Road and the Newell Highway	Increased travel times anticipated for southbound travel from the Newell Highway to Barkers Road and vice versa from Barkers Road to the Newell Highway for northbound travel due to staggered T-intersections.	Improved vehicle accessibility and route choice for motorists using Barkers Road (including access to local farms) as they can utilise the bypass for travel to/from the north of Parkes without having to travel through the Parkes town centre. Travel to north of Parkes town centre improved.	Low

4.3 General proposal benefits

The operational benefits of this project include the following aspects:

- Travel time saving benefits due to bridge over rail lines, which bypass the level crossings
- Through traffic reduction in Parkes town centre primarily for north-south vehicle traffic
- Reduced heavy vehicle traffic through Parkes town centre
- Road user safety benefits
- Road network reliability improvements.

4.3.1 Travel time saving benefits

Surveys of the boom barrier closures at the Hartigan Avenue level crossing were conducted on 23 July 2014. These surveys indicated the following:

- The boom barriers closed 28 times across the day
- The average closure time lasted for 2 minutes and 33 seconds with the maximum 12 minutes and 52 seconds, and a minimum of 21 seconds.

The above survey conclusions have been verified by the Hartigan Avenue level crossing operation data from 3 February 2013 to 8 June 2013 (GTA Consultants, 2014). The report documented the following:

- Over an 18-week period, the average closure time of the boom barriers at the Hartigan Avenue level crossing was 28 seconds
- The average closure time length is 2 minutes 23 seconds with a 1 percent chance of more than 10 minutes and 10 percent chance more than 5 minutes.

The implementation of a bridge over rail lines, will remove the need for level railway crossings and the associated delays discussed above.

4.3.2 Reduced through traffic volumes in Parkes

Based upon OD survey data and forecasted traffic distribution due to the bypass, through traffic from north to south and vice versa on the Newell Highway through Parkes is expected to reduce by approximately 46 percent for all traffic of which a reduction of 74 percent in heavy vehicles is anticipated.

4.3.3 Road user safety benefits

The Parkes Bypass will be designed to a higher standard than the existing Newell Highway and hence be safer during the operation. The Parkes Bypass operation would be able to reduce vehicle conflicts with reduced intersections with priority-controlled intersections along the existing Newell Highway still in operation under reduced through traffic volumes.

The Parkes Bypass operation will remove through traffic including many heavy vehicles from residential areas in Parkes town centre and so improve safety for vulnerable road users, and for those living along or near the route. Heavy vehicles account for approximately 45 percent of crashes in Parkes on the Newell Highway. By redirecting heavy vehicles to the proposed bypass, the number of crashes is anticipated to lower by a similar margin particularly within Parkes town centre.

4.3.4 Road network reliability improvement

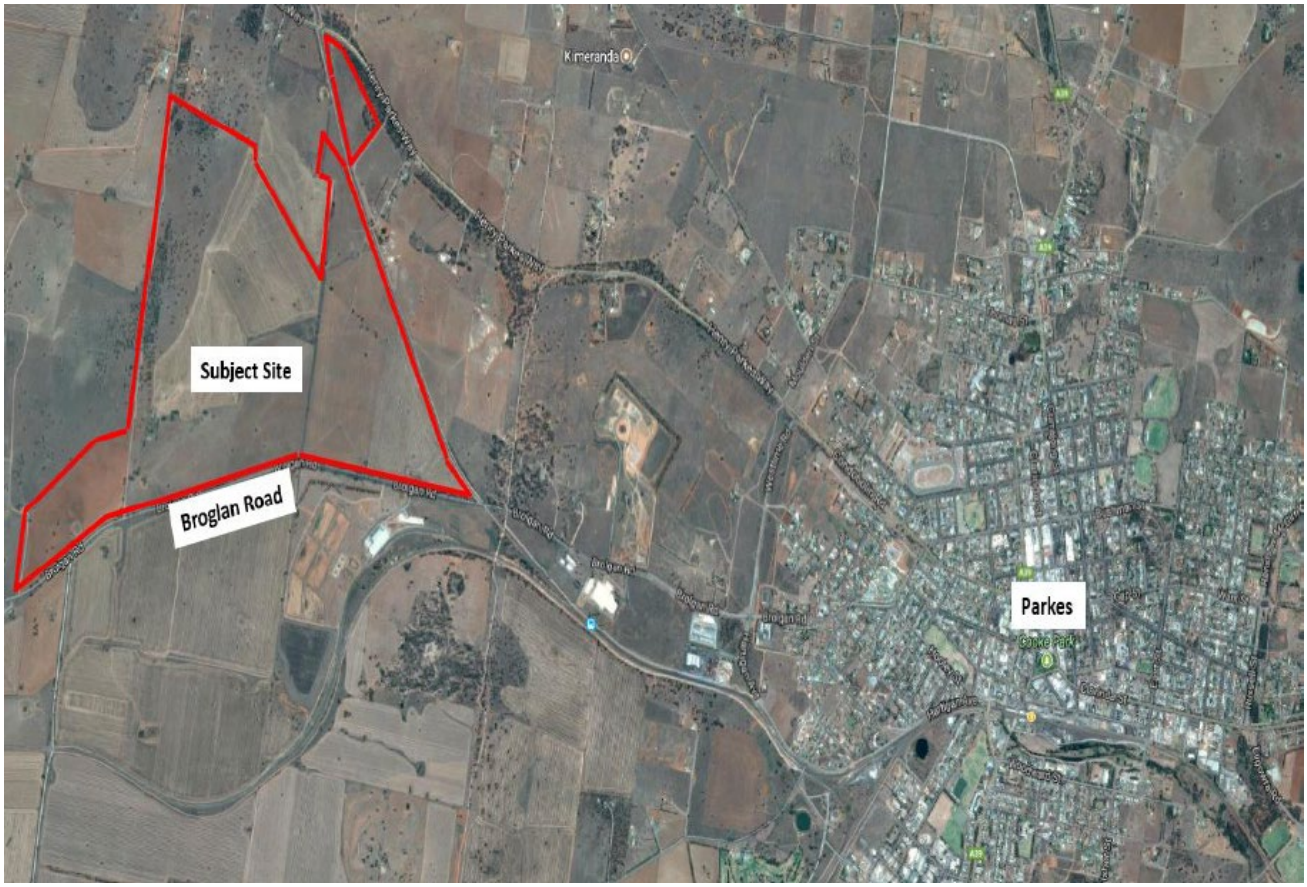
Currently, the road section of Newell Highway from Hartigan Avenue to the southern end of the proposed Bypass has no effective alternative routes. If there are any major incidents which cause the traffic interruption on this road section, the overall traffic operation on Newell Highway would be disrupted. The Bypass operation would offer an effective alternative route to maintain the Newell Highway as a national corridor to operate with high reliability even if any serious incidents happen on the road section of existing Newell Highway from the southern end to the northern end of the proposed Bypass.

4.4 Cumulative traffic impacts

4.4.1 Parkes logistics terminal

The proposed Parkes Logistics Terminal site fronts Brolgan Road to the south and Condobolin Road to the north, and is located approximately 5.5 kilometres west of the Newell Highway and Parkes town centre as shown in Figure 4-1. This facility is part of the greater Parkes National Logistic Hub (PNLH).

The proposed site has a 2.8 kilometres frontage to the northern side of Brolgan Road located west of the existing Parkes–Narromine level crossing. The site also has a 650-metre frontage to Condobolin Road, which is situated to the east of the Parkes to Narromine rail level crossing.



Source: Pacific National (2017)

Figure 4-1 Proposed Parkes Logistics Terminal location

Based upon the Preliminary Environmental Assessment prepared for the Proposed Freight Transport Facility at Parkes National Logistics Hub (as at September 2017), the following key information is provided:

- The site has a 365-hectare land area owned by Pacific National
- It is proposed to operate 24 hours per day, seven days per week
- The development plan is staged in three phases:
  - Phase 1: developing an interim rail terminal in Parkes on Pacific National land adjacent to the Australian Rail Track Corporation connection rail line from Parkes to Narromine to cater for double stacking of existing demand from Sydney to Perth including the first road of Pacific National's long-term terminal for storage and run around purposes; mode of operation with minimal local truck original and destination movements.

    Whilst currently 12 westbound and 10 east bound trains run weekly, this would reduce to eight westbound and six east bound trains per week upon construction of Phase 1 works, and the predominant operational effort would be for train to train transfers for purposes of maximising double stacking opportunities, with minimal traffic movements to and from the site anticipated to be less than 100 vehicle movements in total per day.
  - Phase 2: before 2025, developing an in terminal pavement approximately 1,100 metres in length and a second in terminal siding to cater for anticipated growth and any freight truck original and destination movements.

Based on a total of approximately nine westbound and seven eastbound trains per week the predominant operational effort would be for train to train transfers for purposes of maximising double stacking opportunities, with some local original and destination traffic generated to and from the site anticipated to be less than 200 vehicle movements in total per day.

- Phase 3: within a 12 to 15-year timeframe, developing an 1,800 metres terminal pavement and associated sidings up to three or more.

Based on a total of approximately ten westbound and eight eastbound trains per week the predominant operational effort would be a combination for train to train transfers for purposes of maximising double stacking opportunities and original and destination traffic generated to and from the site anticipated to be less than 250 vehicle movements in total per day. In the future, with the proposed Parkes Logistics Terminal construction and operation, more freight trains would pass through the Hartigan Avenue level crossings. This would increase the level railway crossing closures to road traffic at Hartigan Avenue into the future, however with reduced road traffic volumes with the implementation of the bypass.

Traffic generated by the Parkes Logistics Terminal would likely utilise the Newell Highway, Henry Parkes Way and the proposed Parkes Bypass for site access.

4.4.2 Inland Rail

The Inland Rail project being undertaken by Australian Rail Track Corporation (ARTC) is looking to develop new and upgraded freight rail line of 1700 kilometres length to complete the spine of the national freight rail network. This new rail line would allow freight to be delivered from Melbourne to Brisbane making it competitive to the current method of road freight along the Newell Highway.

ARTC will be upgrading 173 kilometres of track from Stockinbingal to Parkes and 107 kilometres of track from Parkes to Narromine some of which will be new track. The upgraded track will allow inland rail traffic to travel at maximum speed and accommodate double stacking.

This project is not anticipated to impact on the operation of the bypass. Depending on project construction, there is potential for cumulative traffic impact during the construction of Inland Rail and the proposed bypass.

5 Mitigation measures

The following mitigation measures are suggested to reduce, remove or ameliorate any proposal related traffic and transport impacts as shown in Table 5-1.

Table 5-1 Suggested mitigation measures

Impact	Mitigation measure
Construction	
Increased vehicle traffic due to construction vehicle and construction staff traffic on the road network including roads such as the Newell Highway, Hartigan Avenue, Westlime Road, Brolgan Road, London Road, Condobolin Road and Bogan Road.	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Roads and Maritime *Traffic Control at Work Sites Manual* (RTA, 2010) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP will include: • Confirmation of haulage routes • Measures to maintain access to local roads and properties • Site specific traffic control measures (including signage) to manage and regulate traffic movement • Measures to maintain pedestrian and cyclist access • Requirements and methods to consult and inform the local community of impacts on the local road network • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • A response plan for any construction traffic incident • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • Monitoring, review and amendment mechanisms.
Diversions of local road traffic due to construction to alternative routes would cause increased congestion elsewhere and likely increased travel times for general traffic.	Preparation of a TMP (as above).
Damage to the local road network by construction related traffic.	Managed in line with standard Roads and Maritime Construction guidelines (G1)
Disruptions and reduced access due to construction of the bridge over the rail lines and Hartigan Avenue, extension of Hartigan Avenue, realignment of Moulden Street, Condobolin Road roundabout and Back Trundle to Victoria Street cyclist and pedestrian bridge. Increased travel times due to construction works where road or lane closures are required.	Implementation of a TMP (as above). Obtain necessary permits or licences for road or lane closures or rail possessions. Identification of temporary alternate routes to maintain private property access in consultation with relevant land owners/occupiers.
Disruptions to rail services including the Parkes to Broken Hill and Parkes to Narromine rail lines due to the construction of the bridge over the rail lines and the need for rail possessions.	Obtain necessary permits or licences for rail possessions.
Disruptions to bus services due to proposed construction vehicle traffic travelling along the same roads as local bus routes.	Relocate bus stop or re-route the bus route
Operation	

Impact	Mitigation measure
Reduced vehicle accessibility for residents to Moulden Street and Back Trundle Road from Thomas Street including access to Parkes Christian School.	Provide detour signage to Moulden Street and Back Trundle Road via Condobolin Road and Henry Parkes Way including local road network connections with Condobolin Road.
At grade intersection built along bypass will require bypass traffic to slow and stop at roundabout. This will impact on traffic flow and also require vehicles travelling at 80 km/h to slow in a high-speed environment. A major reduction in vehicle speed and increased vehicle conflict introduces additional safety risks with the implementation of an intersection along a bypass.	Provide adequate advisory and warning signage of the road conditions ahead.
Changes to private property access due to the Hartigan Avenue extension or Moulden Street realignment.	Provide alternate property access routes in consultation with the relevant land owners/occupiers.
Cumulative	
Increased road traffic primarily along Brolgan Road and rail movements due to the proposed Parkes Logistics Terminal.	Where possible, current traffic movements and property accesses are to be maintained during the works. Any disturbance is to be minimised to prevent unnecessary traffic delays.

6 Conclusions

The following traffic and transport related conclusions are drawn from this report for the proposed Parkes Bypass:

- The Newell Highway in Parkes currently constrains the movement of freight due to the congestion and delays caused by the level crossings and four 90-degree bends in the road which are difficult for heavy vehicles to safely navigate.
- The proposed Parkes Bypass aims to address the above issues and offer an effective alternative route for freight traffic and through traffic away from the Newell Highway.
- The proposed Bypass is forecast to have more than 2,800 vehicles daily in 2023 of which heavy vehicles account for more than 30 percent of all vehicles. This is anticipated to increase to more than 3,400 vehicles daily in 2033 with a similar heavy vehicle percentage.
- The existing Newell Highway through Parkes is forecast to have more than 2,800 vehicles daily in 2023 of which heavy vehicles account for more than 6 percent of all vehicles. This is anticipated to increase to more than 3,300 vehicles daily in 2033 with a similar heavy vehicle percentage.
- The development of the Parkes Logistics Terminal is predicted to generate the following traffic demand:
    - In year 2023, 40 light vehicles and 200 heavy vehicles and in year 2033, 40 light vehicles and 400 heavy vehicles are anticipated daily.
    - The intermodal logistics hub operation in the future would also increase the frequency of the trains crossing the existing Newell Highway at the Hartigan Avenue level crossing. This will continue to further delay road traffic using the existing Newell Highway through Parkes.
- The impacts of the Parkes Bypass during the construction period have been identified and primarily relate around construction traffic, changed road access conditions and impacts to both public and active transport. The impacts during construction will be temporary in nature and are likely to have a low impact on road users and the community providing that appropriate mitigation measures are implemented.
- The impacts of the Parkes Bypass during the operation period have been identified and primarily relate around road accessibility, redistributed traffic, road traffic noise and changes in travel times. The impacts during operation are likely to have a low impact on road users and the community.
- The benefits of the proposed Bypass during construction and operation periods have been identified as:
    - Travel time saving benefits
    - Reduced through traffic volumes within Parkes town centre
    - Road user safety benefits
    - Road network reliability improvements
    - Increased accessibility due to alternate routes becoming available.

In conclusion, the Parkes Bypass would produce significant benefits during its operation, and its impacts during construction and operation can be minimised to acceptable level with effective mitigations.

7 References

- Terminals Australia, 2006. *Parkes Intermodal Terminal – Concept Design*, Design Brief for Road Transport Infrastructure, Final Report.
- Terminals Australia, 2007. *Parkes Intermodal Terminal Preferred Project Report.*
- GTA Consultants, 2014. *Lachlan Health Service Redevelopment-Parkes Hospital Transport Impact Assessment*.
- Bennett, D. etc., 2013, *Guide to Traffic Management Part 3: Traffic Studies and Analysis*, published by Austroads, pp 44.
- Roads and Maritime Services Traffic Volume Viewer, 2017, Roads and Maritime website.
- DECC, 2009, *Interim Construction Noise Guideline.*
- Roads and Maritime, 2016, *Construction Noise and Vibration Guideline.*
- DECCW, 2009, *Waste Classification Guidelines.*
- Roads and Traffic Authority, 2010, *Traffic Control at Work Sites Manual Version 4.*
- Pacific National, September 2017*, Preliminary Environmental Assessment for Proposed Freight Transport Facility at Parkes National Logistics Hub.*
- ARTC Master Train Plan 26-11-2017V1, ARTC website.

Appendix A

Past traffic surveys

Roads and Maritime permanent counts station on Newell Highway, Forbes

To better understand the monthly variation of the traffic volumes on the Newell Highway, traffic count data from April 2015 to April 2017 at a Roads and Maritime permanent classifier station located to the south of Forbes (190 metres west of Greens Road, Forbes NSW 2871) was extracted from Roads and Maritime count viewer website. The data shows the following features as presented in Figure A-1 and Table A-1:

- December and September have similar average daily traffic volume and are both the peak months in Figure A-1. January has the second highest volume of these two months.
- The traffic volume at this count station is less than 3,000 vehicles per day as shown in Table A-1 in December 2015 and January 2017, which is significantly lower than 4800 vehicles per day observed at TC 01 location in Parkes in December 2016.
- The heavy vehicle traffic volume at this Forbes count station is around 920 vehicles per day in December 2015, which is very similar to the heavy traffic volume (918 vehicles per day) on the section of Newell Highway in Parkes (TC01).
- The heavy vehicle traffic volume proportion at this counter station is around 37 percent in Table A-1, far higher than 20 percent observed at TC 01 location in Parkes in December 2016. This is mainly due to the total traffic volume at TC 01 and TC 07 being far higher than this station in Forbes.

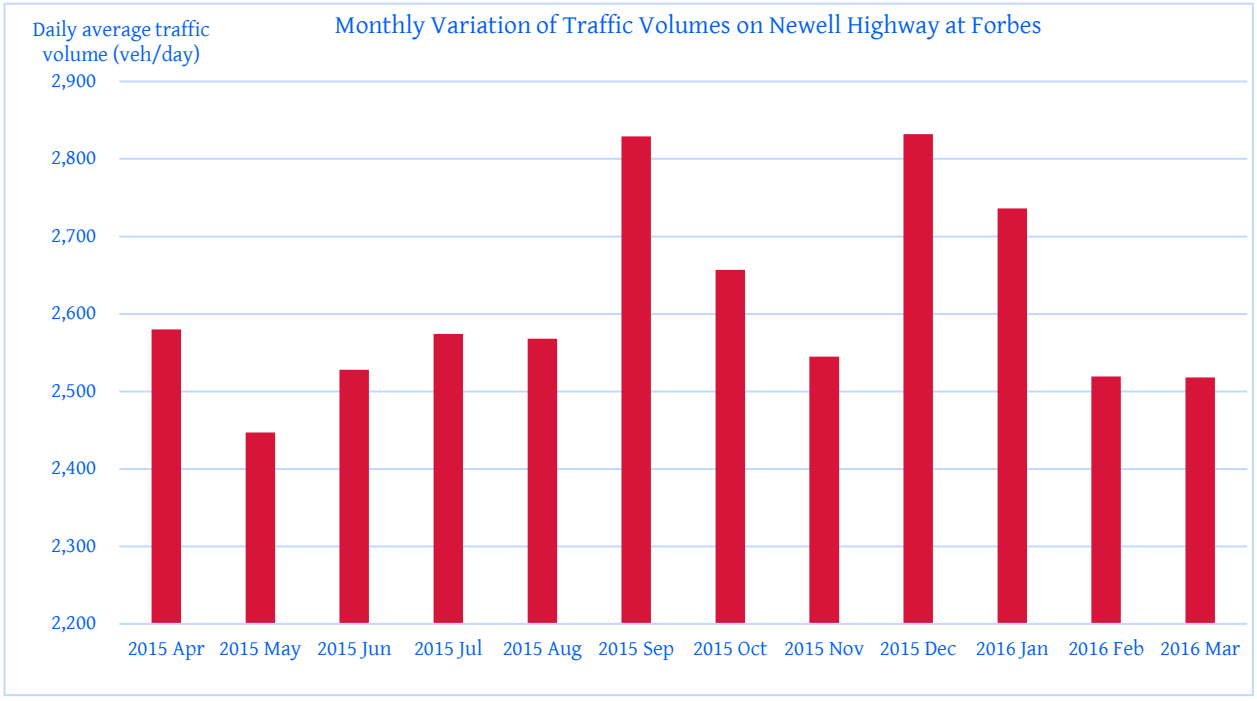


Figure A-1 Monthly variation of average daily traffic volumes on the Newell Highway at Forbes

Table A-1 Traffic volumes at Roads and Maritime Permanent Classifier Station (ID: 6141 or 6144) on Newell Highway at Forbes

Time	Southbound			Northbound			Both direction		
	Heavy vehicle volume	All vehicle volume	Heavy vehicle%	Heavy vehicle volumes	All vehicle volume	Heavy vehicle%	Heavy vehicle volume	All vehicle volume	Heavy vehicle%
Apr 2015	434	1,226	35%	490	1,354	36%	924	2,580	36%
May 2015	464	1,149	40%	514	1,298	40%	978	2,447	40%
Jun 2015	461	1,161	40%	500	1,367	37%	961	2,528	38%
Jul 2015	450	1,236	36%	478	1,338	36%	928	2,574	36%
Aug 2015	483	1,311	37%	488	1,257	39%	971	2,568	38%
Sep 2015	516	1,434	36%	519	1,395	37%	1,035	2,829	37%
Oct 2015	488	1,328	37%	498	1,329	37%	986	2,657	37%
Nov 2015	502	1,262	40%	519	1,283	40%	1,021	2,545	40%
Dec 2015	453	1,386	33%	467	1,446	32%	920	2,832	32%
Jan 2016	434	1,359	32%	461*	1,377*	33%*	895	2,736	33%
Feb 2016	465	1,244	37%	488*	1,275*	38%*	953	2,519	38%
Mar 2016	460	1,224	38%	497*	1,294*	38%*	957	2,518	38%
Apr 2016	472	1,286	37%	-	-	-	472	1,286	37%
May 2016	447	1,132	39%	-	-	-	447	1,132	39%
Jun 2016	452	1,144	40%	-	-	-	452	1,144	40%
Jul 2016	454	1,241	37%	-	-	-	454	1,241	37%
Aug 2016	504	1,365	37%	-	-	-	504	1,365	37%
Sep 2016	435	1,195	36%	-	-	-	435	1,195	36%
Oct 2016	80	325	25%	-	-	-	80	325	25%
Nov 2016	477	1,186	40%	-	-	-	477	1,186	40%
Dec 2016	433	1,355	32%	-	-	-	433	1,355	32%
Jan 2017	434	1,360	32%	461	1,378	33%	895	2,738	33%
Feb 2017	468	1,193	39%	491	1,223	40%	959	2,416	40%
Mar 2017	460	1,188	39%	497	1,256	40%	957	2,444	39%
Apr 2017	444	1,287	34%	476	1,372	35%	920	2,659	35%
Total	**11,170**	**30,577**	**37%**	**7,844**	**21,242**	**37%**	**19,014**	**51,819**	**37%**

Source: *http://www.rms.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes/aadt-map/index.html#/?z=10&lat=-33.39969937998303&lon=148.1201866953124&id=6141*

Notes: *estimated data.

Roads and Maritime Cross-Boundary Survey in 2012

The survey lasted from 2 August to 20 August 2012. The data analysis provides insights on the weekly variation and hourly traffic volume profile on weekday and on the weekend, as well as the heavy vehicle proportion on three key roads as shown in Figure A-2

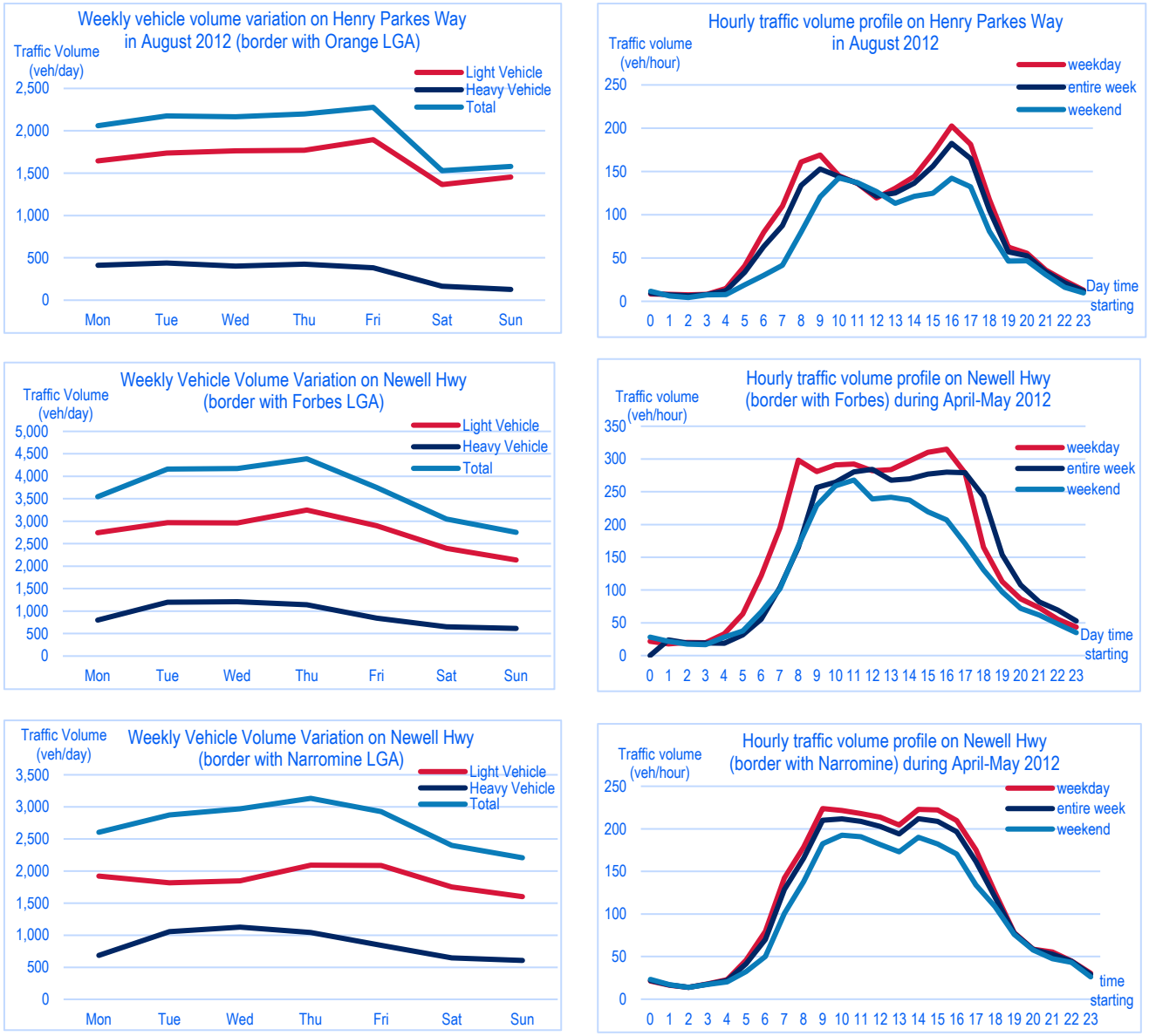
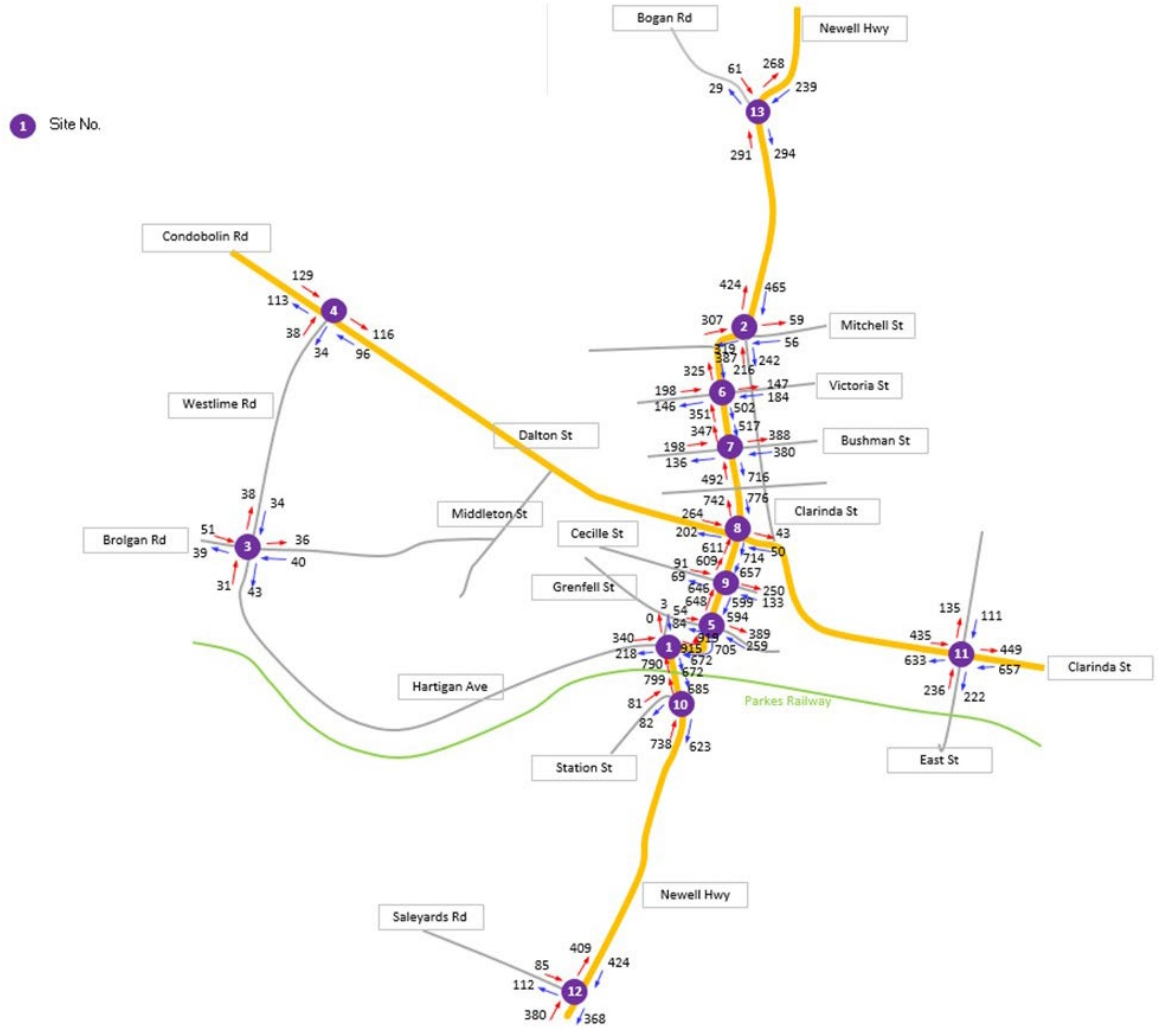


Figure A.2 Weekly traffic variation and hourly traffic volume profile on the Newell Highway and Henry Parkes Way

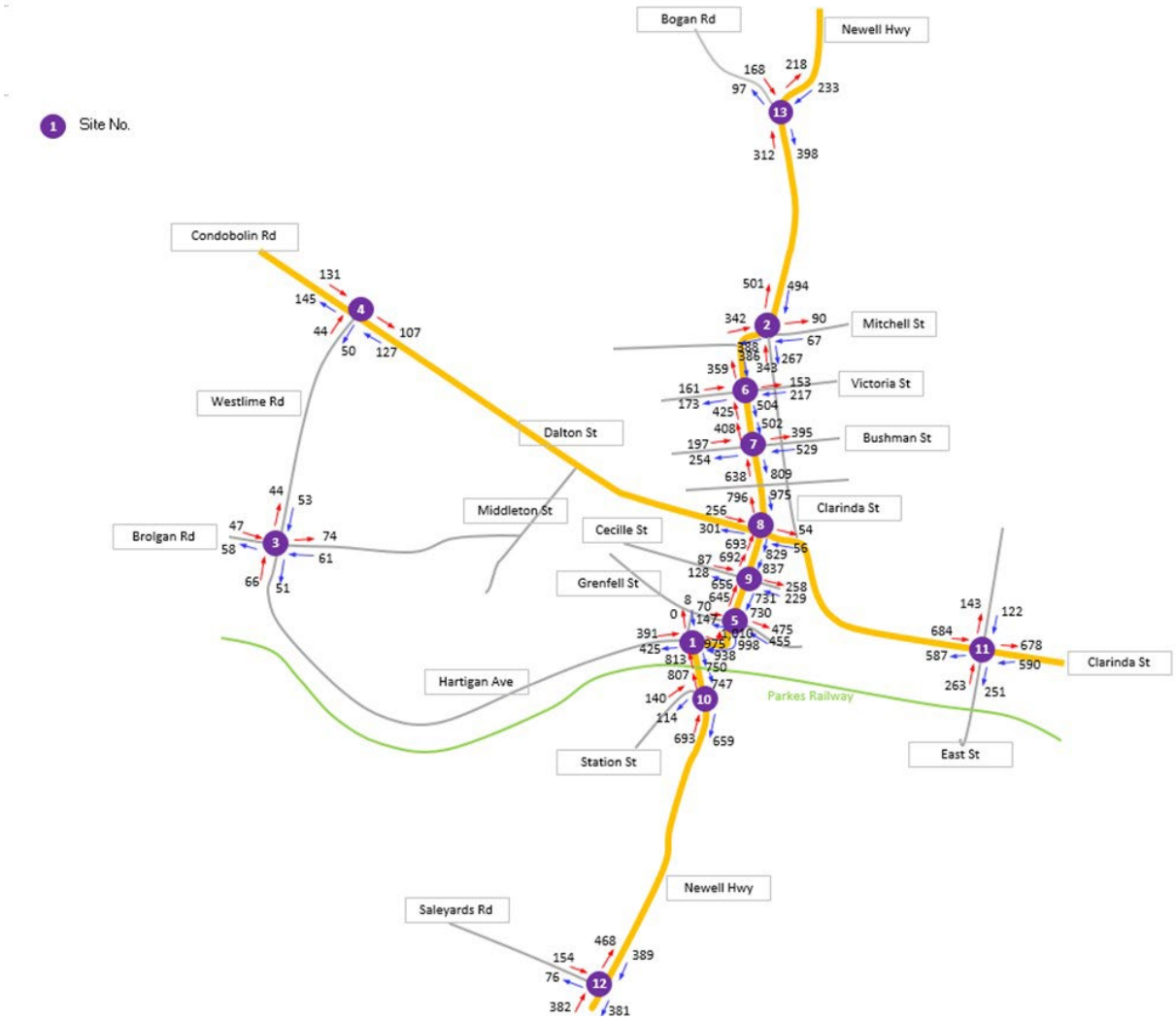
Roads and Maritime Origin-Destination (OD) Survey in 2014

Skyhigh Traffic Surveys on behalf of Roads and Maritime undertook an OD survey in Parkes in July to September 2014. Along with the OD survey, traffic counts on different roads were also performed. The AM/PM traffic on the road network is shown on the following flow charts in Figures A-3 and A-4.



Source: Skyhigh for Roads and Maritime *(2014)*

Figure A-3 8.00 am–10.00 am road network traffic flow in Parkes in 2014 August



Source: Skyhigh for Roads and Maritime (2014)

Figure A-4 4.00 pm–6.00 pm road network traffic flow in Parkes in 2014 August

The traffic counts on Newell Highway, Henry Parkes Way and Condobolin Road, which show an hourly traffic profile and weekly variation are shown in below Figures A-5 to A-9.

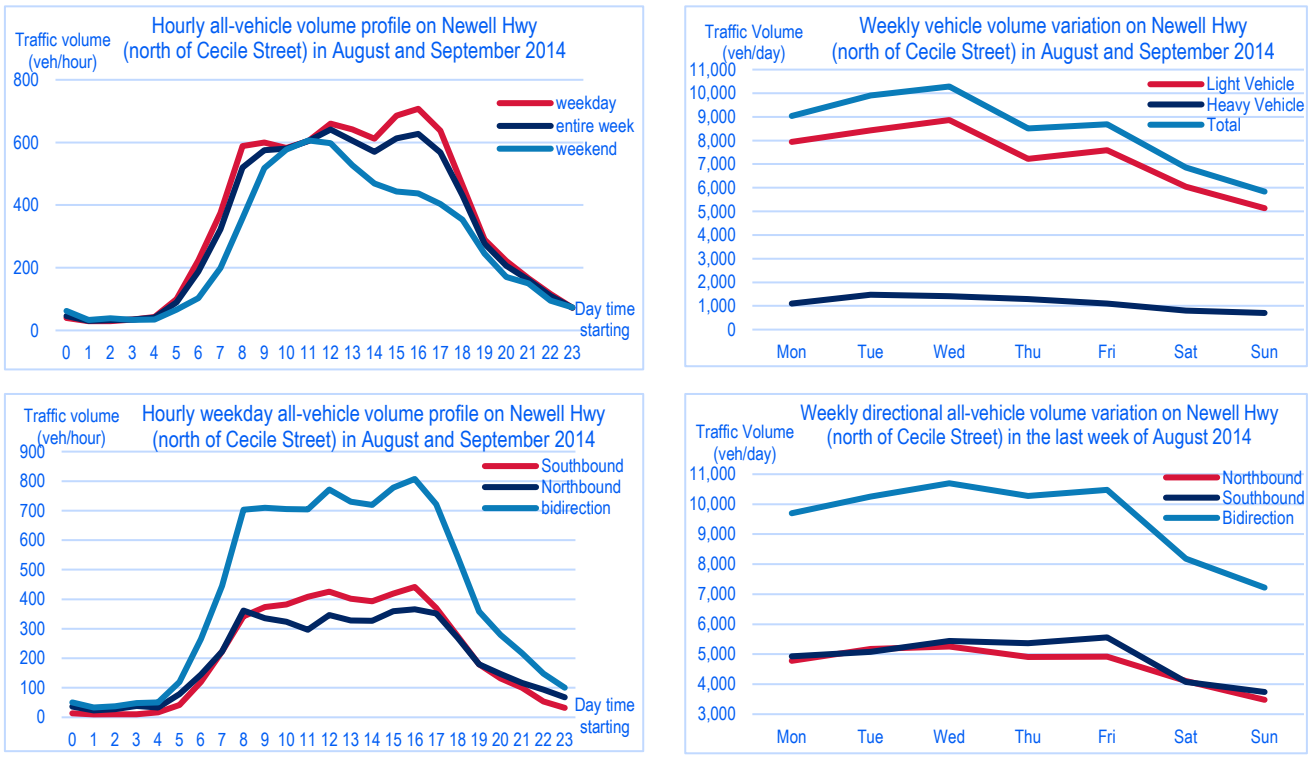


Figure A-5 Traffic volumes on the Newell Highway within Parkes town centre in August and September 2014

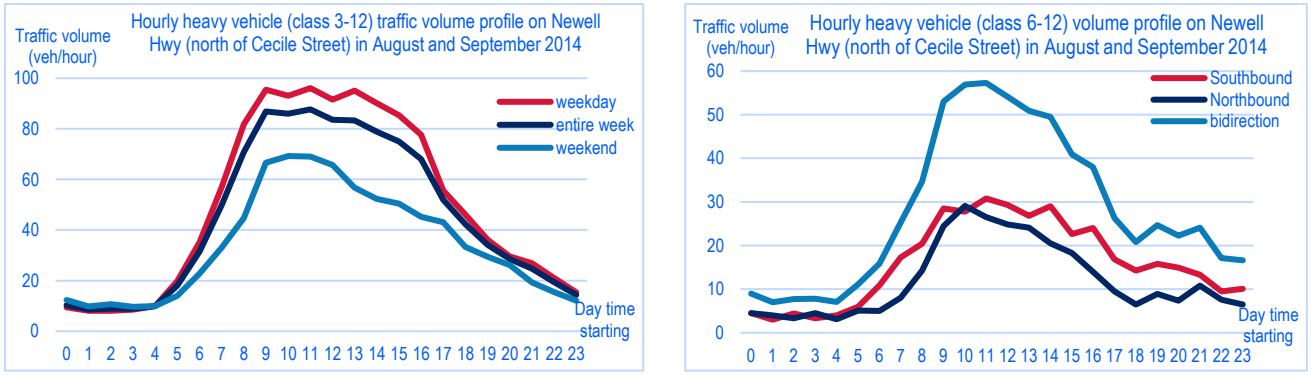


Figure A-6 Heavy vehicle traffic volumes on the Newell Highway within Parkes town centre in August and September 2014

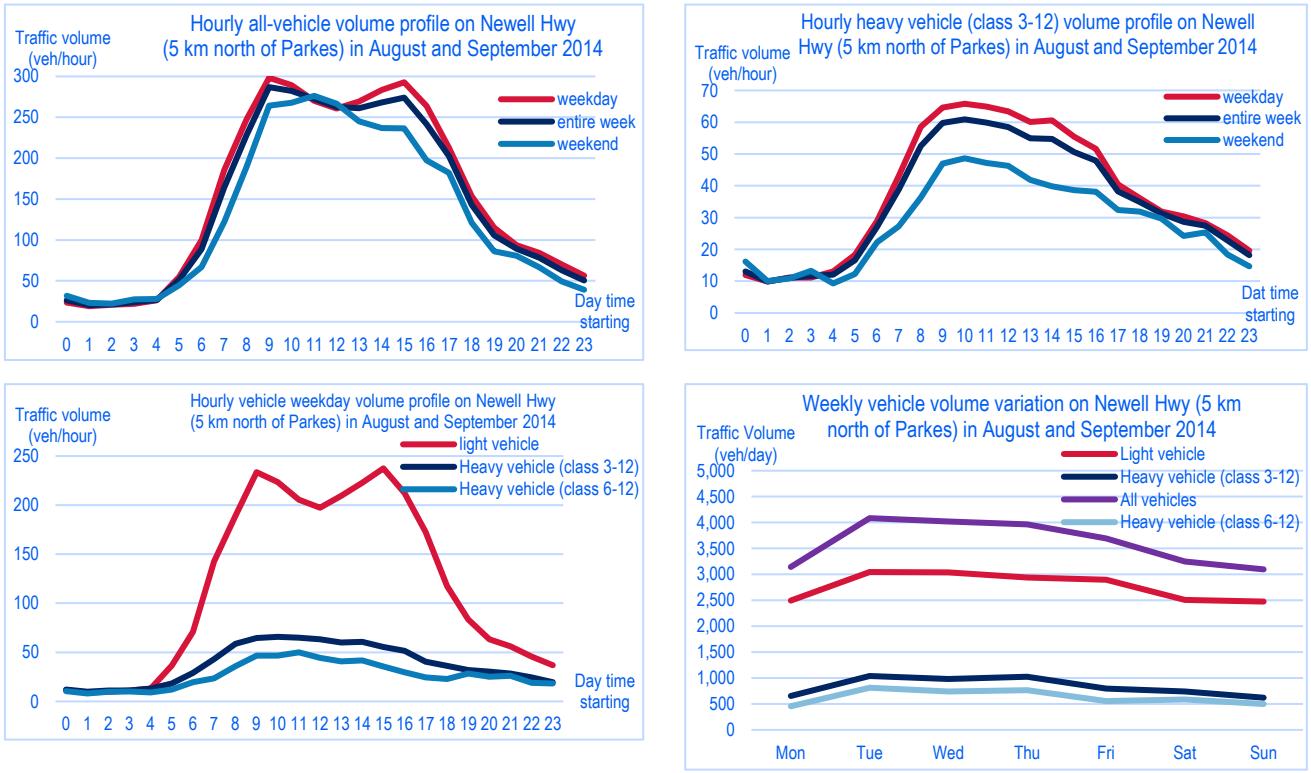


Figure A-7 Traffic volumes on the Newell Highway (5 kilometres north of Parkes) in August and September 2014

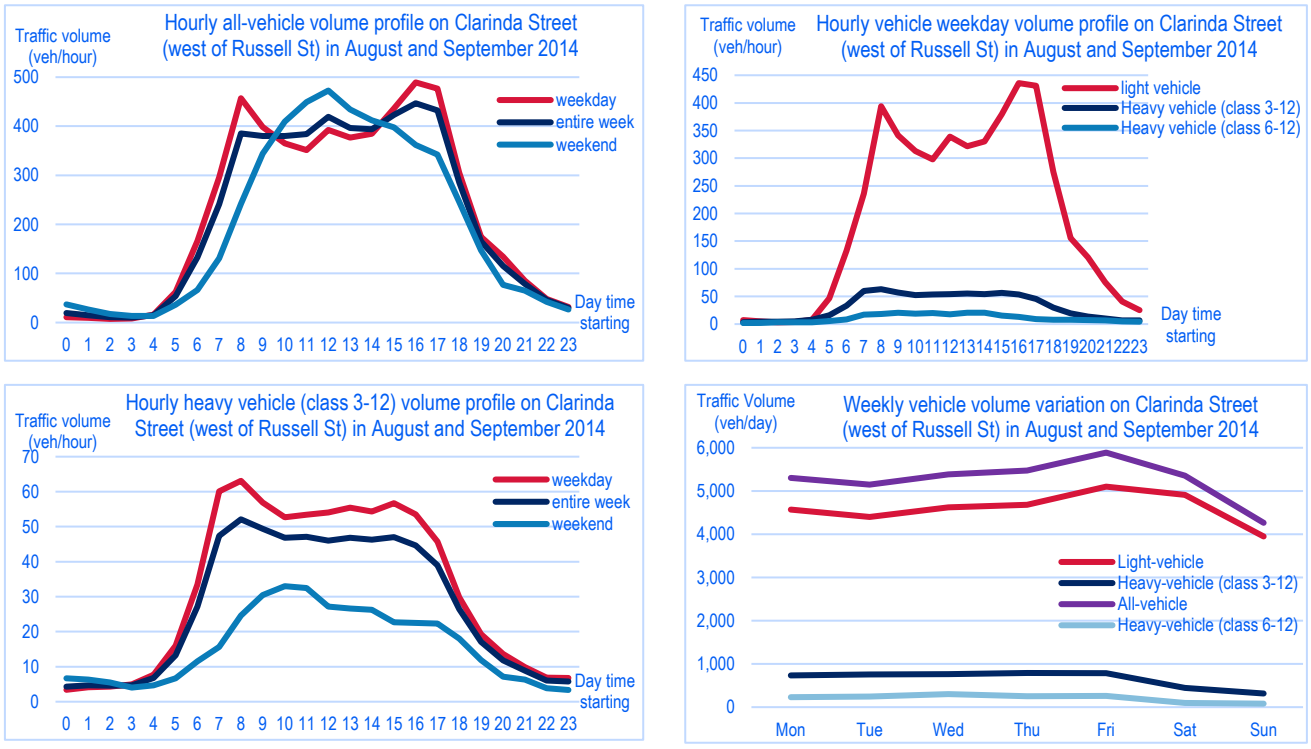


Figure A-8 Traffic volumes on Clarinda Street in August/September 2014

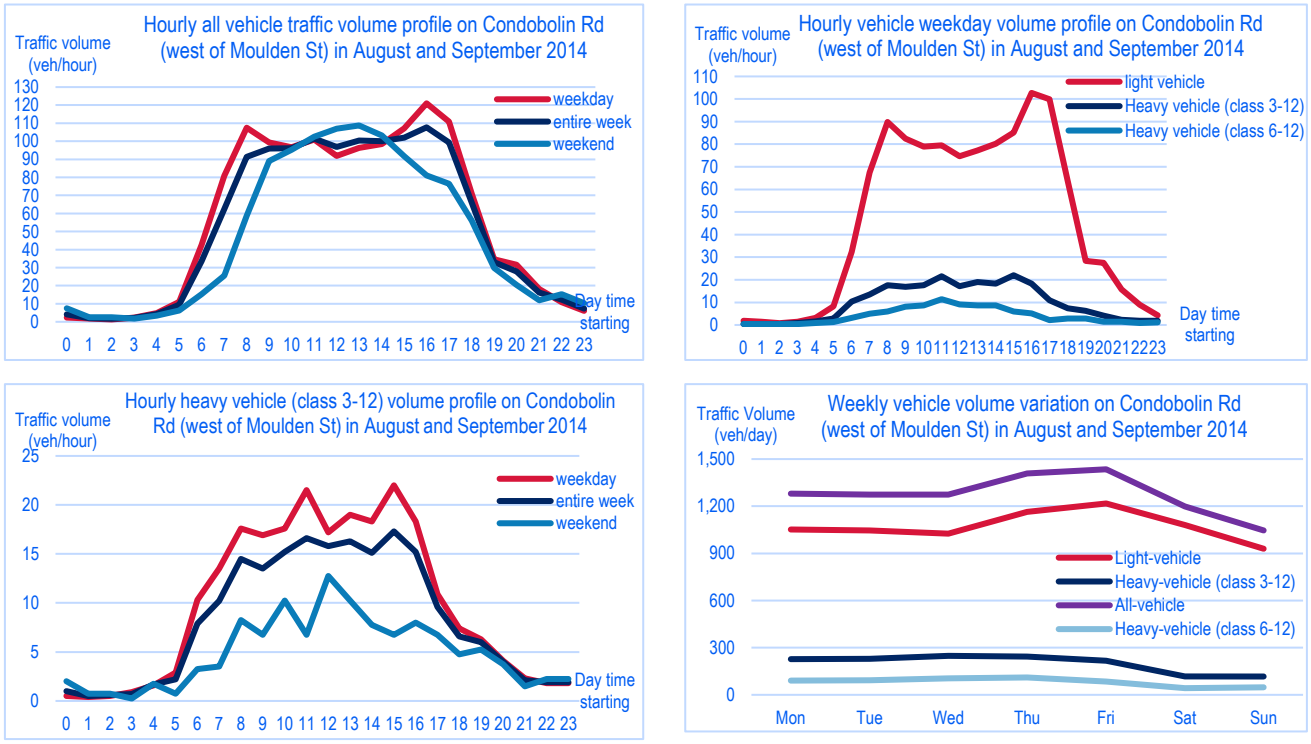


Figure A-9 Traffic volumes on Condobolin Road (west of Moulden Street) in August/September 2014

Parkes Shire Council Survey in 2014

From 5 March to 15 May 2014, Parkes Shire Council performed continuous tube counts on Brolgan Road and Westlime Road centred with their intersection. The weekly variation and hourly traffic volume profile are shown in following Figure A-10.

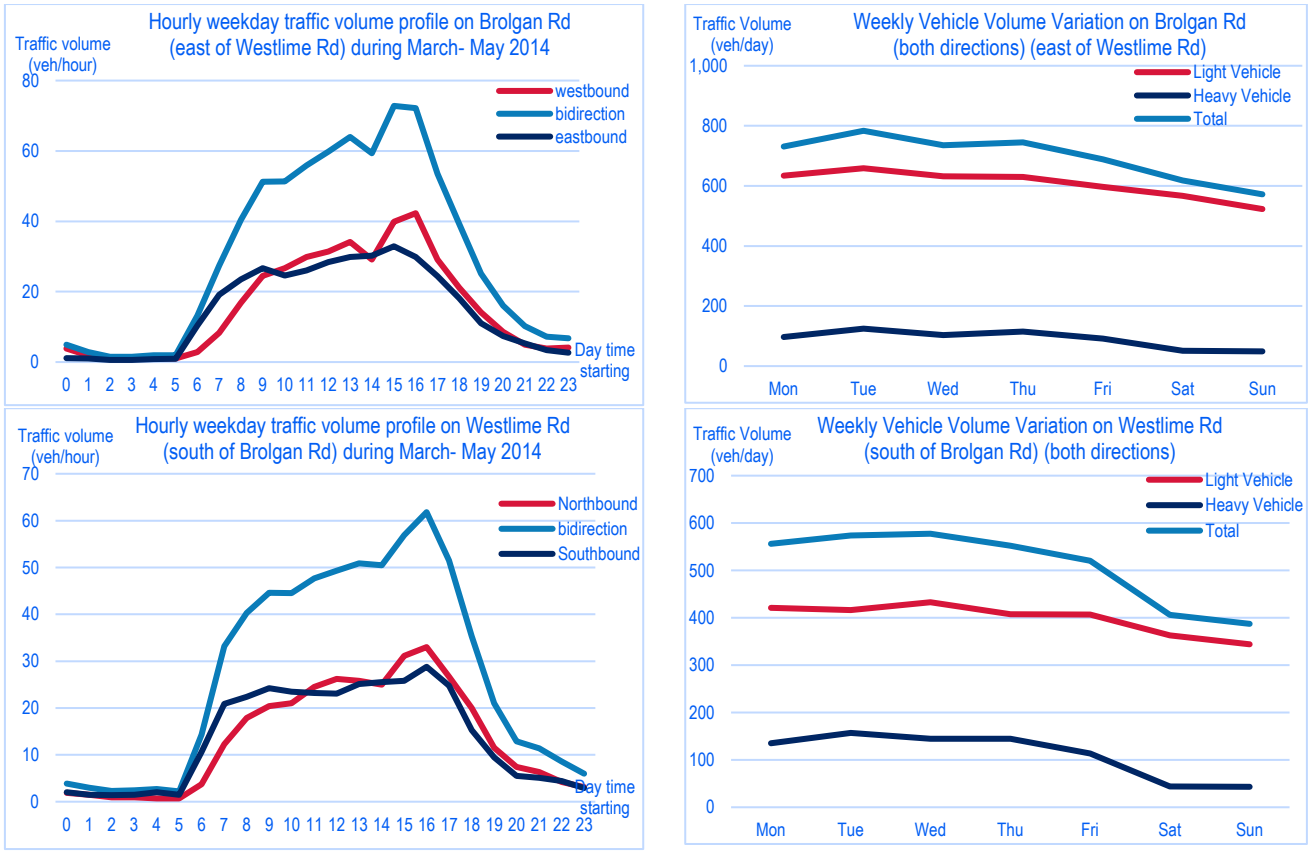


Figure A-10 Weekly traffic volume variation and hourly traffic volume profile on Westlime Road and Brolgan Road in 2014

Roads and Maritime Survey in 2017

In April and May 2017, Roads and Maritime carried out a 3-week survey on Back Trundle Road and Condobolin Road. The weekly traffic variation and hourly traffic volume profile are shown in following Figure A1-11.

Figure A-11 Weekly traffic volume variation and hourly traffic volume profile on Back Trundle Road and Condobolin Road in 2017

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Customer feedback
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November 2017