

# North Rocks Commuter Car Park

102-106 Barclay Road, North Rocks

Traffic, Transport and Access Impact Assessment



Prepared by: GTA Consultants (NSW) Pty Ltd for Advisian

on 16/11/2020

Reference: N198560

Issue #: B

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## Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	11/11/2020	Final	Jason Huang Ashish Modessa	Ashish Modessa	Nick Buchanan	Nick Buchanan
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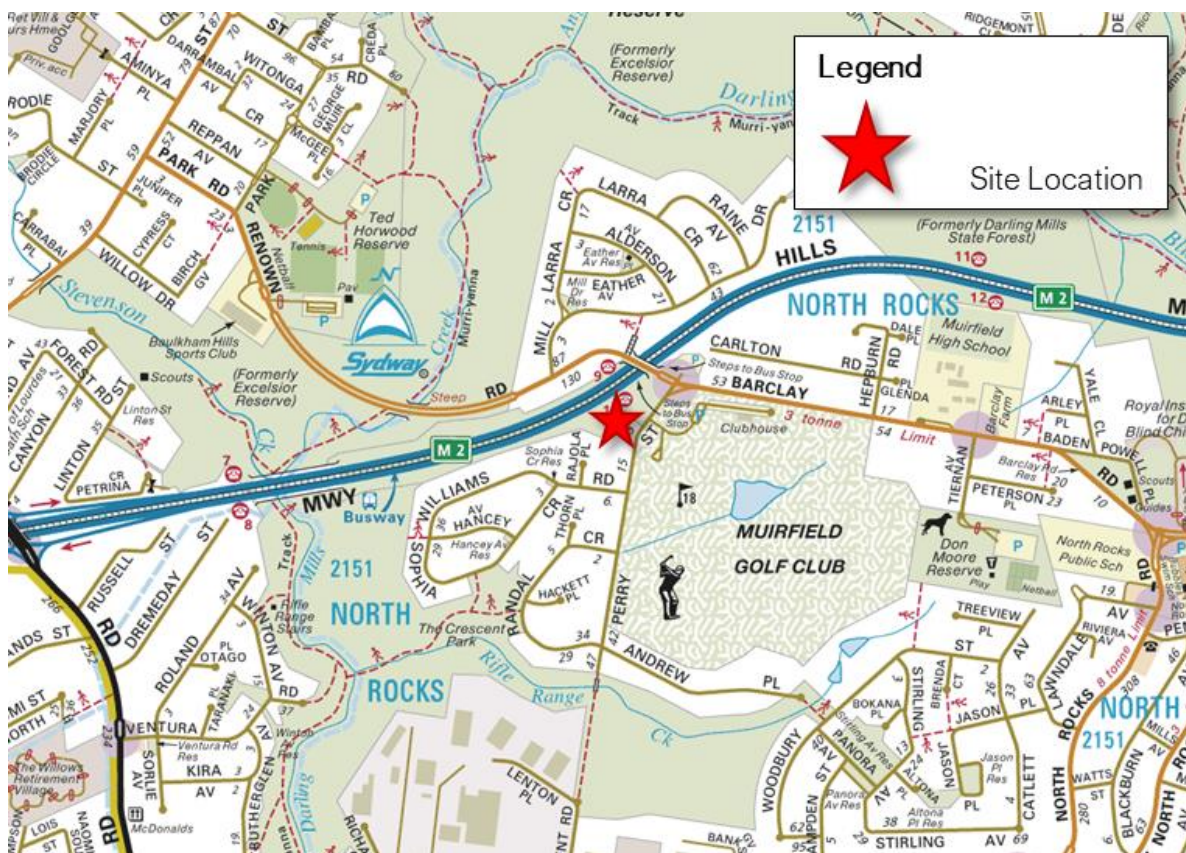
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# 1. INTRODUCTION

## 1.1. Background

A Review of Environmental Factors (REF) is being prepared for Transport for NSW (TfNSW) regarding a proposed at-grade commuter car park at 102-106 Barclay Road, North Rocks (otherwise known as Part Lot 170 of DP 1151136), shown in Figure 1.1. The proposal provides approximately 135 commuter car spaces.

Figure 1.1: Site location and surrounding environs



Basemap source: Sydney Publishing Pty Ltd

The proposal forms part of the Commuter Car Park Program by the NSW Government to provide more accessible transport infrastructure, and TfNSW is providing more commuter car parks where they are needed. The delivery of commuter car parks at key transport interchanges will provide a range of benefits, such as:

- improving customer access to the public transport network
- encouraging mode shift away from private vehicles
- improving the flexibility and reliability of customers' 'first and last mile' of their journey
- contributing to reducing congestion on the Sydney road network.

Advisian commissioned GTA Consultants (GTA) to complete a traffic, transport access impact assessment (TTAIA) for the proposal to accompany the REF.

## 1.2. Purpose of this Report

This TTAIA has been prepared by GTA to assess the potential traffic, transport and access impacts of the proposal. For the purposes of this TTAIA, TfNSW is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Specifically, this report sets out an assessment of the anticipated transport implications of the proposal, including consideration of the following:

- existing traffic and parking conditions surrounding the site
- the traffic generating characteristics of the proposal
- the transport impact of the proposal on the surrounding road network
- the expected traffic management required to carry out construction for the proposal.

## 1.3. References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2018
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- traffic and car parking surveys completed by Matrix Traffic and Transport as referenced in the context of this report
- plans for the proposed development prepared by Futurerail, dated 02 September 2020
- other documents and data as referenced in this report.

## 2. STRATEGIC CONTEXT

### 2.1. State and Regional Policies and Strategic Context

Key overarching policies, strategies and plans with relevance to the proposal are listed in Table 2.1, along with associated implications for this study.

Table 2.1: Key implications of overarching strategies, policies and plans

Policy/ Strategy	Scope	Implications for the site
Greater Sydney Region Plan and Central City District Plan (2018)	Metropolitan Sydney	<ul style="list-style-type: none"> <li>• Intention of making a 30-minute city – connectivity to Parramatta CBD within 30 minutes.</li> </ul>
NSW State Infrastructure Strategy (Update 2018)	NSW	<ul style="list-style-type: none"> <li>• Focus on improving Parramatta connectivity</li> <li>• Investment into Bus Rapid Transit and Bus Priority programs.</li> </ul>
Future Transport 2056 (2018)	NSW with focus on Metropolitan Sydney	<ul style="list-style-type: none"> <li>• In addition to 30-minute catchment, focus on liveability, sustainability and productivity</li> <li>• Increasing car parking provisions would help meet liveability and productivity goals.</li> </ul>
Commuter Car Park Program	Metropolitan Sydney	<ul style="list-style-type: none"> <li>• Directly governs objectives for site development, including:                             <ul style="list-style-type: none"> <li>○ accessible services</li> <li>○ successful places</li> <li>○ efficient connectivity for passengers</li> <li>○ safety and performance</li> <li>○ adaptability</li> <li>○ sustainability.</li> </ul> </li> </ul>

#### 2.1.1. Greater Sydney Region Plan and Central City District Plan

The Greater Sydney Region Plan, published in March 2018 by the Greater Sydney Commission, provides a 40-year vision and a 20-year plan to 2036. Within the document, the Greater Sydney Region is split into the three following cities:

- The Western Parklands City encompassing Campbelltown and Macarthur, Liverpool and Penrith as well as the to be built Western Sydney Airport Aerotropolis and Employment area.
- The Central River City encompassing Greater Parramatta and surrounding regions including the North-west Growth Area.
- The Eastern Harbour City encompassing Sydney CBD, eastern, northern and southern suburbs.

The 20-year plan as proposed within the Greater Sydney Region Plan outlines a range of transport and infrastructure initiatives to support already established and yet-to-be developed precincts, centres and clusters. This includes mass transit investigations, committed train links, urban area investigations and protected natural areas. These initiatives and investigations are a result of directions within the plan to increase and diversify housing supply within Greater Sydney as well as provide efficient and connected places with a key direction being a 30-minute commute between home and work for most residents.

The M2 Barclay Road Bus Interchange currently provides a 32-minute journey to both Parramatta and the Sydney CBD. Further improvement of travel times will likely increase patronage of the bus interchange and increase demand.

### 2.1.2. NSW 2018 State Infrastructure Strategy

The NSW 2018 State Infrastructure Strategy is a 20-year strategy set out by Infrastructure NSW which provides independent advice on current infrastructure as well as projects needs over the next 20 years.

This includes improvement and upgrade of the existing bus network and bus rapid transit services.

### 2.1.3. Future Transport 2056

Future Transport 2056 provides a 40-year strategy for how transport will be planned, amended and forecasted within metropolitan and regional NSW for the expected 12 million residents within the state. Future Transport 2056 follows from the 2012 Long Term Transport Master Plan which listed over 700 transport projects, the majority of which are completed or in progress. It also ties in with Greater Sydney Region Plan and the subsequent district plans to support the three cities metropolis vision.

Future Transport 2056 is supported by two key documents, Greater Sydney Services and Infrastructure Plan and Regional NSW Services and Infrastructure Plan, which provide guidance and planning for these areas.

From a metropolitan view, Future Transport 2056 and associated plans include the 30-minute city where jobs and services are within 30 minutes of residents with Greater Sydney. Strategic transport corridors to move people and goods are outlined between metropolitan and strategic centres, clusters and surrounds. The Movement and Place framework is also emphasised to support liveability, productivity and sustainability.

### 2.1.4. Commuter Car Park Program

The NSW Government is committed to delivering accessible public transport infrastructure, which is why TfNSW are providing more commuter car parks through the Commuter Car Park Program. The Commuter Car Park Program is an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

The objective of the Commuter Car Park Program is to make it easier for customers who need to drive part of their journey to access public transport hubs. The delivery of commuter car parks at key transport interchanges aims to provide a range of benefits as outlined in Table 2.2.



Table 2.2: Objectives of the Commuter Car Park Program

Category	Objectives
Accessible Services	<ul style="list-style-type: none"> <li>increase access to public transport for customers in their 'first and last mile' journey.</li> </ul>
Successful Places	<ul style="list-style-type: none"> <li>complement and integrate with existing and future communities and support economic and place-making objectives in centres.</li> </ul>
Efficient Connectivity for Passengers	<ul style="list-style-type: none"> <li>develop efficient transport interchanges to enable people to reach more destinations within and between cities and centres by enabling the 30 minute city through comparative or improved travel time with private vehicle travel</li> <li>replace car trips to destinations and centres with alternative public and active transport modes.</li> </ul>
Safety and Performance	<ul style="list-style-type: none"> <li>provide a safe multi-modal transport journey by design</li> <li>improve the effectiveness of interchanging.</li> </ul>
Adaptability	<ul style="list-style-type: none"> <li>support the future needs of customers and consider emerging transport trends, growth and technologies</li> <li>plan and design infrastructure that is resilient and able to adapt to future alternative uses and scenarios.</li> </ul>
Sustainability	<ul style="list-style-type: none"> <li>to deliver whole of life value for money</li> <li>limit environmental impact and contribute to the NSW Government's aspirational target to achieve net-zero emissions by 2050</li> <li>maximise the construction phase benefits to the local economy by utilising local businesses and engaging a workforce that reflects the local social demographic of the area.</li> </ul>

# 3. EXISTING CONDITIONS

## 3.1. Location

The subject site is located at 102-106 Barclay Road, North Rocks. The location of the subject site and its surrounding environs is shown in Figure 3.1. The site of approximately 6,100 square metres has a frontage of 120 metres to Perry Street. The site is currently vacant and zoned SP2 Infrastructure Classified Road. It was temporarily used as a compound for the NorthConnex project.

The surrounding properties are predominantly residential along with a golf course and schools further east. North Rocks Shopping Centre is located 1.2 kilometres east of the site. A commuter car park exists on the other side of Barclay Road, with 89 parking spaces.

Figure 3.1: Subject site and its environs



Source: Advisian Oct 2020, Base image source: Nearmap October 2020

## 3.2. Transport Network

### 3.2.1. Road Hierarchy

Roads are classified according to the functions they perform. The main purpose of defining a road's functional class is to provide a basis for establishing the policies which guide the management of the road according to their intended service or qualities.

In terms of functional road classification, State roads are strategically important as they form the primary network used for the movement of people and goods between regions, and throughout the State. TfNSW is responsible for funding, prioritising and carrying out work on State roads. State roads generally include roads classified as freeways, state highways, and main roads under the Roads Act 1993, and the regulation to manage the road system is stated in the Australian Road Rules, most recently amended on 19 March 2018.

TfNSW defines four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility, to high accessibility and low mobility. These road classes are:

**Arterial Roads** – Controlled by TfNSW, typically no limit in flow and designed to carry vehicles long distance between regional centres.

**Sub-Arterial Roads** – Managed by either Council or TfNSW under a joint agreement. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through traffic between specific areas in a sub region or provide connectivity from arterial road routes (regional links).

**Collector Roads** – Provide connectivity between local sites and the sub-arterial road network, and typically carry between 2,000 and 10,000 vehicles per day.

**Local Roads** – Provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

### 3.2.2. Surrounding Road Network

Table 3.1: Road Network Summary

Road	Classification	Description	Photo
M2 Motorway	Arterial (State) Road	<ul style="list-style-type: none"> <li>East-west connector between Winston Hills and turning into the Lane Cove Tunnel and Warringah Freeway towards Sydney CBD</li> <li>100km/h speed limit near the site</li> <li>Six-lane, two-way configuration</li> <li>Dedicated bus lane and median contains the bus interchange</li> </ul>	
Renown Road/ Barclay Road/ North Rocks Road	Sub-Arterial (Regional) Road	<ul style="list-style-type: none"> <li>East-west connector between Baulkham Hills and Carlingford</li> <li>60km/h speed limit near the site</li> <li>Three-lane, two-way configuration</li> <li>12.5m road width and 20m road reserve</li> <li>Kerbside parking is not permitted near the site.</li> </ul>	
Perry Street	Local Road	<ul style="list-style-type: none"> <li>North-south orientation from Barclay Road for approx. 700m to a cul-de-sac</li> <li>50km/h speed limit</li> <li>Two-lane, two-way configuration</li> <li>Unrestricted kerbside parking is permitted.</li> </ul>	

### 3.3. Traffic Volumes

GTA commissioned vehicle turning movement counts at the Barclay Road/ Perry Street intersection (traffic light controlled), which also provides access to the existing Barclay Road Commuter Car park, on Tuesday 13 October 2020 during the following peak periods:

- 7:00am to 8:30am
- 5:00pm to 6:30pm.

The weekday AM and PM peak hours were found to occur from 8:00am to 9:00am and 5:00pm to 6:00pm respectively, with traffic volumes summarised in Table 3.2, alongside SCATS data for 16 October 2019 of the same intersection to understand any effects of Covid-19. Full survey results are provided in Appendix A.

Table 3.2: Existing weekday AM/ PM peak hour traffic volumes

Source	Time Period	Perry St	Barclay Rd E	Existing Commuter Car Park	Barclay Rd W	Grand Total
		Total	Total	Total	Total	
October 2019	7:30am - 8:30am	102	731	43	1,253	<b>2,129</b>
October 2020	7:30am - 8:30am	94	822	39	1,190	<b>2,145</b>
October 2019	5:00pm - 6:00pm	106	1,177	42	763	<b>2,088</b>
October 2020	5:00pm - 6:00pm	74	1,163	36	591	<b>1,864</b>

The difference in volumes have been outlined in Table 3.3.

Table 3.3: 2019 – 2020 Existing Volume Comparison

Time Period	Perry Street	Barclay Road E	Existing Commuter Car Park	Barclay Road W	Total
7:30am – 8:30am	108%	89%	110%	105%	<b>110%</b>
5:00pm – 6:00pm	143%	101%	129%	129%	<b>108%</b>

The comparison suggests there has been a reduction of approximately eight to 10 percent of total volume in 2020 compared to 2019 conditions that can be attributed to Covid-19. That said, the turning movement split and vehicle use class splits observed are expected to be mostly representative of normal operating conditions.

### 3.4. Intersection Operation

The operation of the study intersection has been assessed using SIDRA INTERSECTION<sup>1</sup> (SIDRA), a computer-based modelling package which calculates intersection operation.

<sup>1</sup> Program used under license from Akcelik & Associates Pty Ltd.

The commonly used measure of intersection operation, as defined by the TfNSW, is vehicle delay. SIDRA determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 3.4 shows the criteria that SIDRA adopts in assessing the level of service.

**Table 3.4: SIDRA level of service criteria**

Level of service (LOS)	Average delay per vehicle (secs/ veh)	Traffic signals, roundabout	Give way & stop sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but crash study required
D	43 to 56	Near capacity	Near capacity, crash study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 3.5 presents a summary of the existing operation of the intersection, with full results presented in Appendix B of this report. The modelling is based on 2019 SCATS volumes provided by TfNSW, with the recent traffic surveys used to determine directional split. This ensures the analysis best reflects 'business as usual' conditions prior to Covid-19.

**Table 3.5: Existing operating conditions (2019 SCATS volumes, 2020 directional and modal splits)**

Peak	Leg	Degree of saturation (DOS)	Average delay (sec)	95th percentile queue (m)	Level of service (LOS)
AM	Barclay Rd E	0.69	10	150	A
	Car Park Access	0.40	52	16	D
	Barclay Rd W	0.43	8	88	A
	Perry St	0.37	54	19	D
	<b>Overall</b>	<b>0.67</b>	<b>12</b>	<b>150</b>	<b>A</b>
PM	Barclay Rd E	0.82	10	288	A
	Car Park Access	0.50	61	20	E
	Barclay Rd W	0.23	6	40	A
	Perry St	0.59	67	24	E
	<b>Overall</b>	<b>0.82</b>	<b>13</b>	<b>288</b>	<b>A</b>

Table 3.5 indicates that the intersection of Barclay Road/ Perry Street currently operates satisfactorily. Given the high volume of traffic along Barclay Road, the traffic signals provide the majority of the green time to these through movements to manage queuing. This is evident by the longer delays for Perry Street and the existing commuter car park, although queues are only two to three vehicles.

### 3.5. Car Parking

#### 3.5.1. Supply

As part of the site inspection on 13 October 2020, GTA compiled an inventory of publicly available on-street and off-street car parking, notably:

- the existing Barclay Road Commuter Car Park
- Perry Street, up to 100 metres from the intersection with Barclay Road
- Barclay Road, 100 metres east and west of the Barclay Road/ Perry Street intersection
- Mill Drive, between Barclay Road and Larra Crescent
- Carlton Road, up to 100 metres east of the cul-de-sac.

The car parking survey area is shown indicatively in Figure 3.2, with the breakdown of the car parking supply and corresponding restrictions detailed in Table 3.6.

Figure 3.2: Car parking survey area



Base image source: Nearmap October 2020

**Table 3.6: Car parking supply**

Location	On/ Off Street	Time Restrictions	Supply
Barclay Road Commuter Car Park	Off Street	Unrestricted	89 (3 accessible)
Perry Street	On Street	Unrestricted	14
Barclay Road	On Street	No Parking	0
Mill Drive	On Street	Unrestricted	24
Carlton Drive	On Street	4P	7
	On Street	Unrestricted	10
<b>Total</b>			<b>144</b>

The inventory identified a total of 55 on-street spaces (including 48 spaces that are unrestricted during the day) and 89 off-street car parking spaces (including three accessible spaces) within the surveyed area indicated in Figure 3.2.

### 3.5.2. Demand

Parking demand spot checks were completed during the AM peak on Tuesday 13 October 2020. The results are summarised in Table 3.7.

**Table 3.7: Car parking demand**

Location	Restriction	Supply	Demand	
			7:00am	8:30am
North Rocks Commuter Car Park	Unrestricted	86 (+3 accessible)	53 (62%)	86 (100%)
Perry Street	Unrestricted	14	1 (7%)	14 (100%)
Barclay Road	No Parking	0	0	0
Mill Drive	Unrestricted	24	1 (4%)	3 (13%)
Carlton Drive	4P	7	1 (14%)	3 (42%)
	Unrestricted	10	7 (70%)	10 (100%)
<b>Total</b>		<b>144</b>	<b>63 (44%)</b>	<b>116 (81%)</b>

Table 3.7 indicates that on-street car parking demands in the nominated area are relatively high by 8:30am, with peak demands of 56 per cent (21 spaces vacant) for unrestricted kerbside parking and 42 per cent (four spaces vacant) for the 4-hour kerbside parking. The existing commuter car park is essentially full by 8:30am, with only the three accessible spaces vacant).

### 3.6. Public Transport

The new commuter car park is proposed to service the M2 Barclay Road Bus Interchange with a summary of the interchange provided in Table 3.8.

**Table 3.8: M2 Barclay Road Bus Interchange Details**

Element	Description
Bus Service Frequency	AM Peak: 1 per 5 – 10 minutes Inter-peak: 1 per 15 – 30 minutes PM Peak: 1 per 5 – 10 minutes Off-Peak: 1 per 30 minutes – 1 hour
Travel Time to CBDs	32 minutes to Sydney CBD 32 minutes to Parramatta CBD
No. of Platforms	Two platforms on an island platform, buses operate either side

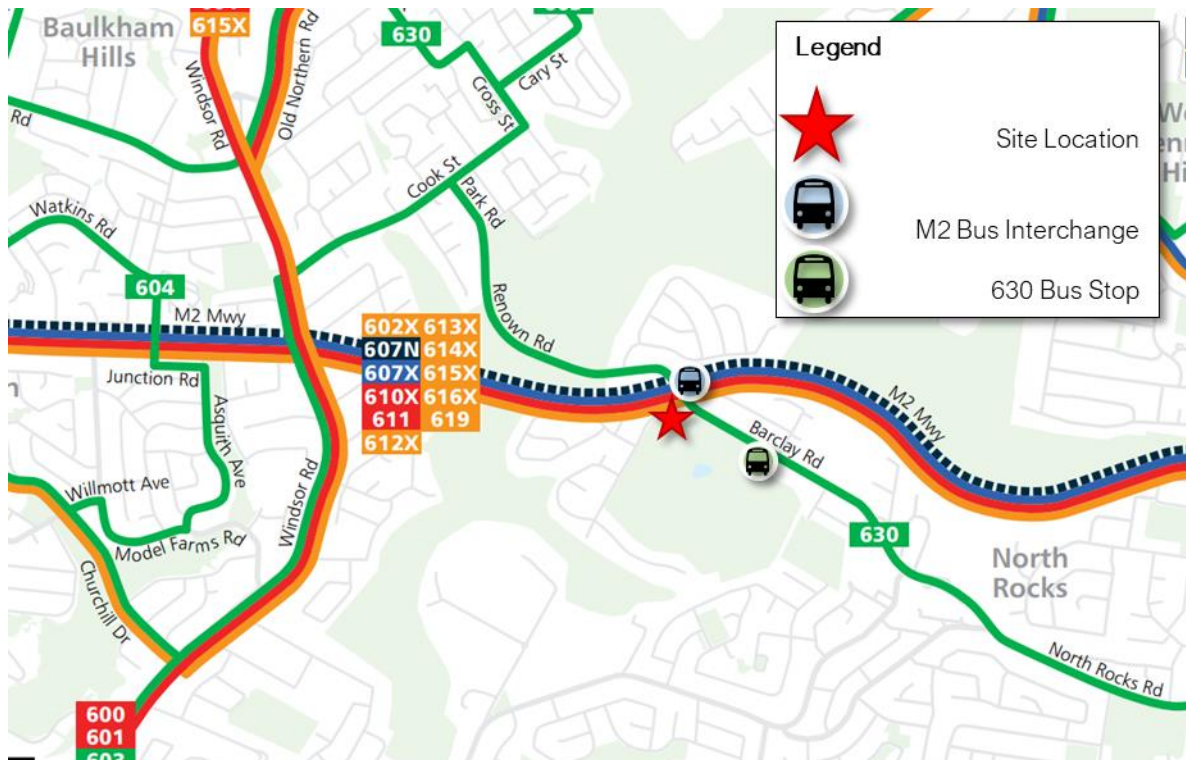
The bus routes available are shown in Table 3.9 and Figure 3.3.

**Table 3.9: Summary of bus routes past the site**

Route number	Route description	Frequency (peak/ inter-peak)	Route number	Route description	Frequency (peak/ inter-peak)
611	Macquarie Park to Blacktown via M2	15 mins/ 15 mins	612X	North Sydney to Castle Hill	5 min/ 20 min
619	Macquarie Park to Castle Hill via Baulkham Hills	15 mins/ 30 mins	613X	Bella Vista to City QVB	15 min/ 20 min
630	Blacktown/ Seven Hills to Epping	30 mins/ 60 mins	614X	Crestwood to City QVB	10 min/ 20 min
607N	City QVB to Tallawong Station via M2 Mwy & North West Twy	NIGHT SERVICE N/A/ 30 mins	615X	City QVB to North Kellyville	10 min/ 15 min
602X	Bella Vista Stn to North Sydney	10 mins/ 20 mins	616X	City QVB to Kellyville Ridge	5 min/ 10-20min
607X	Kellyville to City QVB via Lane Cove Tunnel	15 mins/ 20 mins	2047	Epping Stn to William Clarke College via M2	School Bus
610X	Kellyville to City QVB via Lane Cove Tunnel	10 mins/ 15 mins	8618	William Clarke College to Epping via Baulkham Hills	School Bus



Figure 3.3: Bus routes in the site vicinity



Base image source: Transport for NSW, accessed 14 October 2020

### 3.7. Walking and Cycling Infrastructure

Pedestrian paths are located as follows:

- Perry Street (west side) – 0.9-metre-wide path, providing access to Barclay Road
- Barclay Road (both sides) – 1.2-metre-wide path, providing access to the M2 Barclay Road Bus Interchange.

The Barclay Road/ Perry Street intersection has traffic lights, with pedestrian crossings on three of the four legs, with the excluded being the eastern leg.

Bike lockers are provided in the existing Barclay Road commuter car park for 10 bikes.

## 4. DEVELOPMENT PROPOSAL

### 4.1. North Rocks Commuter Car Park

The Proposal involves the construction of an at-grade car park in North Rocks, Sydney, as part of the Commuter Car Park Program which would provide customers with more convenient access to public transport at the M2 Barclay Road Bus Interchange and help ease congestion on the roads.

The Proposal would include the following key features:

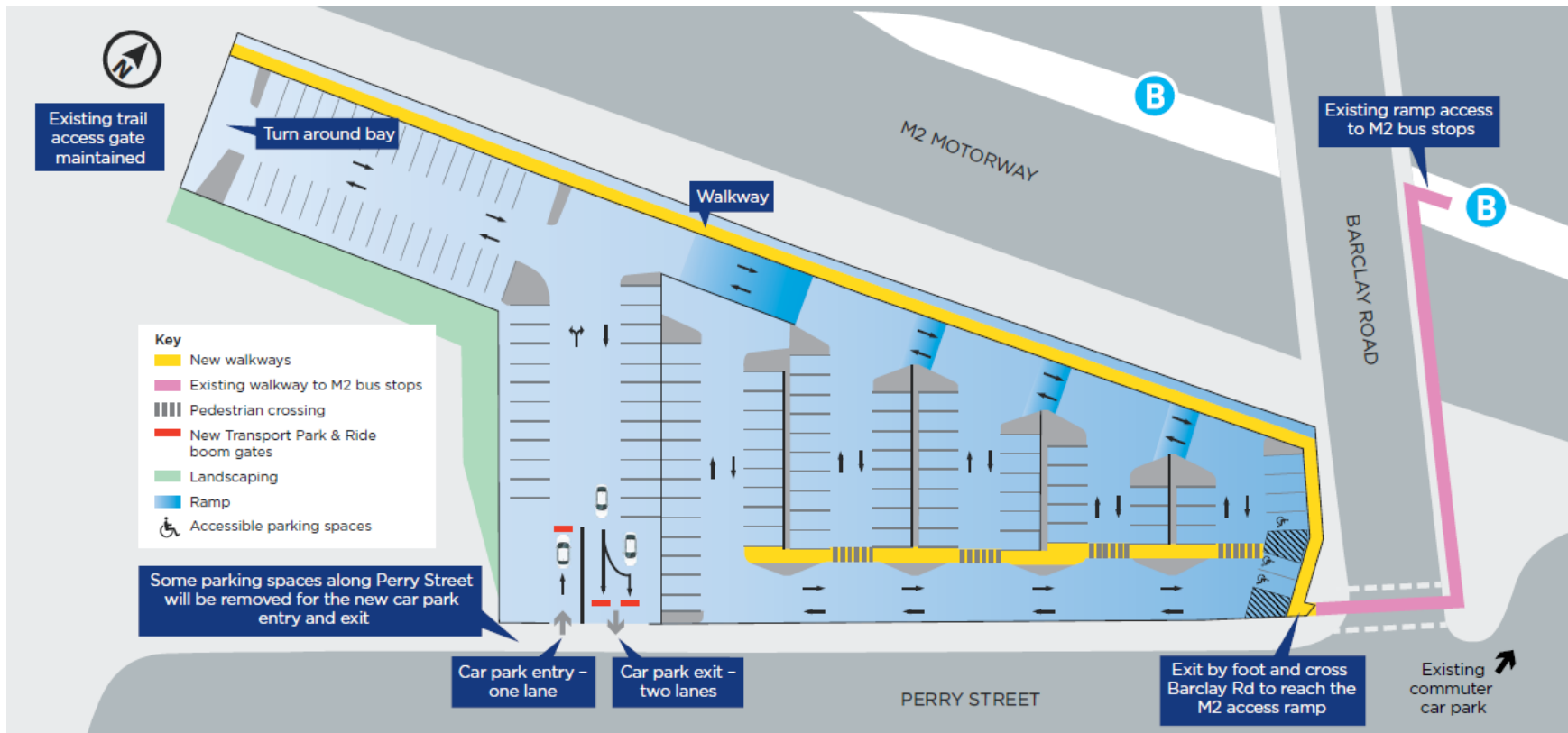
- enabling works including cut and fill bulk earthworks and site clearance of existing landscaping and perimeter trees
- provision of an at-grade car park, comprising:
  - around 135 car parking spaces
  - 3 accessible parking spaces, either within the existing Barclay Road Commuter Car Park or within the new commuter car park
  - wayfinding signage for pedestrian and vehicular circulation
  - new line-marking
  - retaining walls between car parking terraces
  - Transport Park & Ride infrastructure
- Landscaping works, including:
  - retaining wall along Perry Street
  - soft landscaping
  - pedestrian footpaths and lighting within the Proposal
- ancillary works including site investigations, stormwater drainage and on-site detention tank, services relocation and/or adjustments, installation of boom gates and handrails
- new infrastructure including CCTV cameras, subject to requirements resulting from the detailed design security risk workshop
- new driveway crossing and layback for vehicular entry and exit on Perry Street
- temporary site compounds for storage of equipment and materials, as well as site offices and amenities.

Subject to approval, construction is expected to commence in mid-2021 and take around 12 months to complete.

The car park site layout has been conceptually shown in Figure 4.1.

# DEVELOPMENT PROPOSAL

Figure 4.1: North Rocks Commuter Car Park



Source: Transport for NSW

# 5. TRAFFIC ASSESSMENT

## 5.1. Sight Line Assessment

The commuter car park access is proposed to be located directly opposite the Muirfield Golf Club car park access. This essentially creates a four-way intersection, which is considered appropriate as movement priorities are clear and there is sufficient separation from the Barclay Road intersection.

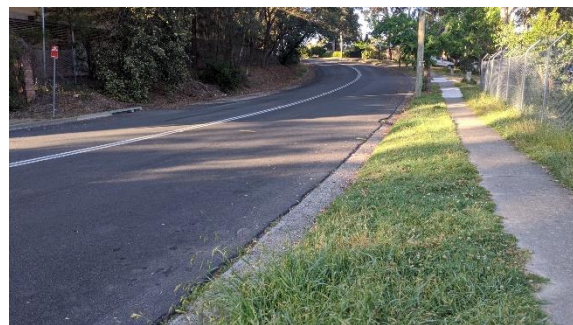
A review of available sight lines at the proposed commuter car park access was completed during the site inspection on 13 October 2020. A sight line inspection reviews the visibility of the road from a minor road approach or driveway at drivers' level. This assesses the ability for a driver to see enough of the road, hence approaching vehicles to identify appropriate gaps to turn into the traffic stream.

The available sight line is shown in Figure 5.1 and Figure 5.2, which illustrates there are no obstructions towards the traffic signals and at least 75 metres towards the south which is more than the desirable distance set out in Australian Standard 2890.1:2004.

Figure 5.1: Site Access, Facing North



Figure 5.2: Site Access, Facing South



## 5.2. Traffic Generation

### 5.2.1. Existing Commuter Car Park

To estimate the traffic generation of the new car park, reference has been made to the existing commuter car park on the northern side of Barclay Road and its peak hour vehicle movements. The existing car park is considered mostly reflective of the expected demand of the proposed car park, being that:

- it is in very close proximity of the proposed car park
- the proposed car park is expected to operate similarly in terms of providing free commuter car parking
- both car parks are expected to primarily service the M2 Barclay Road Bus Interchange.

There will be some differences with the operation of the two car parks, such as:

- The new commuter car park will have Transport Park & Ride boom gates
- the existing car park is likely to have peak traffic generation earlier than the new car park in the morning as commuters will fill it up first, being closer to the interchange
- the existing car park will continue to be primarily used for drop-off/ pick-up activities.

## AM Rates

The existing 89 space commuter car park generated 106 vehicle trips in the weekday AM peak hour (7:30am – 8:30am), including:

- 67 inbound
- 39 outbound.

Notably, most outbound trips are due to the car park reaching capacity, so cars enter, circulate, and then egress to find on-street parking. Nevertheless, it can be considered a conservative assessment, as the proposed car park is likely to reduce trips generated due to circulation. Hence, the trip rates in the AM peak hour are as follows:

- 0.75 inbound trips per space
- 0.44 outbound trips per space.

## PM Rates

The PM peak hour of the existing car park is slightly later than the intersection peak hour. Conservatively, the car park peak has been used to calculate trip rates. The existing commuter car park generated 61 vehicle trips in the weekday PM peak hour (5:30pm – 6:30pm), including:

- 19 inbound
- 42 outbound.

As such, the corresponding trip rates for the PM peak hour are as follows:

- 0.21 inbound trips per space
- 0.47 outbound trips per space.

### 5.2.2. Proposed Commuter Car Park

For the purposes of understanding the traffic generation of the proposed car park, the following adjustments have been made to the trip rates to better reflect the operation of the proposed car park:

- A proportion of the outbound trips in the AM peak hour were due to the existing commuter car park being at capacity; so, commuters would depart to find on-street parking. This is not expected to occur with the new car park during the broader peak hour, likewise, there would be minimal drop-off/ pick-up activities from the new car park. As such, outbound trips have been removed for the new car park, with these removed trips also been removed for inbound trips (to reflect no drop-off/ pick-up activities and that the car park will not be full in the peak hour), reducing the rate to 0.31 trips per space.
- The majority of the inbound trips in the PM peak hour were due to pick-up activities within the existing commuter car park. This is not expected to occur within the new car park; so, these trips have been removed. The corresponding PM peak hour trip rates for the new car park are expected to be 0.26 outbound trips per space, with no inbound trips.

As such, the trip rates that have been adopted for the new car park are summarised in Table 5.1

Table 5.1: Traffic generation rate for proposed car park

Use	AM Trip Generation Rate (trips/ space)			PM Trip Generation Rate (trips/ space)		
	In	Out	Total	In	Out	Total
Car Park	0.31	-	<b>0.31</b>	-	0.26	<b>0.26</b>

The anticipated peak hour traffic volumes generated by the new car park are set out in Table 5.2.

Table 5.2: Traffic generation anticipated for proposed car park

Use	Spaces	AM Trip Generation			PM Trip Generation		
		In	Out	Total	In	Out	Total
Car Park	130	40	-	<b>40</b>	-	34	<b>34</b>

Table 5.2 indicates that the site could potentially generate around 40 and 34 vehicle trips in the weekday AM and PM peak hours, respectively.

## 5.3. Distribution and Assignment

The directional distribution of arrivals and departures from the existing car park is the best representation of what to expect for the proposed car park. The directional distributions for the existing car park are summarised in Table 5.3.

Table 5.3: Directional distribution – existing car park

Time Period	Leg	Direction	Volume	Split
AM (7:30am – 8:30am) - In	Barclay Rd W	RT into Car park	45	70%
	Barclay Rd E	LT into Car park	19	30%
	Perry Street	Through into Car park	3	N/A
PM (5:30pm – 6:30pm) - Out	Perry Street	RT into Barclay Rd E	13	33%
		LT into Barclay Rd W	27	67%
		Through into Perry Street	1	N/A

It is noted that for the above assessment, all through movements from Perry Street (essentially a cul-de-sac) will not affect the directional split, as traffic from Perry Street is from the south and would access the proposed car park without entering the intersection. Applying these splits for the rates generated in Table 5.2 provides the volumes shown in Table 5.3.

Table 5.4: Directional generation estimates

Time Period	Leg	Direction	Volume
AM	Barclay Rd W	LT into Perry St	28
	Barclay Rd E	RT into Perry St	12
PM	Perry St	LT into Barclay Rd E	11
		RT into Barclay Rd W	23

Based on the above, Figure 5.3 and Figure 5.4 has been prepared to show the estimated marginal increase in turning movements at the intersection of Barclay Road and Perry Street near the proposed car park.

Figure 5.3: Proposed directional generation – AM

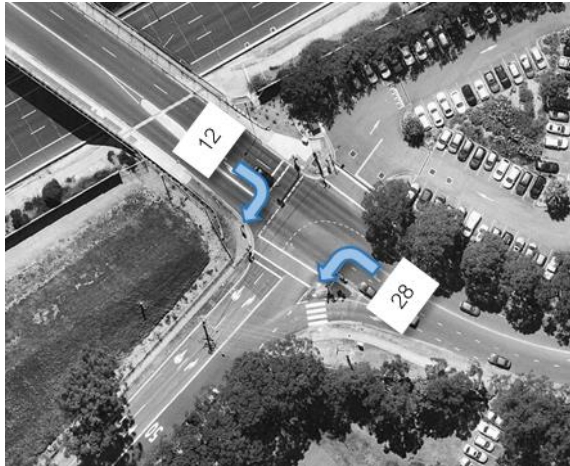


Figure 5.4: Proposed directional generation - PM



Base image source: Nearmap October 2020

## 5.4. Traffic Impact

The expected impact of the additional traffic generated by the new car park has been assessed using SIDRA. Table 5.5 summarises the anticipated future intersection operation, with additional detail found in Appendix B. This analysis is based on background traffic volumes prior to Covid-19 to best reflect 'business as usual' traffic conditions.

Table 5.5: Post development operation conditions

Peak	Leg	Existing Level of service (LOS)	Degree of saturation (DOS)	Average delay (sec)	95th percentile queue (m)	Level of service (LOS)
AM	Barclay Rd E	A	0.72	10	151	A
	Car Park Access	D	0.47	53	19	D
	Barclay Rd W	A	0.51	9	110	A
	Perry St	D	0.37	54	19	D
	<b>Overall</b>	<b>A</b>	<b>0.72</b>	<b>12</b>	<b>151</b>	<b>A</b>
PM	Barclay Rd E	A	0.82	10	285	A
	Car Park Access	E	0.39	61	15	E
	Barclay Rd W	A	0.23	6	39	A
	Perry St	E	0.60	67	24	E
	<b>Overall</b>	<b>A</b>	<b>0.82</b>	<b>13</b>	<b>285</b>	<b>A</b>

Table 5.5 illustrates that the study intersection is expected to retain similar operation to existing conditions, with only a minor increase in delay determined.

As such, compared against existing traffic volumes near the site, the additional traffic generated by the proposed car park could not be expected to compromise the safety or function of the surrounding road network.



# 6. OVERVIEW CONSTRUCTION TRAFFIC MANAGEMENT

## 6.1. Introduction

This section sets out a preliminary assessment of the construction traffic and pedestrian management initiatives for consideration during the construction of the proposed car park.

The appointed contractor(s) will be required to prepare a detailed Construction Traffic and Pedestrian Management Plan (CTPMP) that provides traffic and pedestrian management measures to be implemented during the construction based on the selected construction methodology. This CTPMP would include, but not be limited to:

- construction vehicle access routes
- construction site access and circulation arrangements
- construction personnel parking provisions and management measures
- stage by stage construction traffic volumes
- impact of construction activities on the surrounding transport network with consideration of pedestrians, cyclists, public transport, road network and nearby construction sites
- mitigation and management measures to minimise the impact during construction.

Traffic Control Plans would be prepared to accompany the detailed CTPMP to appropriately manage traffic and pedestrians near the construction site.

The overall principles of traffic management during construction include:

- minimising the impact on pedestrian movements
- maintaining appropriate public transport access
- minimising the impact to existing traffic on adjacent roads and intersections
- maintaining access to/ from any adjacent properties
- restricting construction vehicle movements to designated routes to/ from the site
- managing and controlling construction vehicle activity near the site
- ensuring construction activity is carried out in accordance with the approved hours of works.

## 6.2. Construction Details

### 6.2.1. Description of Works

The proposal is for the construction of a new at-grade car park on vacant land near the M2 Barclay Road Bus Interchange.

# OVERVIEW CONSTRUCTION TRAFFIC MANAGEMENT

## 6.2.2. Site Compound Area

The compound area within the site is expected to be initially located within the southwest section of the site and occupies approximately 550 square metres. The compound may be relocated to different areas within the site as construction activities progress.

Figure 6.1: Proposed compound area



Source: Transport for NSW

## 6.2.3. Work Period

Construction will take approximately twelve months to complete. Subject to planning approval, construction is expected to start in mid-2021 and be completed by mid-2022.

## 6.2.4. Anticipated Work Hours

The majority of the work would be completed during standard (NSW) Environment Protection Authority (EPA) construction hours, which are as follows:

- 7:00am to 6:00pm Monday to Friday
- 8:00am to 1:00pm Saturdays
- no work on Sundays or public holidays.

The appointed contractor will be responsible for instructing and controlling all subcontractors regarding the hours of work.

Certain work may need to occur outside standard hours and would include night works. Out of hours works are required in some cases to minimise disruptions to customers, pedestrians, motorists and

nearby sensitive receivers. Such works or deliveries required outside the approved construction hours will be subject to specific prior approval from TfNSW.

Approval from TfNSW would be required for any out of hours work and the affected community would be notified as outlined in Transport for NSW's *Construction Noise and Vibration Strategy*.

### 6.3. Construction Workers

It is anticipated that there will be up to 40 workers on site at peak construction (approximately three weeks) during asphalt layering, with an average of 18 on-site at other times.

It is expected that no parking for construction workers will be provided on site. Workers that drive will be advised to avoid parking in the existing commuter car park or on-street near the bus interchange to prioritise local commuters.

Workers would be advised to use public transport, where possible, with appropriate tool/ equipment drop-off arrangements provided on site. Given the anticipated work hours, workers will tend to arrive and depart the site outside of the road network peak hours.

### 6.4. Site Access and/ or Work Zones

Access to the site will be provided by Perry Street. It is expected that all loading and unloading activities can be contained wholly within the site for most construction activities.

Construction of a new wider layback and kerb fronting the site will require the temporary closure of at least the kerbside parking lane. This will require a Road Opening and Temporary Occupancy Permit from City of Parramatta.

### 6.5. Anticipated Truck Movements

It is anticipated that the construction activities would generate two to 10 trucks per hour across the construction program and 30 to 50 truck movements daily during peak activities (a 6-8 week period).

Anticipated construction traffic volumes will be able to be appropriately accommodated within existing traffic volumes on the surrounding road network.

### 6.6. Designated Truck Routes

The directional distribution and assignment of traffic generated by the construction activities will be influenced by several factors, most notably the origin/ destination of materials, site access points and the configuration of the arterial road network.

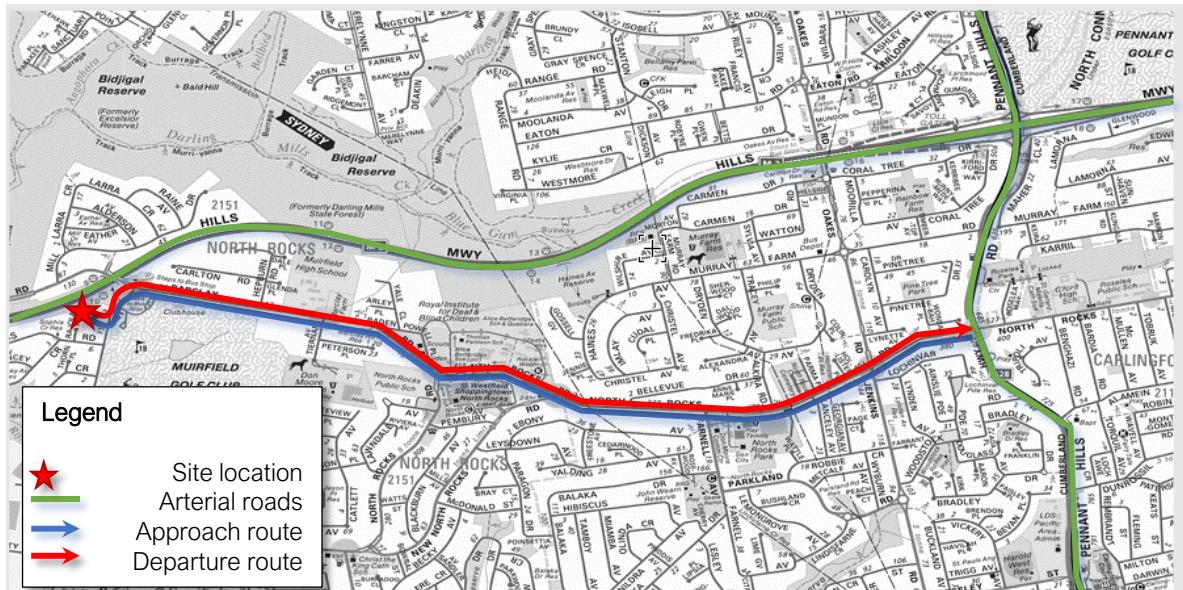
The movement of all construction vehicles will be restricted to designated routes and confined to the regional road network. Since there is no intersection between Barclay Road and the Hills M2 Motorway, trucks are expected to use the following approach and departure routes:

- Approach: M2 Motorway, Pennant Hills Road, North Rocks Road, Barclay Road and Perry Street.
- Departure: Perry Street, Barclay Road, North Rocks Road, Pennant Hills Road and M2 Motorway.

The anticipated truck routes are shown in Figure 6.2.

# OVERVIEW CONSTRUCTION TRAFFIC MANAGEMENT

Figure 6.2: Indicative Truck Routes to/from Pennant Hills Road



Basemap source: Sydney Publishing Pty Ltd

## 6.7. Pedestrian and Cyclist Management

The construction activities are expected to have minimal impact on pedestrian and cyclist movements near the site as Perry Street acts as a cul-de-sac environment. The site access(es) will be managed and controlled by accredited traffic controllers. The traffic controllers will aim to priority pedestrians, cyclists and general traffic over construction vehicles, where practical.

## 7. CONCLUSION

Based on the analysis and discussions presented within this report, the following conclusions are made:

1. The M2 Barclay Road Bus Interchange is a key bus station providing public transport access to the Sydney and Parramatta CBDs, as well as other key centres.
2. Currently, the combined (on-street and off-street) parking approaches full occupancy by 8:30am.
3. TfNSW seeks to develop an additional commuter car park for the bus interchange, supplementing the existing commuter car park and reducing the need for on-street car parking.
4. The proposal will provide approximately 135 parking spaces to increase the car parking capacity of the interchange.
5. The proposal is expected to generate in the order of 40 and 34 vehicle trips in the weekday AM and PM peak hours, respectively.
6. SIDRA modelling of the Barclay Road/ Perry Street intersection shows that there is likely to be minimal impact as a result of the additional trips, so the proposal would have negligible impact to the existing road network.
7. A preliminary construction traffic and pedestrian management review has been completed to inform the preparation of a detailed CTPMP by the appointed contractor based on the selected construction methodology.

# A. TRAFFIC SURVEYS

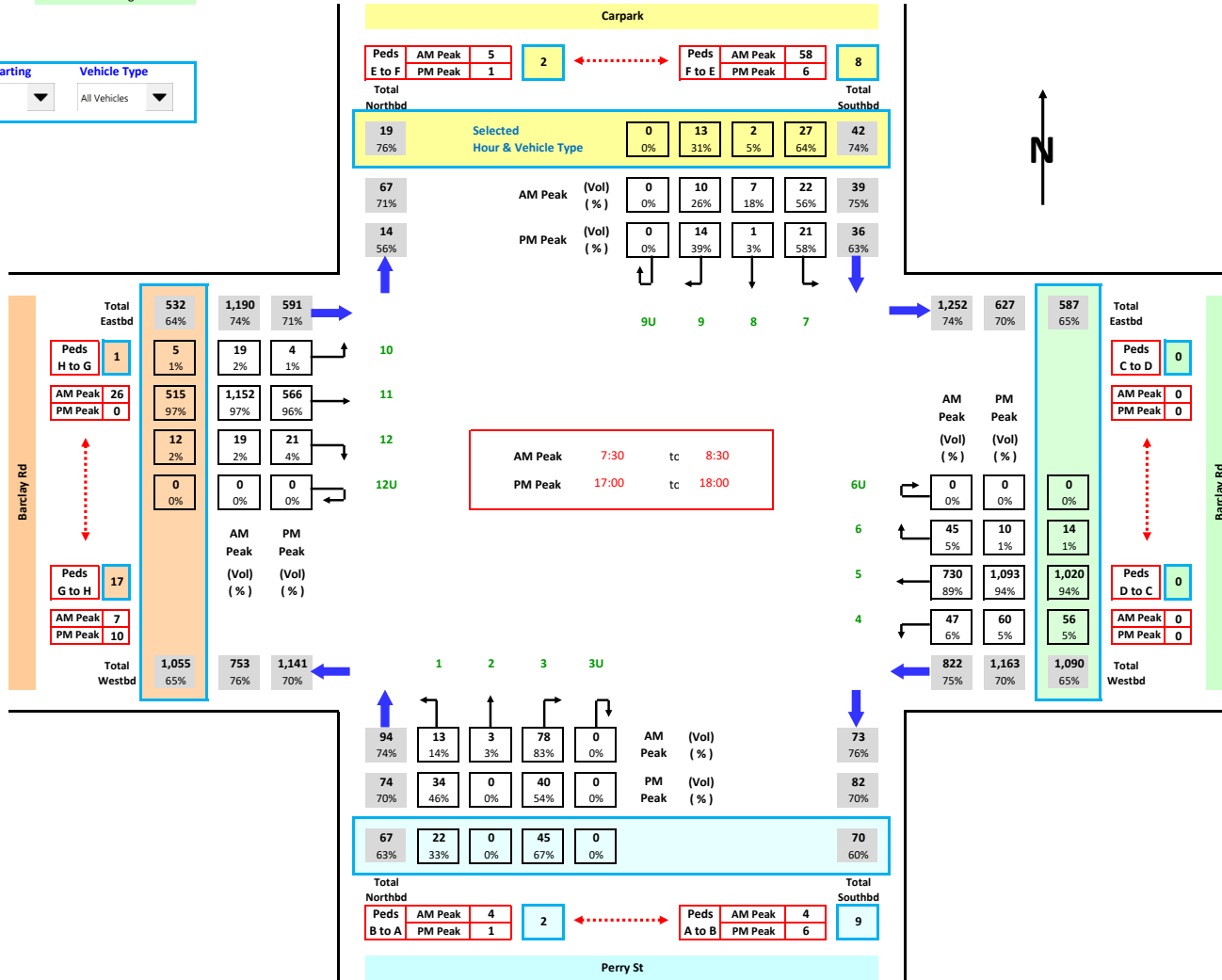


Job No. : N5987  
 Client : GTA  
 Suburb : North Rocks  
 Location : 1. Barclay Rd / Perry St

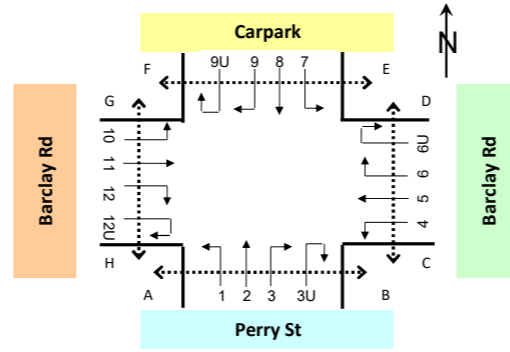
Day/Date : Tue, 13th October 2020  
 Weather : Fine  
 Description : Classified Intersection Count  
 : Intersection Diagram



Hour Starting: 17:30  
 Vehicle Type: All Vehicles



**Job No.** : N5987  
**Client** : GTA  
**Suburb** : North Rocks  
**Location** : 1. Barclay Rd / Perry St  
**Day/Date** : Tue, 13th October 2020  
**Weather** : Fine  
**Description** : Classified Intersection Count  
 : 15 mins Data

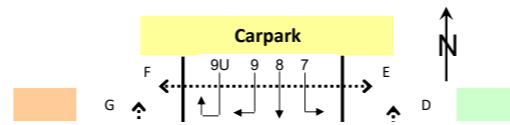


Classifications	Class 1	Class 2	Class 3
	Cars	Trucks	Buses

Approach	Perry St												Barclay Rd																							
	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)							
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 7:15	7	0	0	7	0	0	0	0	9	0	0	9	0	0	0	0	5	1	0	6	98	0	0	98	10	0	0	10	0	0	0	0				
7:15 to 7:30	3	0	0	3	0	0	0	0	14	0	0	14	0	0	0	0	13	0	0	13	126	3	1	130	11	0	0	11	0	0	0	0				
7:30 to 7:45	2	0	0	2	1	0	0	1	20	0	0	20	0	0	0	0	17	0	0	17	124	2	3	129	13	0	0	13	0	0	0	0				
7:45 to 8:00	5	0	0	5	0	0	0	0	18	1	0	19	0	0	0	0	12	1	0	13	191	0	2	193	11	0	0	11	0	0	0	0				
8:00 to 8:15	4	1	0	5	2	0	0	2	20	0	0	20	0	0	0	0	6	0	0	6	164	0	1	165	8	0	0	8	0	0	0	0				
8:15 to 8:30	1	0	0	1	0	0	0	0	17	1	1	19	0	0	0	0	10	1	0	11	241	0	2	243	13	0	0	13	0	0	0	0				
<b>AM Totals</b>	<b>22</b>	<b>1</b>	<b>0</b>	<b>23</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>98</b>	<b>2</b>	<b>1</b>	<b>101</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>63</b>	<b>3</b>	<b>0</b>	<b>66</b>	<b>944</b>	<b>5</b>	<b>9</b>	<b>958</b>	<b>66</b>	<b>0</b>	<b>0</b>	<b>66</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>				
17:00 to 17:15	8	0	0	8	0	0	0	0	8	0	0	8	0	0	0	0	15	0	0	15	282	1	0	283	3	0	0	3	0	0	0	0				
17:15 to 17:30	12	0	0	12	0	0	0	0	11	0	0	11	0	0	0	0	15	1	0	16	259	0	1	260	2	0	0	2	0	0	0	0				
17:30 to 17:45	10	0	0	10	0	0	0	0	9	1	0	10	0	0	0	0	11	0	0	11	266	2	1	269	2	0	0	2	0	0	0	0				
17:45 to 18:00	4	0	0	4	0	0	0	0	11	0	0	11	0	0	0	0	17	1	0	18	279	1	1	281	3	0	0	3	0	0	0	0				
18:00 to 18:15	5	0	0	5	0	0	0	0	12	0	0	12	0	0	0	0	13	0	0	13	250	0	1	251	3	0	0	3	0	0	0	0				
18:15 to 18:30	3	0	0	3	0	0	0	0	12	0	0	12	0	0	0	0	14	0	0	14	218	0	1	219	6	0	0	6	0	0	0	0				
<b>PM Totals</b>	<b>42</b>	<b>0</b>	<b>0</b>	<b>42</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>63</b>	<b>1</b>	<b>0</b>	<b>64</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>85</b>	<b>2</b>	<b>0</b>	<b>87</b>	<b>1,554</b>	<b>4</b>	<b>5</b>	<b>1,563</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>				

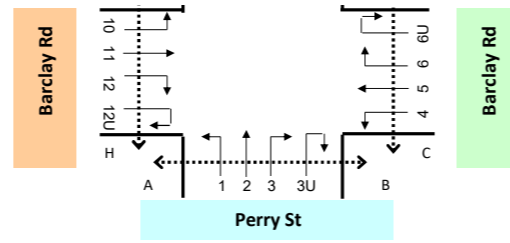
Approach	Carpark												Barclay Rd												Crossing Pedestrians																											
	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)				B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H	Total											
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total				
7:00 to 7:15	3	0	0	3	0	0	0	0	1	0	0	1	0	0	0	0	3	0	0	3	184	1	2	187	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	10											
7:15 to 7:30	6	0	0	6	0	0	0	0	3	0	0	3	0	0	0	0	3	0	0	3	218	0	0	218	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	9											
7:30 to 7:45	7	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	285	2	2	289	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	10											
7:45 to 8:00	5	0	0	5	0	0	0	0	4	0	0	4	0	0	0	0	5	0	0	5	302	0	1	303	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	31											
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8:15 to 8:30	7	0	0	7	6	0	0	6	2	0	0	2	0	0	0	0	4	0	0	4	224	3	4	231	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	22											
<b>AM Totals</b>	<b>31</b>	<b>0</b>	<b>0</b>	<b>31</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>25</b>	<b>1,540</b>	<b>8</b>	<b>9</b>	<b>1,557</b>	<b>22</b>	<b>0</b>	<b>1</b>	<b>23</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>64</b>	<b>8</b>	<b>32</b>	<b>8</b>	<b>123</b>			
17:00 to 17:15	4	0	0	4	0	0	0	0	3	0	0	3	0	0	0	0	1	0	0	1	137	0	0	137	7	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5						
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17:45 to 18:00	7	0	0	7	0	0	0	0	2	0	0	2	0	0	0	0	3	0	0	3	118	1	1	120	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7					
18:00 to 18:15	8	0	0	8	1	0	0	1	2	0	0	2	0	0	0	0	2	0	0	2	111	0	0	111	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11					
18:15 to 18:30	6	0	0	6	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	123	0	0	123	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11				
<b>PM Totals</b>	<b>35</b>	<b>0</b>	<b>0</b>	<b>35</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>797</b>	<b>1</b>	<b>2</b>	<b>800</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>2</b>	<b>1</b>	<b>20</b>	<b>46</b>

**Job No.** : N5987  
**Client** : GTA





Suburb : North Rocks  
 Location : 1. Barclay Rd / Perry St  
 Day/Date : Tue, 13th October 2020  
 Weather : Fine  
 Description : Classified Intersection Count  
 : Hourly Summary



Approach	Perry St																Barclay Rd																							
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)											
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total				
7:00 to 8:00	17	0	0	17	1	0	0	1	61	1	0	62	0	0	0	0	47	2	0	49	539	5	6	550	45	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0
7:15 to 8:15	14	1	0	15	3	0	0	3	72	1	0	73	0	0	0	0	48	1	0	49	605	5	7	617	43	0	0	43	0	0	0	0	0	0	0	0	0	0	0	0
7:30 to 8:30	12	1	0	13	3	0	0	3	75	2	1	78	0	0	0	0	45	2	0	47	720	2	8	730	45	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0
<b>AM Totals</b>	<b>22</b>	<b>1</b>	<b>0</b>	<b>23</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>98</b>	<b>2</b>	<b>1</b>	<b>101</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>63</b>	<b>3</b>	<b>0</b>	<b>66</b>	<b>944</b>	<b>5</b>	<b>9</b>	<b>958</b>	<b>66</b>	<b>0</b>	<b>0</b>	<b>66</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
17:00 to 18:00	34	0	0	34	0	0	0	0	39	1	0	40	0	0	0	0	58	2	0	60	1,086	4	3	1,093	10	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0
17:15 to 18:15	31	0	0	31	0	0	0	0	43	1	0	44	0	0	0	0	56	2	0	58	1,054	3	4	1,061	10	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0
17:30 to 18:30	22	0	0	22	0	0	0	0	44	1	0	45	0	0	0	0	55	1	0	56	1,013	3	4	1,020	14	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
<b>PM Totals</b>	<b>42</b>	<b>0</b>	<b>0</b>	<b>42</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>63</b>	<b>1</b>	<b>0</b>	<b>64</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>85</b>	<b>2</b>	<b>0</b>	<b>87</b>	<b>1,554</b>	<b>4</b>	<b>5</b>	<b>1,563</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Approach	Carpark																Barclay Rd																Crossing Pedestrians																								
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)																												
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	B to A	A to B	D to C	C to D	F to E	E to F	H to G	G to H	Total								
7:00 to 8:00	21	0	0	21	0	0	0	0	8	0	0	8	0	0	0	0	13	0	0	13	989	3	5	997	13	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	29	6	17	3	60
7:15 to 8:15	21	0	0	21	1	0	0	1	11	0	0	11	0	0	0	0	18	0	0	18	1,132	4	3	1,139	17	0	1	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	1	0	54	5	19	5	91				
7:30 to 8:30	22	0	0	22	7	0	0	7	10	0	0	10	0	0	0	0	19	0	0	19	1,138	7	7	1,152	18	0	1	19	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	58	5	26	7	104								
<b>AM Totals</b>	<b>31</b>	<b>0</b>	<b>0</b>	<b>31</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>25</b>	<b>1,540</b>	<b>8</b>	<b>9</b>	<b>1,557</b>	<b>22</b>	<b>0</b>	<b>1</b>	<b>23</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>64</b>	<b>8</b>	<b>32</b>	<b>8</b>	<b>123</b>												
17:00 to 18:00	21	0	0	21	1	0	0	1	14	0	0	14	0	0	0	0	4	0	0	4	563	1	2	566	21	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	1	6	0	0	6	1	0	10	24								
17:15 to 18:15	25	0	0	25	2	0	0	2	13	0	0	13	0	0	0	0	5	0	0	5	537	1	2	540	19	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0	0	8	2	1	11	30								
17:30 to 18:30	27	0	0	27	2	0	0	2	13	0	0	13	0	0	0	0	5	0	0	5	513	1	1	515	12	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	2	9	0	0	8	2	1	17	39								
<b>PM Totals</b>	<b>35</b>	<b>0</b>	<b>0</b>	<b>35</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>797</b>	<b>1</b>	<b>2</b>	<b>800</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>2</b>	<b>1</b>	<b>20</b>	<b>46</b>												

# B.SIDRA RESULTS

# B

# USER REPORT FOR SITE

 Project: 201019sid-N198560 Barclay Road Perry St Carpark Existing

Template: GTA Appendix

## Site: 101 [Existing 2020 Barclay Perry AM]

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

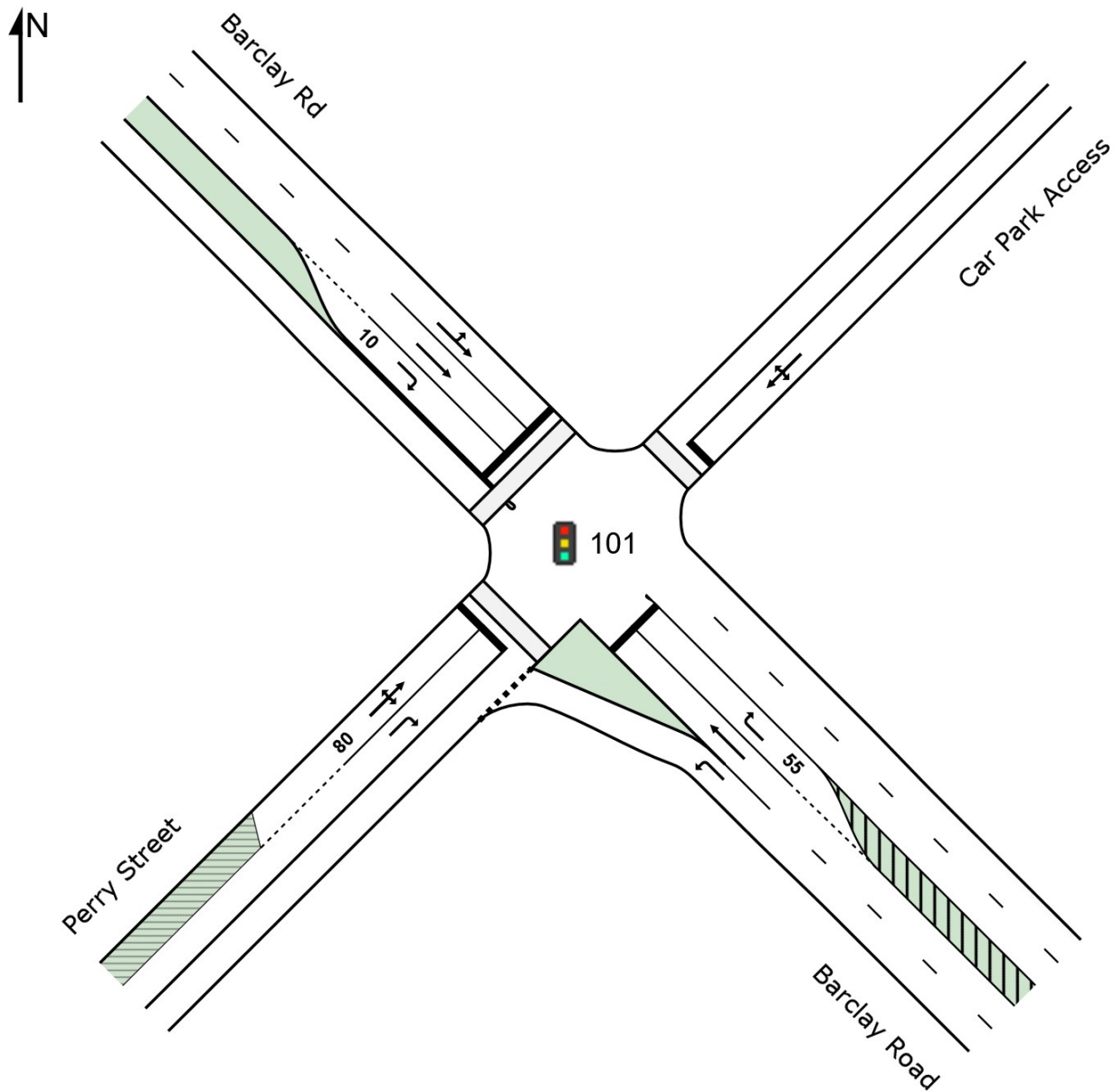
Reference Phase: Phase A

Input Phase Sequence: A, B\*, C\*, D\*, E, F\*

Output Phase Sequence: A, D\*, E

(\* Variable Phase)

### Site Layout



### Phase Timing Summary

Phase	A	D	E
Phase Change Time (sec)	0	74	86
Green Time (sec)	68	6	8
Phase Time (sec)	74	12	14
Phase Split	74%	12%	14%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Average Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Barclay Road												
21	L2	52	4.1	0.036	6.1	LOS A	0.2	1.3	0.14	0.58	0.14	50.1
22	T1	806	1.3	0.693	9.3	LOS A	21.3	150.6	0.60	0.54	0.60	52.0
23	R2	49	0.0	0.185	18.1	LOS B	1.3	8.8	0.53	0.71	0.53	34.2
Approach		907	1.4	0.693	9.6	LOS A	21.3	150.6	0.57	0.56	0.57	51.0
NorthEast: Car Park Access												
24	L2	25	0.0	0.403	52.3	LOS D	2.3	16.0	1.00	0.74	1.00	21.1
25	T1	8	0.0	0.403	52.3	LOS D	2.3	16.0	1.00	0.74	1.00	15.1
26	R2	12	0.0	0.403	52.3	LOS D	2.3	16.0	1.00	0.74	1.00	21.1
Approach		45	0.0	0.403	52.3	LOS D	2.3	16.0	1.00	0.74	1.00	20.1
NorthWest: Barclay Rd												
27	L2	18	0.0	0.434	13.3	LOS A	12.4	87.9	0.49	0.45	0.49	39.0
28	T1	1079	1.2	0.434	7.6	LOS A	12.4	87.9	0.48	0.44	0.48	53.3
29	R2	18	5.9	0.067	22.2	LOS B	0.5	3.7	0.58	0.69	0.58	38.5
Approach		1115	1.2	0.434	7.9	LOS A	12.4	87.9	0.48	0.44	0.48	52.8
SouthWest: Perry Street												
30	L2	15	7.1	0.367	54.3	LOS D	2.6	18.9	0.99	0.75	0.99	26.6
31	T1	3	0.0	0.367	54.8	LOS D	2.6	18.9	0.99	0.75	0.99	15.1
32	R2	88	3.6	0.367	54.3	LOS D	2.6	18.8	0.99	0.75	0.99	26.6
Approach		106	4.0	0.367	54.3	LOS D	2.6	18.9	0.99	0.75	0.99	26.3
All Vehicles		2174	1.4	0.693	11.8	LOS A	21.3	150.6	0.55	0.51	0.55	49.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P6	NorthEast Full Crossing	66	44.3	LOS E	0.2	0.2	0.94	0.94	
P7	NorthWest Full Crossing	35	44.2	LOS E	0.1	0.1	0.94	0.94	
P8	SouthWest Full Crossing	8	44.2	LOS E	0.0	0.0	0.94	0.94	
All Pedestrians		109	44.3	LOS E			0.94	0.94	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

## Site: 101 [Existing 2020 Barclay Perry PM]

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 115 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

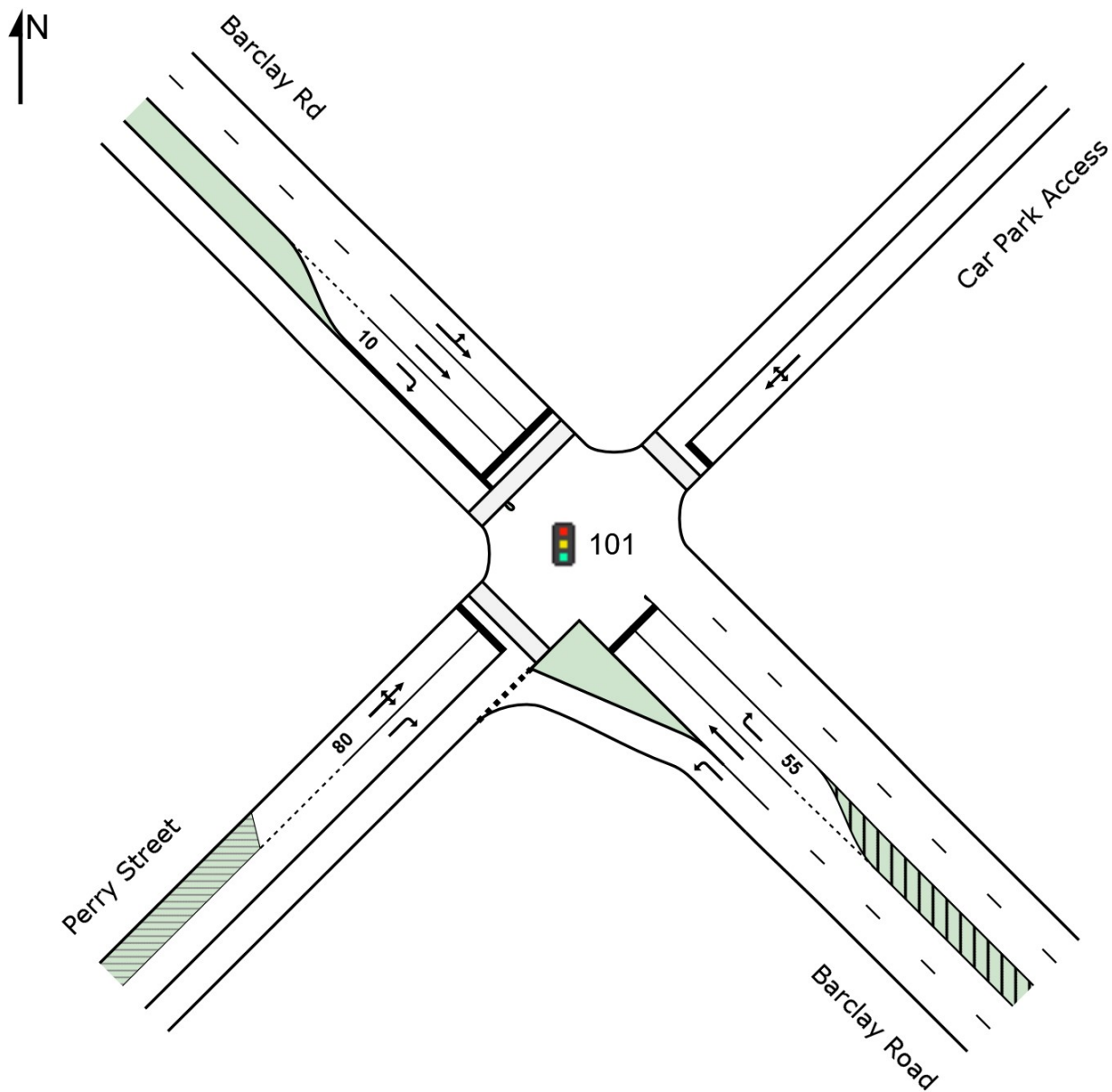
Reference Phase: Phase A

Input Phase Sequence: A, B\*, C\*, D\*, E, F\*

Output Phase Sequence: A, D\*, E

(\* Variable Phase)

### Site Layout



### Phase Timing Summary

Phase	A	D	E
Phase Change Time (sec)	0	91	103
Green Time (sec)	85	6	6
Phase Time (sec)	91	12	12
Phase Split	79%	10%	10%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Barclay Road												
21	L2	82	3.8	0.057	6.3	LOS A	0.4	3.0	0.15	0.59	0.15	50.1
22	T1	1153	0.8	0.820	10.2	LOS A	40.8	287.6	0.70	0.66	0.70	51.4
23	R2	14	0.0	0.025	11.6	LOS A	0.2	1.7	0.33	0.64	0.33	38.0
Approach		1248	1.0	0.820	9.9	LOS A	40.8	287.6	0.66	0.66	0.66	51.2
NorthEast: Car Park Access												
24	L2	28	0.0	0.499	61.4	LOS E	2.8	19.9	1.00	0.74	1.00	19.5
25	T1	1	0.0	0.499	61.4	LOS E	2.8	19.9	1.00	0.74	1.00	13.7
26	R2	19	0.0	0.499	61.4	LOS E	2.8	19.9	1.00	0.74	1.00	19.5
Approach		48	0.0	0.499	61.4	LOS E	2.8	19.9	1.00	0.74	1.00	19.3
NorthWest: Barclay Rd												
27	L2	4	0.0	0.230	10.5	LOS A	5.7	40.0	0.34	0.30	0.34	41.0
28	T1	602	0.5	0.230	4.9	LOS A	5.7	40.0	0.33	0.29	0.33	55.5
29	R2	22	0.0	0.161	33.7	LOS C	0.9	6.2	0.71	0.72	0.71	33.3
Approach		628	0.5	0.230	5.9	LOS A	5.7	40.0	0.34	0.31	0.34	54.4
SouthWest: Perry Street												
30	L2	52	0.0	0.585	66.7	LOS E	3.4	23.6	1.00	0.77	1.06	23.9
31	T1	1	0.0	0.585	67.2	LOS E	3.4	23.6	1.00	0.77	1.06	13.3
32	R2	60	1.8	0.585	66.7	LOS E	3.4	23.6	1.00	0.77	1.07	23.9
Approach		113	0.9	0.585	66.7	LOS E	3.4	23.6	1.00	0.77	1.07	23.8
All Vehicles		2038	0.8	0.820	13.1	LOS A	40.8	287.6	0.59	0.56	0.59	48.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P6	NorthEast Full Crossing	7	51.7	LOS E	0.0	0.0	0.95	0.95	
P7	NorthWest Full Crossing	11	51.7	LOS E	0.0	0.0	0.95	0.95	
P8	SouthWest Full Crossing	7	51.7	LOS E	0.0	0.0	0.95	0.95	
All Pedestrians		25	51.7	LOS E			0.95	0.95	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

## Site: 101 [Proposed 2020 Barclay Perry AM]

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

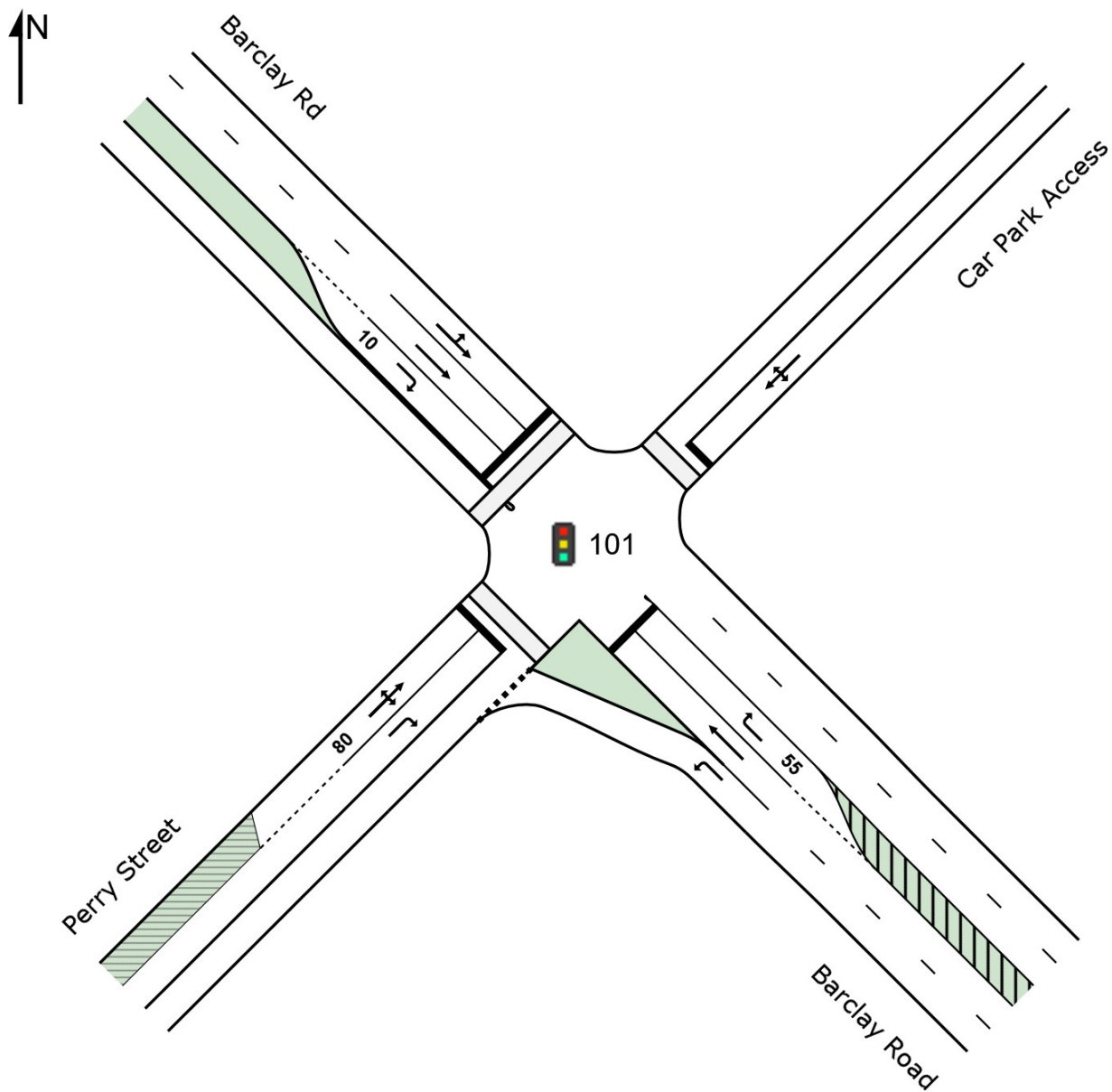
Reference Phase: Phase A

Input Phase Sequence: A, B\*, C\*, D\*, E, F\*

Output Phase Sequence: A, D\*, E

(\* Variable Phase)

### Site Layout



### Phase Timing Summary

Phase	A	D	E
Phase Change Time (sec)	0	74	86
Green Time (sec)	68	6	8
Phase Time (sec)	74	12	14
Phase Split	74%	12%	14%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Barclay Road												
21	L2	81	2.6	0.058	6.3	LOS A	0.4	2.6	0.17	0.59	0.17	50.9
22	T1	806	1.3	0.717	9.3	LOS A	21.3	150.6	0.60	0.54	0.60	52.0
23	R2	49	0.0	0.231	20.3	LOS B	1.4	9.7	0.58	0.72	0.58	33.1
Approach		937	1.3	0.717	9.6	LOS A	21.3	150.6	0.56	0.56	0.56	51.0
NorthEast: Car Park Access												
24	L2	29	0.0	0.468	52.7	LOS D	2.7	18.7	1.00	0.74	1.00	21.1
25	T1	9	0.0	0.468	52.7	LOS D	2.7	18.7	1.00	0.74	1.00	15.0
26	R2	14	0.0	0.468	52.7	LOS D	2.7	18.7	1.00	0.74	1.00	21.1
Approach		53	0.0	0.468	52.7	LOS D	2.7	18.7	1.00	0.74	1.00	20.1
NorthWest: Barclay Rd												
27	L2	20	0.0	0.506	13.8	LOS A	15.6	110.1	0.53	0.49	0.53	38.6
28	T1	1224	1.2	0.506	8.0	LOS A	15.6	110.1	0.51	0.47	0.51	52.9
29	R2	33	3.2	0.120	22.6	LOS B	0.9	6.7	0.60	0.71	0.60	38.7
Approach		1277	1.2	0.506	8.5	LOS A	15.6	110.1	0.51	0.47	0.51	52.4
SouthWest: Perry Street												
30	L2	15	7.1	0.367	54.3	LOS D	2.6	18.9	0.99	0.75	0.99	26.6
31	T1	3	0.0	0.367	54.8	LOS D	2.6	18.9	0.99	0.75	0.99	15.1
32	R2	88	3.6	0.367	54.3	LOS D	2.6	18.8	0.99	0.75	0.99	26.6
Approach		106	4.0	0.367	54.3	LOS D	2.6	18.9	0.99	0.75	0.99	26.3
All Vehicles		2373	1.4	0.717	12.0	LOS A	21.3	150.6	0.56	0.52	0.56	49.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P6	NorthEast Full Crossing	66	44.3	LOS E	0.2	0.2	0.94	0.94	
P7	NorthWest Full Crossing	35	44.2	LOS E	0.1	0.1	0.94	0.94	
P8	SouthWest Full Crossing	8	44.2	LOS E	0.0	0.0	0.94	0.94	
All Pedestrians		109	44.3	LOS E			0.94	0.94	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.



## Site: 101 [Proposed 2020 Barclay Perry PM]

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 115 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

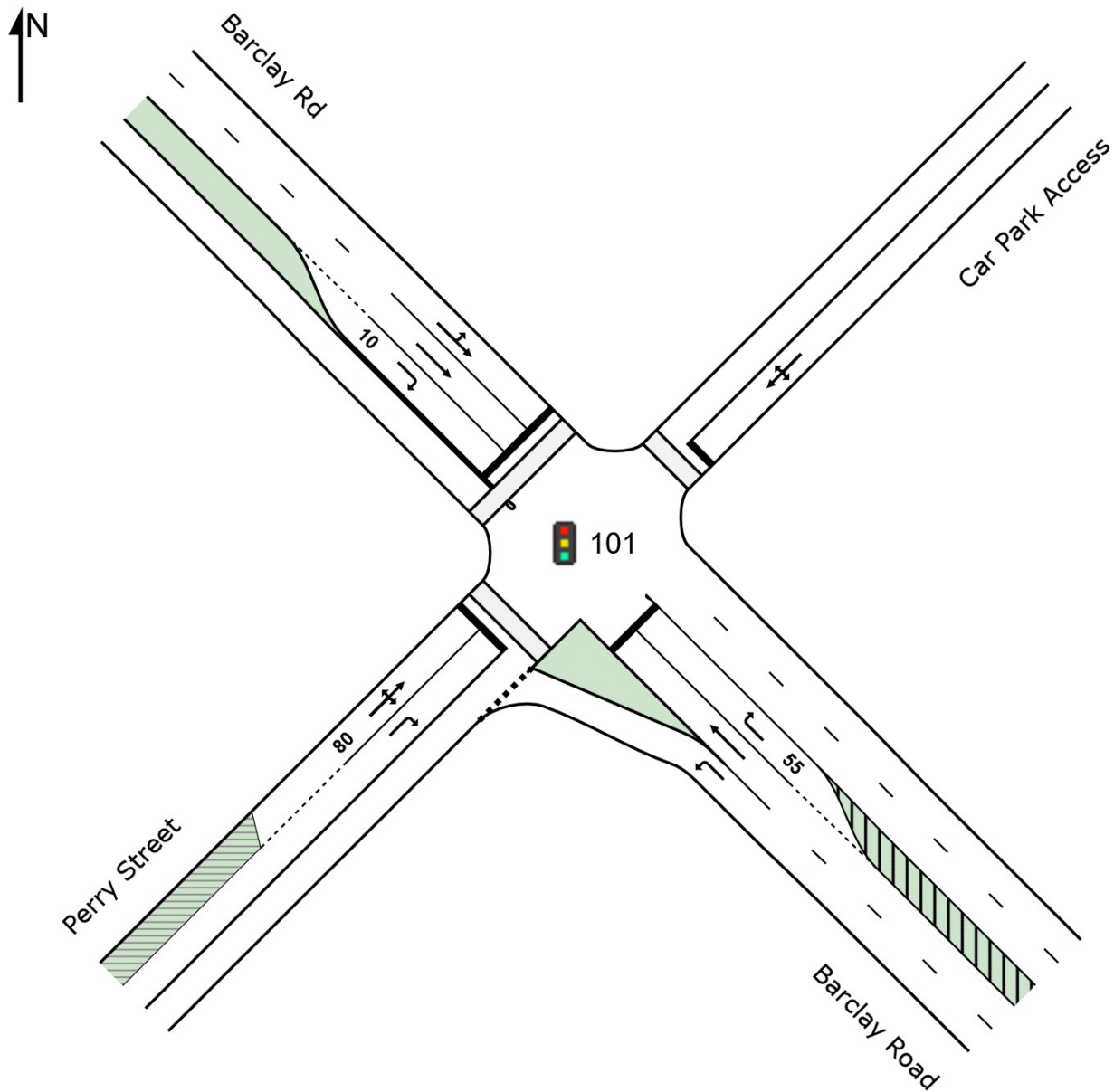
Reference Phase: Phase A

Input Phase Sequence: A, B\*, C\*, D\*, E, F\*

Output Phase Sequence: A, D\*, E

(\* Variable Phase)

### Site Layout



### Phase Timing Summary

Phase	A	D	E
Phase Change Time (sec)	0	91	103
Green Time (sec)	85	6	6
Phase Time (sec)	91	12	12
Phase Split	79%	10%	10%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Barclay Road												
21	L2	79	2.7	0.054	6.3	LOS A	0.4	2.8	0.15	0.59	0.15	50.1
22	T1	1151	0.6	0.818	10.1	LOS A	40.5	285.4	0.70	0.66	0.70	51.4
23	R2	14	0.0	0.025	11.6	LOS A	0.2	1.7	0.33	0.64	0.33	38.0
Approach		1243	0.8	0.818	9.9	LOS A	40.5	285.4	0.66	0.65	0.66	51.2
NorthEast: Car Park Access												
24	L2	22	0.0	0.391	60.8	LOS E	2.2	15.4	1.00	0.73	1.00	19.5
25	T1	1	0.0	0.391	60.8	LOS E	2.2	15.4	1.00	0.73	1.00	13.8
26	R2	15	0.0	0.391	60.8	LOS E	2.2	15.4	1.00	0.73	1.00	19.6
Approach		38	0.0	0.391	60.8	LOS E	2.2	15.4	1.00	0.73	1.00	19.4
NorthWest: Barclay Rd												
27	L2	4	0.0	0.228	10.5	LOS A	5.6	39.4	0.34	0.30	0.34	41.0
28	T1	596	0.5	0.228	4.9	LOS A	5.6	39.4	0.33	0.29	0.33	55.5
29	R2	22	0.0	0.160	33.6	LOS C	0.9	6.2	0.71	0.72	0.71	33.3
Approach		622	0.5	0.228	5.9	LOS A	5.6	39.4	0.34	0.31	0.34	54.4
SouthWest: Perry Street												
30	L2	47	0.0	0.596	67.0	LOS E	3.4	24.1	1.00	0.78	1.07	24.0
31	T1	1	0.0	0.596	67.3	LOS E	3.4	24.1	1.00	0.78	1.07	13.4
32	R2	66	1.6	0.596	67.2	LOS E	3.4	24.1	1.00	0.78	1.07	24.0
Approach		115	0.9	0.596	67.2	LOS E	3.4	24.1	1.00	0.78	1.07	23.9
All Vehicles		2018	0.7	0.818	12.9	LOS A	40.5	285.4	0.59	0.55	0.59	48.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P6	NorthEast Full Crossing	7	51.7	LOS E	0.0	0.0	0.95	0.95	
P7	NorthWest Full Crossing	11	51.7	LOS E	0.0	0.0	0.95	0.95	
P8	SouthWest Full Crossing	7	51.7	LOS E	0.0	0.0	0.95	0.95	
All Pedestrians		25	51.7	LOS E			0.95	0.95	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)  
 Pedestrian movement LOS values are based on average delay per pedestrian movement.  
 Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

