APPENDIX I

Traffic Assessment and Addendum

TRAFFIC AND PARKING IMPACT ASSESSMENT OF

MIXED USE RESIDENTIAL & RETAIL/COMMERCIAL DEVELOPMENT

AT 32 - 42 BROOKS PARADE, 2-10 SHARP STREET & 5-11 EDGAR STREET, BELMONT

Address: Shop 7, 720 Old Princes Highway Sutherland NSW 2232
Postal: P.O Box 66 Sutherland NSW 1499

Telephone: +61 2 8355 2440
Fax: +61 2 9521 7199
Web: www.mclarentraffic.com.au
Email: admin@mclarentraffic.com.au

Division of RAMTRANS Australia ABN: 45067491678

Transport Planning, Traffic Impact Assessments, Road Safety Audits, Expert Witness

16160.01FB – 28th November 2016

Development Type: Mixed Use Residential & Retail/Commercial Development

Site Address: 32 - 42 Brooks Parade, 2-10 Sharp Street & 5-11 Edgar Street, Belmont

Prepared for: Coeve Design

Document reference: 16160.01FB

Status	Issue	Prepared By	Checked By	Date
Draft	A	TL	HC	April 2016
Final	A	HC	CM	16th August 2016
Final	B	HC	CM	28th November 2016

TABLE OF CONTENTS

1 INTRODUCTION

M^{C}Laren Traffic Engineering (MTE) was commissioned by *Coeve Design* to provide a Traffic and Parking Impact Assessment of the Mixed Use Residential & Retail/Commercial Development at 32 - 42 Brooks Parade, 2-10 Sharp Street & 5-11 Edgar Street, Belmont as shown in **Annexure A**.

1.1 Description and Scale of Development

The proposed mixed use development includes 130 units divided between four blocks above mixed commercial and retail space with basement carpark. The development consists of the following:

- 20 One-bedroom + study units
- 10 Two-bedroom units
- 78 Two-bedroom + study units
- 9 Three-bedroom units
- 13 Three-bedroom + study units
- 506 m^2 Commercial / retail GFA
- 169 Residential spaces (15 allocated to visitors)
- 19 Commercial/retail car parking spaces

1.2 State Environmental Planning Policy (Infrastructure) 2007

The proposed development does not qualify as a development with relevant size and/or capacity under Clause 104 of the SEPP (Infrastructure) 2007. Accordingly, formal referral to the Roads and Maritime Services (RMS) is not necessary and Lake Macquarie Council officers can determine this proposal accordingly.

1.3 Site Description

The subject site is currently occupied by residential and commercial lots that will be combined to accommodate the proposed development. The site has three boundaries facing local roads with its western boundary being a drainage spillway. Vehicular access to the site will be via two driveways, a commercial / visitor carpark to the east Sharp Street and driveway to the north on Edgar Street which accesses a basement car park.

The site is generally surrounded by low to medium density residential dwellings as well as small retail and medium commercial businesses.

1.4 Site Context

Site Location

FIGURE 1: SITE CONTEXT – AERIAL PHOTO

Site Location

FIGURE 2: SITE CONTEXT – STREET MAP

2 EXISTING TRAFFIC AND PARKING CONDITIONS

2.1 Road Hierarchy

Brooks Parade has the following characteristics within close proximity to the site:

- Unclassified LOCAL road
- Approximately 12m in width facilitating one lane in each direction
- Signposted 50km/h; 40km/hr in areas of high pedestrian activity
- Unrestricted kerbside parking permitted along both sides of the road

Edgar Street has the following characteristics within close proximity to the site:

- Unclassified LOCAL road
- Approximately 12m in width facilitating two-way passing
- Signposted 50km/h speed limit
- Unrestricted kerbside parking permitted along both sides of the road

Sharp Street has the following characteristics within close proximity to the site:

- Unclassified LOCAL road
- Approximately 12m in width facilitating two-way passing
- Signposted 50km/h speed limit
- 1 hour restricted kerbside parking along both sides of the road

2.2 Existing Traffic Management

- Round-a-bout controlled intersection of Herbert Street and Edgar Street.

2.3 Existing Traffic and Parking Environment

Traffic surveys undertaken in July 2016 showed generally light traffic volumes at the Edgar Street / Herbert Street roundabout.

Traffic counts were completed at the intersection of Edgar Street / Herbert Street on Thursday 21 July 2016, representing a typical weekday. The survey sheets are provided in **Annexure C**.

2.3.1 Intersection Performances

Existing intersection performances have been assessed using SIDRA INTERSECTION 6.1. The SIDRA output is provided in **Annexure D** and summarised in **Table 1** below.

TABLE 1: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 6.1)

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
EXISTING PERFORMANCE						
Edgar St / Herbert St / Property Access	AM	0.086	5.5 (7.7)	**A** (Worst: A)	Round-about	RT from Edgar St.
	PM	0.141	5.4 (7.7)	**A** (Worst: A)		RT from Edgar St.

NOTES:

(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.

(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

As shown above, the surrounding intersections are operating satisfactorily at Level of Service (LoS) A during the morning and afternoon peak periods. This represents minimal delays and additional capacity.

2.4 Public Transport

The subject site has access to existing bus routes 310 and 318 provided by Newcastle Buses which runs through Brooks Parade, with the nearest bus stop located near the intersection of Brooks Parade and Maude Street. Route 318 provides local access around Belmont whilst route 310 provides intercity access to Newcastle via Charlestown.

Site Location

3 PARKING ASSESSMENT

3.1 Car Parking Requirement

The subject site is zoned B4 – Mixed Use as per Sheet 010CA of Council's LEP 2014.

The *Lake Macquarie City Council DCP 2014 Revision 7, Part 4 – Development within Business Zones* Table 6 provides the following car parking rate:

Residential Flat Building – Criteria A

1 bedroom – 0.5 space per unit

2 bedroom – 0.75 spaces per unit

3 bedroom – 1.0 space per unit

Visitor parking – 1 per 4 units

Business & Office

1 space per 40m² GFA

Shops or Group of Shops - <5,000m² GFA

1 space per 25m² GFA

TABLE 1: DCP PARKING REQUIREMENTS

Type	Scale	Rate	Spaces Required
Residential	20 x 1 bed	0.5 per unit	10
	88 x 2 bed	0.75 per unit	66
	22 x 3	1 per unit	22
Residential Visitor	130	1 per 4 units	32.5
Commercial / retail	506m²	1/40m² to 1/25m²	12.7 to 20.2 Spaces
Total	**-**	**-**	**143.2 to 150.7 car spaces**

As shown above, the proposal requires a total of 143 to 151 car spaces, whereby the range is based on either a commercial or retail outcome for the non–residential floor space.

The proposal details a total of 169 car parking spaces, representing a surplus of 18 to 26 car parking spaces, however it is considered that the requirement of 143 to 151 car parking spaces could warrant reduction based on the following factors:

- Developments which propose mixed uses often result in a “dual use” outcome, whereby non-residential parking is shared amongst users. The dual use of residential visitor parking and the commercial / retail parking is appropriate due to the offset peak parking accumulation of the two uses. Residential visitor peak parking occurs Friday and Weekday evenings, often outside of business hours or when commercial / retail uses are not at peak operation.

3.2 Bicycle & Motorcycle parking Requirements

Lake Macquarie City Council DCP 2014 Revision 7, Part 4 – Development within Business Zones Section 5.3 requires the following with respect to bicycle parking:

For customers and short term users;

Three bike parking spaces or

One bike parking space for each 20 car parking spaces, whichever is the greater.

For employees

One bike parking space for each 20 employees, or part thereof

Therefore, based on the above bicycle rate applied to the upper requirement of 53 non-residential car parking spaces (i.e 32.5 residential visitor parking plus 20.2 retail parking spaces), the development requires a minimum of three (3) bicycle spaces for retail / commercial customers and residential visitors. Whilst employee density is unknown at this stage, it is considered that 2 bicycle racks for staff would be suitable (which would be compliant for 40 staff members).

Lake Macquarie City Council DCP 2014 Revision 7, Part 4 – Development within Business Zones Section 5.4 requires the following with respect to motorcycle parking:

One motorbike parking space for each 20 car parking spaces

Based on the required 145 to 153 car spaces, 7 to 8 motorcycle spaces would be required.

3.3 Servicing & Loading

Lake Macquarie City Council DCP 2014 Revision 7, Part 9 – Residential Flat Building Section 13.14 states the following:

Kerbside collection may only occur when:

- *Mobile garbage bins (MGBs) are utilised, and can be accommodated on the subject property frontage at a rate of one MGB per 2.5 metres of available property frontage; or*
- *The development is not greater than three storeys high; or*
- *The development contains no more than 16 dwellings.*

Lake Macquarie City Council Waste Management Guideline specifies the following in regard to waste collection:

If access onto the site is required and Council agrees to collect waste on the site or permits the on-site collection by a private contractor, the following matters should be considered:

- *The convenient placement of waste storage and recycling areas and/or rooms,*
- *Location of the area away from living/working space in buildings,*
- *The area should be weather protected,*
- *Appropriate signposting, such as for recycling bins,*
- *Proposed truck sizes to be entering the site,*
- *Adequate driveway widths and height at entrance ways – minimum driveway width of 3.5 metres, maximum grade of 1:8, minimum vertical clearance 4.3 metres,*
- *Structural capability of driveway to carry fully loaded waste collection vehicles,*
- *On-site manoeuvrability – turning circles or three point turn arrangements so that vehicles enter and leave the site moving in a forward direction, minimum turning circle 21.7 metres*

Council's DCP does not strictly require on-site loading, however if on-site loading is to be provided then it must achieve certain design outcomes as listed above.

Although not specified, a vehicle with 21.7 metres turning circle and 4.3m minimum vertical clearance is equivalent, albeit slightly larger than an 8.8m Medium Rigid Vehicle (MRV) as listed by AS2890.2:2002 which requires 4.5m vertical clearance and operates with a 20m turning circle but smaller than a 12.5m Heavy Rigid Vehicle which operates with a 25m turning circle.

The site proposes to provide an on-site waste collection bay accessed from Sharp Street. The loading bay requires a reverse manoeuvre into the bay from Sharp Street. Whilst this reverse manoeuvre is contrary to Council's DCP, it is considered that this variation is justified by the following:

- Sharp Street is the lower order road in comparison to Brooks Parade and Edgar Street
- The frequency of waste collection is expected to be relatively low and outside of peak commuter hours
- Strict application of Council's DCP does not require an on-site loading provision, and thus the provision of any loading facility is beneficial.

3.4 Disabled Parking

Lake Macquarie City Council DCP 2014 Revision 7, Part 4 – Development within Business Zones Table 6 requires the following:

1 space per 50 spaces. Where the requirement is between 5 and 50 spaces, at least 1 space is to be provided for persons with a disability.

Furthermore, *Lake Macquarie City Council DCP 2014 Revision 7, Part 9 – Residential Flat Building* Section 13.13 requires the following:

1) *For proposal for more than 10 dwellings, one adaptable dwelling must be provided for every 10 dwellings*
2) *Adaptable dwellings must have a car park linked to the dwelling by an unobstructed path of travel, at a suitable gradient for wheelchair access*
3) *Adaptable dwelling must have entries, doors and passageways that are of suitable dimensions to facilitate wheelchair access*
4) *Adaptable dwellings must be designed and constructed to meet the performance requirements stated in Clause 2.2 and to include the essential features listed in Appendix A of AS 4299.*

Further to the above, Appendix A of AS4299 lists car parking, 3.8m x 6.0m as an essential required feature.

Therefore, based on Council's DCP and AS4299, one (1) disabled space is required for non-residential tenants (i.e. residential visitor and commercial / retail) whilst a minimum of 13 adaptable dwellings are to be provided with appropriate disabled parking measuring minimum 3.8m in width. AS4299 allows a concession to car parking lengths from 6.0m reduced to 5.4m.

The appropriate design outcome for residential tenants are a disabled space measuring 3.8m in width by 5.4m in length whilst non-residential tenant parking shall be provided with a 2.4m wide space and an adjacent 2.4m wide shared zone as per AS2890.6:2009.

The plans allocated 12adaptable units and 12 disabled spaces for residential tenants, and a further 2 disabled spaces for non-residential uses.

3.5 Access Design

The proposal details an entry and exit driveway directly from the existing roundabout controlled intersection of Edgar Street & Herbert Street, creating a fourth leg on the western side of this intersection. This driveway provides access to 150 car parking spaces, containing all residential allocated spaces (135 spaces) and 15 visitor spaces.

A secondary access is proposed off Sharp Street providing access to 19 visitor car parking spaces only.

With respect to the driveway onto the existing roundabout at Edgar Street & Herbert Street, consideration is given to AUSTROADS Guide to Road Design Part 4B – Roundabouts which requires the following design criterion (based on Figure 3.1 as shown in **Annexure E**):

1) Should provide the desirable Approach Sight Distance for the new leg. Distance based on the absolute minimum Approach Sight Distance using the 85th percentile speed on the entry curve
2) Should provide adequate sight distance for drivers to detect an acceptable gap of 4s to 5s. Refer to Table 3.1 of the Guide
3) Provide sight triangle to allow recognition of potential conflict

Further to the above, Section 4.10.2 of the AUSTROADS Guide outlines the following:

> *Generally, it is desirable that the gradient on approaches to roundabouts be limited to 3% to 4% and should not exceed 6%. Whilst the gradient may extend along part of the length of the entry curve it is essential that on:*
>
> • *An uphill approach – a flat area (say 2 – 3% maximum) is provided on the immediate approach to the roundabout to accommodate the length of one design vehicle. This flat area will assist heavy vehicles to start up and move into gaps, ensure that capacity is not unduly compromised and also assist with respect to sight distance*
> • *A downhill approach – a sag curve will be required to match the higher gradient to a 3% positive superelevation on the roundabout.*

Based on an approach speed of 10km/h to 20km/h, the ASD requirement would be 6.6 to 15.5m. A 15km/h approach speed would require an ASD of 10.8m. it is considered that a 15km/h approach speed is a conservative approach.

In this regard, the proposed driveway achieves 3.5m verge width plus a 7.3m ramp length (at 5%) achieving the 10.8m considered to be acceptable sight distance to approach the roundabout.

3.6 Car Park Design & Compliance

Referring to **Annexure F**, the car park design and access has been assessed in accordance with AS2890.1:2004 and AS2890.6:2009 where applicable and has found to be compliant. The on-site parking achieves the following:

- Residential tenant spaces measure 2.4m wide by 5.4m in length
- Residential visitor spaces measure 2.5m wide by 5.4m in length
- Minimum aisle width in the basement level is 5.8m complying with User Class 1, 1A & 2
- Retail parking spaces provided at 2.6m wide by 5.4m in length
- Minimum aisle width on the ground floor is 6.2m which exceeds the requirements of User Class 3.
- Additional 300mm clearance provided to obstructions and walls
- Disabled parking spaces provide sufficient loading areas adjacent to parking spaces
- Minimum headroom of 2.2m for passenger cars achieved in all areas, increasing to 2.5m above disabled parking spaces and shared zones.

It is noted that typically a condition of consent can be placed upon the development to achieve compliance with Australian Standards, with design and construction certificates required to be provided for the off-street parking.

4 TRAFFIC ASSESSMENT

The impact of the expected traffic generation levels associated with the subject proposal is discussed in the following sub-sections.

4.1 Traffic Generation

The RTA (now RMS) Guide to Traffic Generation Developments details the following traffic generation rates:

High Density Residential
0.29 trips per unit

Commercial
2 trips per 100m²

Retail
5.6 trips per 100m²

The high density residential trip generation is adopted from the RMS Guide for High Density development in sub-regional areas. The Technical Direction adopts a revised traffic generation level of 0.15 to 0.19 trips per unit however it is considered that the 0.29 is a more appropriate outcome given the sites location outside of Sydney with limited access to a rail network, with only high frequency buses servicing the area.

The traffic generation is summarised in **Table 2** below.

TABLE 2: TRAFFIC GENERATION OF SITE

Type	Scale	Trip Rate	Traffic Generation
Residential	130	0.29 per unit	38 trips
Commercial / retail	506m²	2/100m² to 5.6/100m²	10 to 28 trips
Total	**-**	**-**	**48 to 66 trips**

As shown above, the proposal is estimated to generate between 48 and 66 peak hour vehicle trips. As a worst case scenario, it is assumed that the retail peak hour traffic generation occurs in the AM, despite the likely retail uses would peak during the evening only.

The traffic generation split is as follows:

AM
30 residential movements outbound; 8 residential movements inbound
Up to 14 retail movements outbound; 14 retail movements inbound
Total of 44 outbound movements and 22 inbound movements

PM
8 residential movements outbound; 30 residential movements inbound
Up to 14 retail movements outbound; 14 retail movements inbound

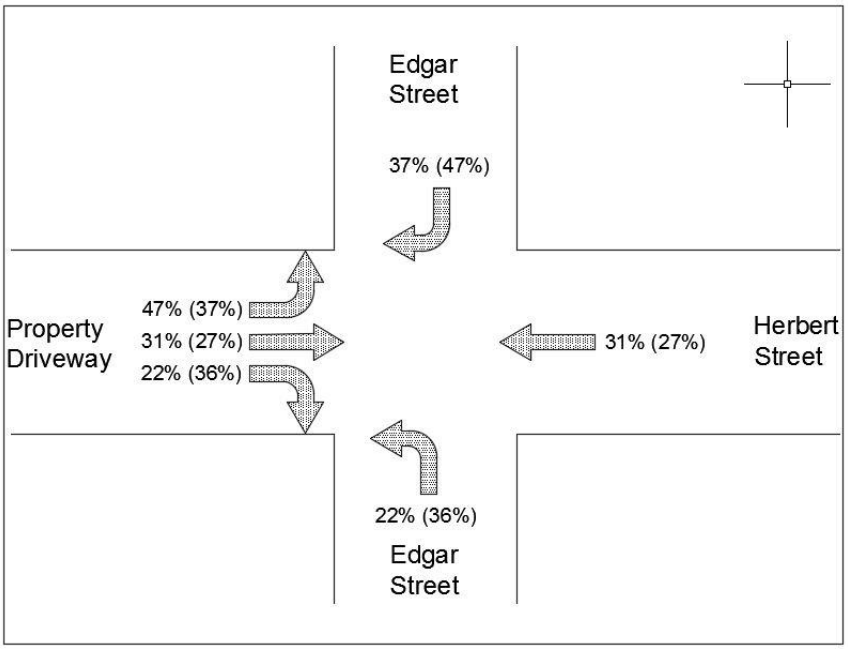
Total of 22 movements outbound and 44 movements inbound

The site will demolish Ten (10) existing residential dwellings (3 along Edgar Street, 5 along Sharp Street and 2 along Brooks Parade) and three (3) commercial / retail properties along Brooks Parade. The ten existing dwellings are assumed to generate 10 vehicle trips during the morning and evening peak hour whilst the existing retail and commercial premises along Brooks Parade have been assumed to generate 13 to 36 vehicle trips based on a combined floor area of 650m^2 (this floor area is based on an approximation of the floor area). Adopting an average of 24 vehicle trips for the non-residential uses, the existing site generates some 34 vehicle trips. The net traffic generation of the proposal is up to 32 vehicle trips during the peak hours. This is equivalent to an additional 1 vehicle every 2 minutes.

4.2 Traffic Assignment

The traffic assignment adopted has been done so following the existing traffic flow past the site.

The resulting additional movements at the Edgar Street / Herbert Street are as follows (as a worst case scenario, 100% of the site generated traffic has been assumed to enter and exit the site at this location, despite the pool of parking provided of Sharp Street):



4.3 Traffic Impact

The traffic generation outlined in **Section 4.1 & 4.2** above has been added to the existing traffic volumes recorded. SIDRA INTERSECTION 6.1 was used to assess the intersections performance. The purpose of this assessment is to compare the existing intersection operations to the future scenario under the increased traffic load. The results of this are provided in **Annexure G** and summarised in **Table 3** below.

TABLE 3: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 6.1)

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
EXISTING PERFORMANCE						
Edgar St / Herbert St / Property Access	AM	0.086	5.5 (7.7)	**A** (Worst: A)	Round-about	RT from Edgar St.
	PM	0.141	5.4 (7.7)	**A** (Worst: A)		RT from Edgar St.
FUTURE PERFORMANCE (Post development)						
Edgar St / Herbert St / Basement Access	AM	0.095	5.6 (8.2)	**A** (Worst: A)	Round-about	RT from Herbert St.
	PM	0.157	5.7 (8.7)	**A** (Worst: A)		RT from Basement Access

NOTES:

(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.

(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

As shown in **Table 3** above, the surrounding intersections remain unaltered under the future scenario. The existing LoS has been retained with minimal delays and additional capacity maintained.

4.4 Residential Amenity

The net increase of some 32 vehicle trips within this town centre precinct will not adversely impact residential amenity threshold considerations.

5 CONCLUSION

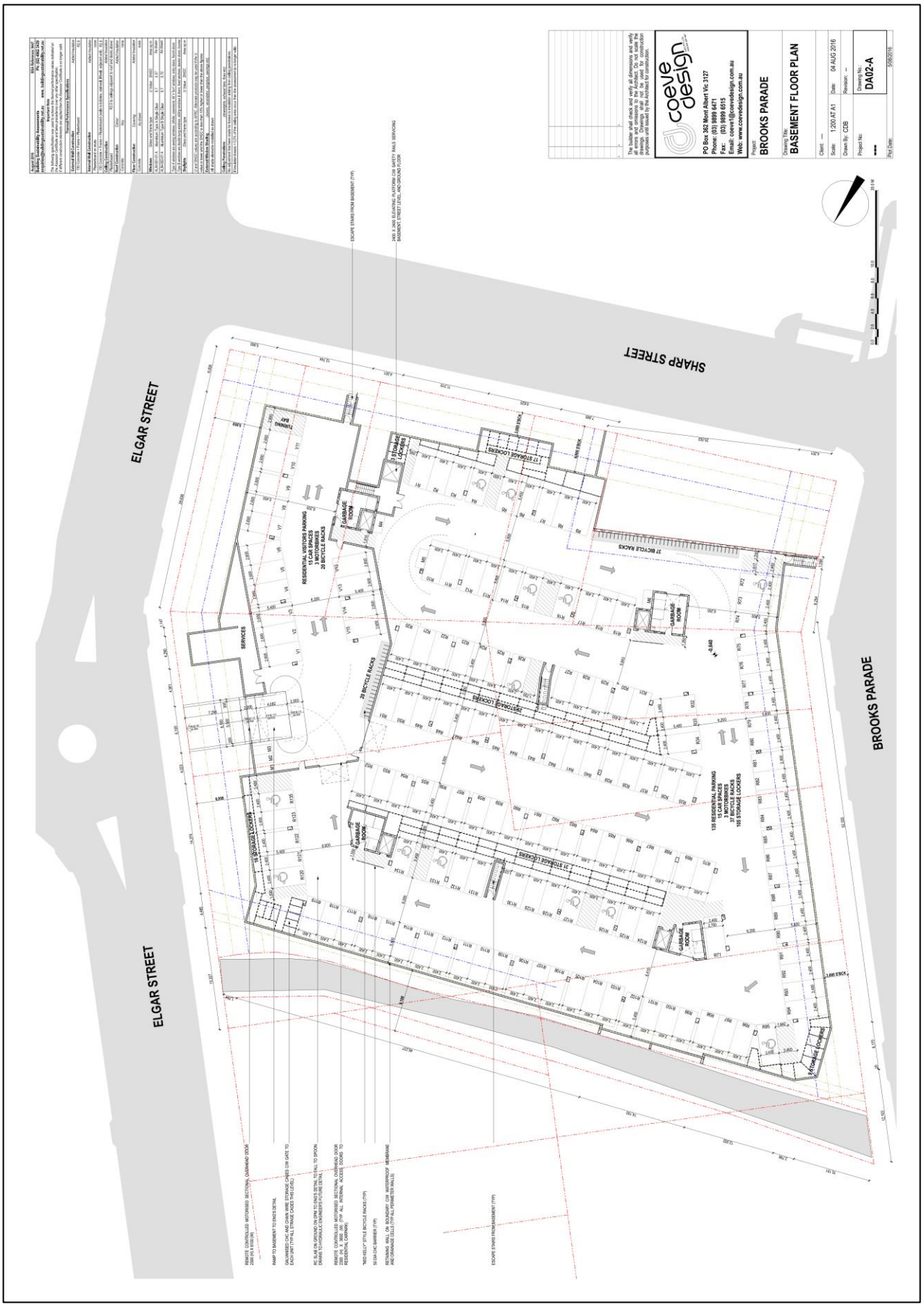
In view of the foregoing, the subject proposal (as depicted in **Annexure A**) is fully supportable in terms of its traffic and parking impacts. The following outcomes of this traffic impact assessment are relevant to note:

- The proposal details a total of 169 car parking spaces, representing a surplus of 18 to 26 car parking spaces, however it is considered that the requirement of 143 to 151 car parking spaces could warrant reduction based on the following factors:
    - Developments which propose mixed uses often result in a "dual use" outcome, whereby non-residential parking is shared amongst users. The dual use of residential visitor parking and the commercial / retail parking is appropriate due to the offset peak parking accumulation of the two uses. Residential visitor peak parking occurs Friday and Weekday evenings, often outside of business hours or when commercial / retail uses are not at peak operation.
- Based on Councils bicycle rate applied to the upper requirement of 53 non-residential car parking spaces (i.e 32.5 residential visitor parking plus 20.2 retail parking spaces), the development requires a minimum of three (3) bicycle spaces for retail / commercial customers and residential visitors. Whilst employee density is unknown at this stage, it is considered that 2 bicycle racks for staff would be suitable (which would be compliant for 40 staff members). Based on the required 145 to 153 total car spaces, 7 to 8 motorcycle spaces would be required
- The site proposes to provide an on-site waste collection bay accessed from Sharp Street. The loading bay requires a reverse manoeuvre into the bay from Sharp Street. Whilst this reverse manoeuvre is contrary to Council's DCP, it is considered that this variation is justified by the following:
    - Sharp Street is the lower order road in comparison to Brooks Parade and Edgar Street
    - The frequency of waste collection is expected to be relatively low and outside of peak commuter hours
    - Strict application of Council's DCP does not require an on-site loading provision, and thus the provision of any loading facility is beneficial.
- The proposed driveway to Edgar Street roundabout achieves a 3.5m verge width plus a 7.3m ramp length (at 5%) achieving the 10.8m considered to be acceptable sight distance to approach the roundabout.
- The car park design and access has been assessed in accordance with AS2890.1:2004 and AS2890.6:2009 where applicable and has found to be compliant.
- The site will demolish Ten (10) existing residential dwellings (3 along Edgar Street, 5 along Sharp Street and 2 along Brooks Parade) and three (3) commercial / retail properties along Brooks Parade. The ten existing dwellings are assumed to generate 10 vehicle trips during the morning and evening peak hour whilst the existing retail and commercial premises along Brooks Parade have been assumed to generate 13 to 36 vehicle trips based on a combined floor area of 650m^2 (this floor area is based on an approximation of the floor area). Adopting an average of

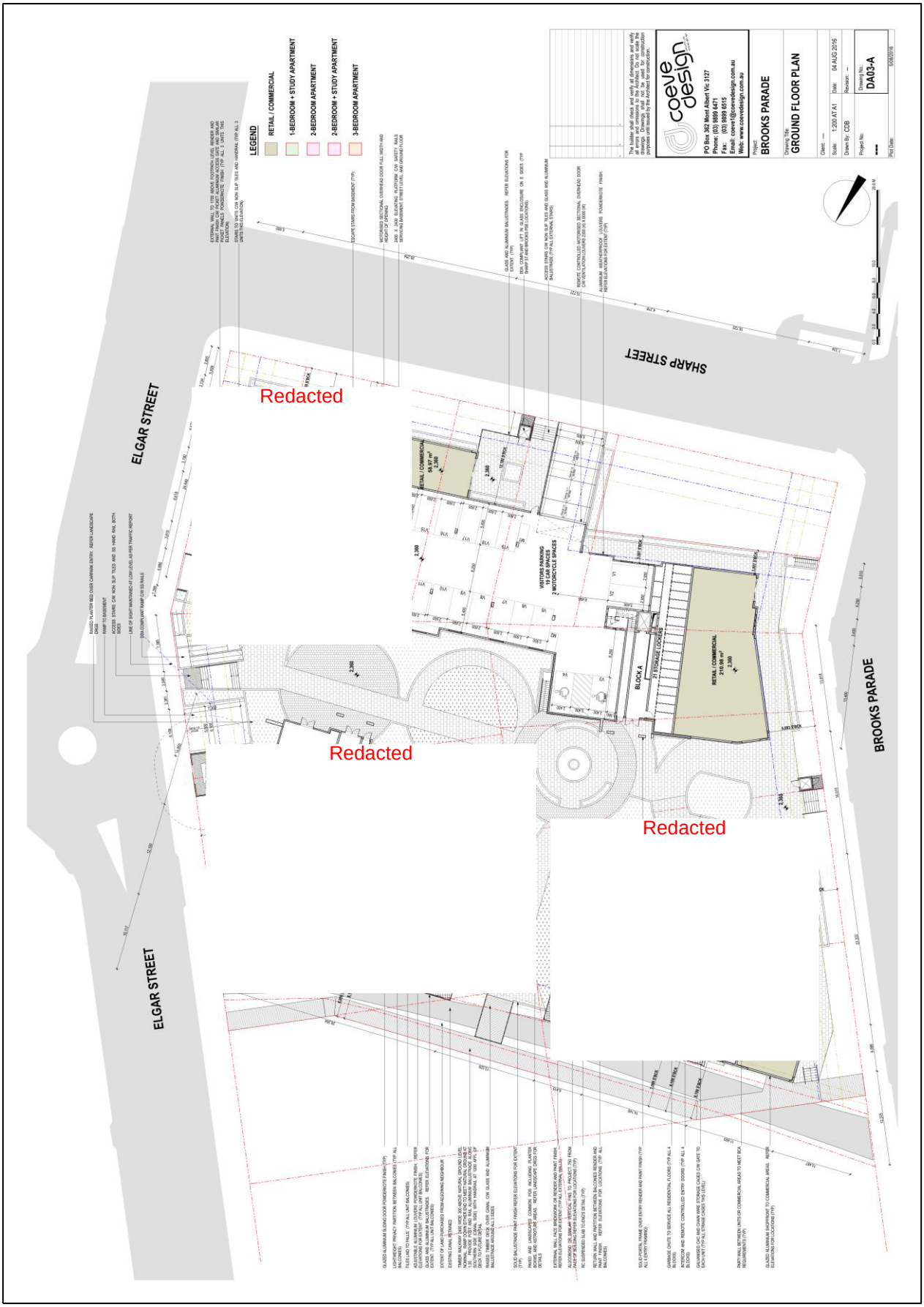
24 vehicle trips for the non-residential uses, the existing site generates some 34 vehicle trips. The net traffic generation of the proposal is up to 32 vehicle trips during the peak hours. This is equivalent to an additional 1 vehicle every 2 minutes.

- The surrounding intersections remain unaltered under the future scenario. The existing LoS has been retained with minimal delays and additional capacity maintained.
- The net increase of some 32 vehicle trips within this town centre precinct will not adversely impact residential amenity threshold considerations.

ANNEXURE A: PROPOSED PLANS



ANNEXURE B: PROPOSED PLANS

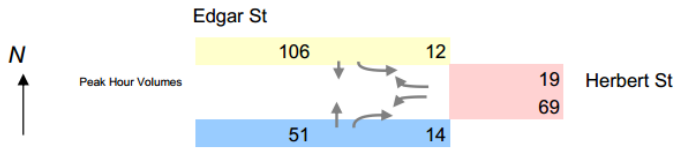


ANNEXURE C: TRAFFIC SURVEYS

Curtis Traffic Surveys

Turning movement count

Job: 160703mcl
Day, date: 21/07/16
Location: Edgar St & Herbert St
Weather: Fine
Client: McLaren Traffic Engineering

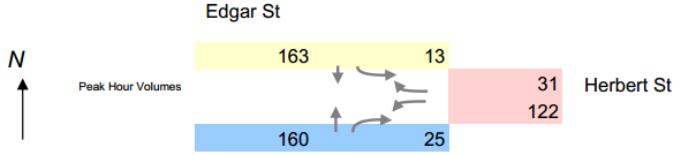


Time Period	From Edgar St south through	From Edgar St south right	From Herbert St left	From Herbert St right	From Edgar St north left	From Edgar St north through	Total vehicles	Peak
07:00 to 07:15	6	1	7	1	3	6	24	
07:15 to 07:30	6	1	12	0	3	8	30	
07:30 to 07:45	11	0	5	1	2	10	29	
07:45 to 08:00	11	7	8	1	6	10	43	
08:00 to 08:15	17	1	12	2	1	20	53	
08:15 to 08:30	14	3	14	1	3	25	60	
08:30 to 08:45	13	6	14	7	3	27	70	
08:45 to 09:00	7	4	29	9	5	34	88	peak
Total	85	23	101	22	26	140		
Hourly summary								
07:00 to 08:00	34	9	32	3	14	34	126	
07:15 to 08:15	45	9	37	4	12	48	155	
07:30 to 08:30	53	11	39	5	12	65	185	
07:45 to 08:45	55	17	48	11	13	82	226	
08:00 to 09:00	51	14	69	19	12	106	271	peak hour

Curtis Traffic Surveys

Turning movement count

Job: 160703mcl
Day, date: 21/07/16
Location: Edgar St & Herbert St
Weather: Fine
Client: McLaren Traffic Engineering



Time Period	From Edgar St south through	From Edgar St south right	From Herbert St left	From Herbert St right	From Edgar St north left	From Edgar St north through	Total vehicles	Peak
07:00 to 07:15	27	3	20	8	5	41	104	
07:15 to 07:30	30	3	28	9	5	40	115	
07:30 to 07:45	33	8	37	5	6	45	134	
07:45 to 08:00	40	6	21	3	3	33	106	
08:00 to 08:15	46	8	37	16	2	42	151	peak
08:15 to 08:30	41	3	27	7	2	43	123	
08:30 to 08:45	28	4	32	7	4	29	104	
08:45 to 09:00	27	4	23	3	1	22	80	
Total	272	39	225	58	28	295		
Hourly summary								
07:00 to 08:00	130	20	106	25	19	159	459	
07:15 to 08:15	149	25	123	33	16	160	506	
07:30 to 08:30	160	25	122	31	13	163	514	peak hour
07:45 to 08:45	155	21	117	33	11	147	484	
08:00 to 09:00	142	19	119	33	9	136	458	

ANNEXURE D: EXISTING SIDRA OUTPUTS

(SHEET 1 OF 2)

MOVEMENT SUMMARY

Site: Edgar / Herbert Street EX AM

Edgar Street / Herbert Street
Existing
AM
Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Edgar Street											
2	T1	54	0.0	0.051	4.9	LOS A	0.2	1.7	0.10	0.53	53.8
3	R2	15	0.0	0.051	7.7	LOS A	0.2	1.7	0.10	0.53	53.4
Approach		68	0.0	0.051	5.5	LOS A	0.2	1.7	0.10	0.53	53.7
East: Herbert Street											
4	L2	73	0.0	0.065	5.3	LOS A	0.3	2.2	0.07	0.58	52.8
6	R2	20	0.0	0.065	7.6	LOS A	0.3	2.2	0.07	0.58	53.2
Approach		93	0.0	0.065	5.8	LOS A	0.3	2.2	0.07	0.58	52.9
North: Edgar Street											
7	L2	112	0.0	0.086	5.3	LOS A	0.4	3.0	0.08	0.55	53.2
8	T1	13	0.0	0.086	4.8	LOS A	0.4	3.0	0.08	0.55	54.0
Approach		124	0.0	0.086	5.2	LOS A	0.4	3.0	0.08	0.55	53.3
All Vehicles		285	0.0	0.086	5.5	LOS A	0.4	3.0	0.08	0.55	53.2

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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.

Organisation: MCLAREN TRAFFIC ENGINEERING | Processed: Friday, 22 July 2016 10:27:18 AM
Project: Z:\Jobs\2016\16160\MTE SIDRA\16 07 22.sip6

MOVEMENT SUMMARY

Site: Edgar / Herbert Street EX PM

Edgar Street / Herbert Street
Existing
PM
Roundabout

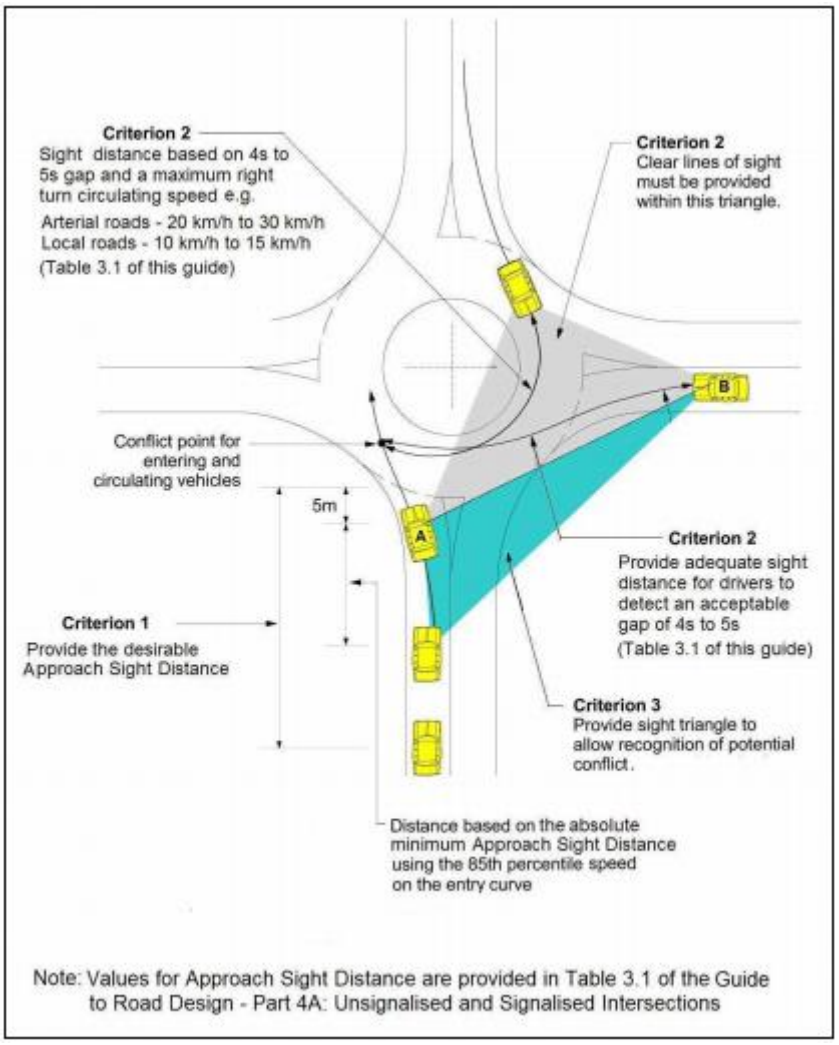
Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Edgar Street											
2	T1	168	0.0	0.141	4.9	LOS A	0.7	5.0	0.14	0.52	53.8
3	R2	26	0.0	0.141	7.7	LOS A	0.7	5.0	0.14	0.52	53.4
Approach		195	0.0	0.141	5.3	LOS A	0.7	5.0	0.14	0.52	53.8
East: Herbert Street											
4	L2	128	0.0	0.110	5.3	LOS A	0.6	3.9	0.08	0.58	52.8
6	R2	33	0.0	0.110	7.6	LOS A	0.6	3.9	0.08	0.58	53.2
Approach		161	0.0	0.110	5.8	LOS A	0.6	3.9	0.08	0.58	52.9
North: Edgar Street											
7	L2	172	0.0	0.132	5.4	LOS A	0.7	4.8	0.12	0.54	53.0
8	T1	14	0.0	0.132	4.9	LOS A	0.7	4.8	0.12	0.54	53.9
Approach		185	0.0	0.132	5.3	LOS A	0.7	4.8	0.12	0.54	53.1
All Vehicles		541	0.0	0.141	5.4	LOS A	0.7	5.0	0.11	0.54	53.3

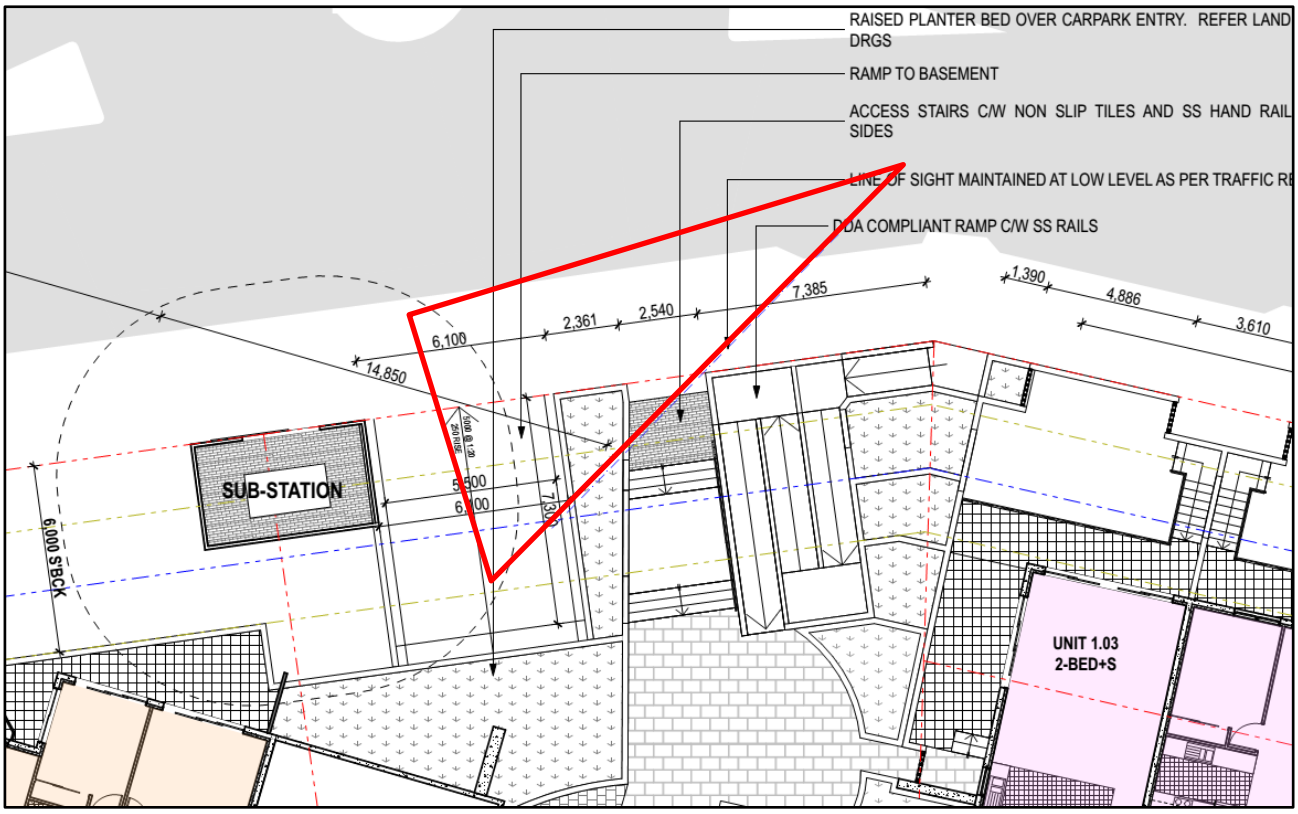
Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes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

Organisation: MCLAREN TRAFFIC ENGINEERING | Processed: Friday, 22 July 2016 10:33:34 AM
Project: Z:\Jobs\2016\16160\MTE SIDRA\16 07 22.sip6

ANNEXURE E: ACCESS DESIGN



Annexure E: Access Design



ANNEXURE F: COMPLIANCE

(Sheet 1 of 4)

AS2890.1:2004 COMPLIANCE TABLE		
CLAUSE	**COMPLIANCE**	**NOTES**
TABLE 1.1: USER CLASS (SPACES) 1 (0) 1A (0) 2 (0) 3 (0) 3A (0) 4 (0) TOTAL (**0**)	Yes	
Figure 2.2 Angle Parking Dimensions Applicable bay length, bay width, aisle width	Yes	
Clause 2.4.1(a)(iii) Small Car Space 2.3m wide x 5.0m long	N/A	
Clause 2.4.1(b)(ii) 300mm clearance to high objects	Yes	
Clause 2.4.2(c) 1m blind aisle extension	Yes	
Figure 2.5 Parallel Parking Dimensions Applicable bay length, bay width, aisle width	Yes	
Clause 2.4.5.2(a) Kerb Height	N/A	Kerbs to be 150mm high
Clause 2.4.5.4 Wheel Stops Height, width, setback	N/A	
Clause 2.4.6 Gradients within parking modules Minimum & maximum gradients	Yes	
Clause 2.4.7 Motorcycles Parking bay dimensions	Yes	
Clause 2.5.2(a) Straight ramp widths 3m between kerbs (1 way), 5.5m between kerbs (2 way)	Yes	
Kerb widths – standard 300mm	Yes	
Wall-to-wall width (on straight) SINGLE LANE – standard 3.6m TWO LANES – standard 6.1m	Yes	
Table 2.2 Curved ramp widths See table	N/A	
Figure 2.9 Curved ramp dimensions See table	N/A	
Clause 2.5.3(a) Ramp grades (public) >20m:16.7% max <20m: 20% max	Yes	
Clause 2.5.3(b) Ramp grades (private) >20m: 20% max <20m: 25% max	Yes	
Clause 2.5.3(d) Changes of grade Not in excess of 12.5% for summit 15% for sag	Yes	

Annexure F: Compliance

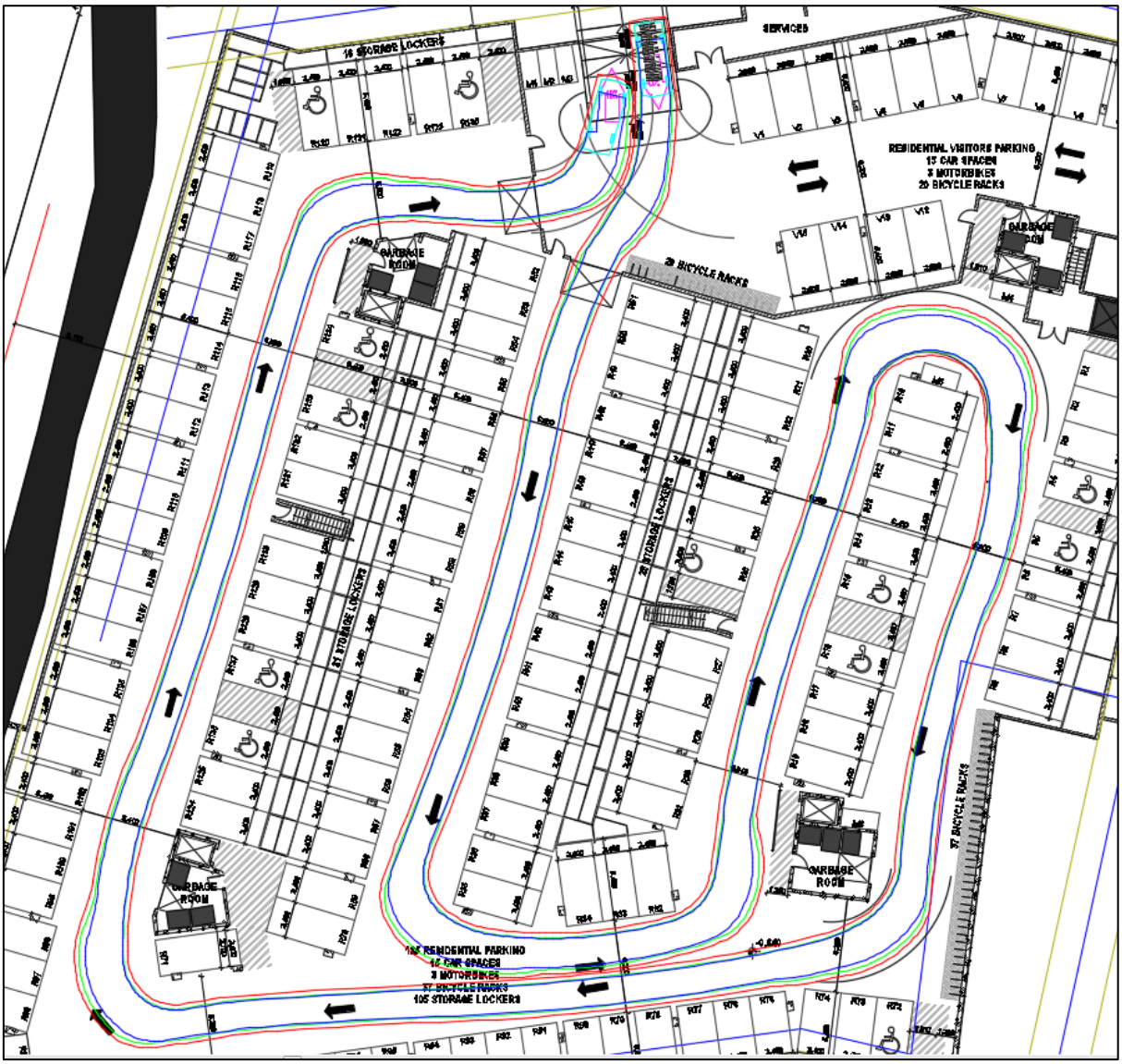
(Sheet 2 of 4)

Select access facility category from Table 3.1	2	
Table 3.2 Access driveway widths 1: 3-5.5m combined 2: 6-9m combined 3: 6m entry, 4-6m exit, 1-3m separation 4: 6-8m entry, 6-8m exit, 1-3m separation 5: intersection to be provided.	No	Access to be modified to suit Roundabout requirements
Clause 3.2.3 Driveway location compliance	Yes	
Figure 3.2 Car sight distances	Yes	
Figure 3.3 Pedestrian sight distances	Yes	
Clause 3.4 Queuing areas See table 3.3	N/A	
Clause 4.3.4 Low clearance signs Give way / stop signs Speed limit signs Other warning signs	No	Not on plans, can be detailed prior to CC
Clause 4.4 Pavement markings Linemarking Pedestrian crossings arrows	No	Not on plans, can be detailed prior to CC
Clause 5.2 Column location See figure 5.1 E.g. 90^{o}: 750mm setback	Yes	
Clause 5.3.1 headroom At least 2.2m for cars	Yes	
Clause 5.4 enclosed garages **Single**: 3m internal width 2.4m doorway min (see figure 5.4) **Multiple:** 2.4m wide each	N/A	
Circulation	Yes	

AS2890.6:2009 COMPLIANCE TABLE		
CLAUSE	**COMPLIANCE**	**NOTES**
Parking Dimensions 2400x 5400mm 2400x 5400mm shared space Fig 2.2	Yes	
Bollard Located 800 ± 50 1200mm along shared space Fig 2.2	N/A	To be installed accordingly during construction
Min. 2500mm required directly above space (Fig 2.7) Min. 2200mm for general access (Cl 2.4)	N/A	
Space Identification Fig 3.1 1200x 1200 min with 500 to 600mm from front of space	N/A	To be linemarked accordingly by a suitable contractor
Space Delineation Clause 3.2	N/A	To be linemarked accordingly by a suitable contractor

Annexure F: Compliance

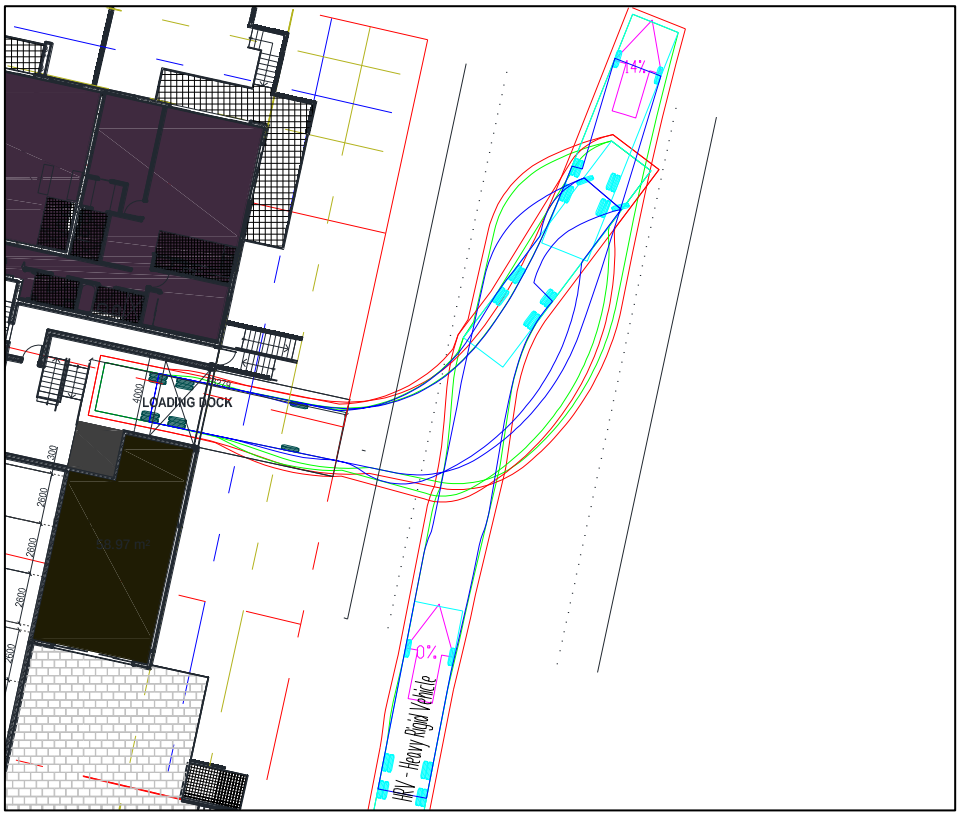
(Sheet 3 of 4)



BASEMENT CIRCULATION
Successful
5km/h
Cyan – Wheels
Red – Vehicle body
Green – 300mm clearance

Annexure F: Compliance

(Sheet 4 of 4)



HRV Access and Egress from Loading Dock
2 Manouvres Access, Successful
1 Manouvre Egress, Successful
Green – Vehicle Body
Blue – Wheels
Red – 500mm Clearance

ANNEXURE G: FUTURE SIDRA OUTPUTS

(SHEET 1 OF 2)

MOVEMENT SUMMARY

Site: 101 [Edgar / Herbert Street FU AM]

Edgar Street / Herbert Street
Future Flows
AM
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Edgar Street											
1	L2	2	0.0	0.053	5.4	LOS A	0.3	1.8	0.12	0.53	52.9
2	T1	54	0.0	0.053	4.9	LOS A	0.3	1.8	0.12	0.53	53.7
3	R2	15	0.0	0.053	7.7	LOS A	0.3	1.8	0.12	0.53	53.3
Approach		71	0.0	0.053	5.5	LOS A	0.3	1.8	0.12	0.53	53.6
East: Herbert Street											
4	L2	73	0.0	0.083	5.9	LOS A	0.4	2.8	0.29	0.58	52.2
5	T1	2	0.0	0.083	5.4	LOS A	0.4	2.8	0.29	0.58	53.0
6	R2	20	0.0	0.083	8.2	LOS A	0.4	2.8	0.29	0.58	52.6
Approach		95	0.0	0.083	6.4	LOS A	0.4	2.8	0.29	0.58	52.3
North: Edgar Street											
7	L2	13	0.0	0.095	5.4	LOS A	0.5	3.3	0.13	0.50	53.2
8	T1	112	0.0	0.095	4.9	LOS A	0.5	3.3	0.13	0.50	54.0
9	R2	4	0.0	0.095	7.7	LOS A	0.5	3.3	0.13	0.50	53.6
Approach		128	0.0	0.095	5.1	LOS A	0.5	3.3	0.13	0.50	53.9
West: Driveway											
10	L2	15	0.0	0.027	5.7	LOS A	0.1	0.9	0.23	0.55	52.4
11	T1	9	0.0	0.027	5.2	LOS A	0.1	0.9	0.23	0.55	53.2
12	R2	7	0.0	0.027	8.0	LOS A	0.1	0.9	0.23	0.55	52.8
Approach		32	0.0	0.027	6.1	LOS A	0.1	0.9	0.23	0.55	52.8
All Vehicles		325	0.0	0.095	5.6	LOS A	0.5	3.3	0.18	0.53	53.3

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.
Roundabout Capacity Model: SIDRA Standard.
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.

Annexure G: Future Sidra Outputs

(SHEET 2 OF 2)

MOVEMENT SUMMARY

Site: 101 [Edgar / Herbert Street FU PM]

Edgar Street / Herbert Street
Future Flows
PM
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Edgar Street											
1	L2	12	0.0	0.157	5.5	LOS A	0.9	6.1	0.19	0.52	52.8
2	T1	168	0.0	0.157	5.0	LOS A	0.9	6.1	0.19	0.52	53.6
3	R2	26	0.0	0.157	7.8	LOS A	0.9	6.1	0.19	0.52	53.2
Approach		206	0.0	0.157	5.4	LOS A	0.9	6.1	0.19	0.52	53.5
East: Herbert Street											
4	L2	128	0.0	0.157	6.3	LOS A	0.8	5.7	0.38	0.61	52.0
5	T1	8	0.0	0.157	5.9	LOS A	0.8	5.7	0.38	0.61	52.8
6	R2	33	0.0	0.157	8.7	LOS A	0.8	5.7	0.38	0.61	52.4
Approach		169	0.0	0.157	6.7	LOS A	0.8	5.7	0.38	0.61	52.1
North: Edgar Street											
7	L2	14	0.0	0.142	5.4	LOS A	0.7	5.2	0.14	0.50	53.1
8	T1	172	0.0	0.142	4.9	LOS A	0.7	5.2	0.14	0.50	54.0
9	R2	12	0.0	0.142	7.7	LOS A	0.7	5.2	0.14	0.50	53.6
Approach		197	0.0	0.142	5.1	LOS A	0.7	5.2	0.14	0.50	53.9
West: Driveway											
10	L2	3	0.0	0.008	6.3	LOS A	0.0	0.3	0.37	0.57	51.8
11	T1	2	0.0	0.008	5.9	LOS A	0.0	0.3	0.37	0.57	52.6
12	R2	3	0.0	0.008	8.7	LOS A	0.0	0.3	0.37	0.57	52.2
Approach		8	0.0	0.008	7.1	LOS A	0.0	0.3	0.37	0.57	52.1
All Vehicles		581	0.0	0.157	5.7	LOS A	0.9	6.1	0.23	0.54	53.2

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.
Roundabout Capacity Model: SIDRA Standard.
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.

ADDENDUM

McLAREN TRAFFIC ENGINEERING

Address: Shop 7, 720 Old Princes Highway Sutherland NSW 2232
Postal: P.O Box 66 Sutherland NSW 1499

Telephone: +61 2 8355 2440
Fax: +61 2 9521 7199
Web: www.mclarentraffic.com.au
Email: admin@mclarentraffic.com.au

Division of RAMTRANS Australia ABN: 45067491678

Transport Planning, Traffic Impact Assessments, Road Safety Audits, Expert Witness

28 August 2017 Reference: 17315.01FB

Coeve Design (NSW) Pty Ltd
266 King Street,
NEWCASTLE NSW 2300
Attention: Charles De Bono

SUPPLEMENTARY TRAFFIC IMPACT ASSESSMENT
MIXED USE RESIDENTIAL & RETAIL/COMMERCIAL DEVELOPMENT
AT 32-42 BROOKS PARADE, 2-10 SHARP STREET & 5-11 EDGAR STREET, BELMONT

Dear Charles,

Reference is made to your request to provide additional information as requested by the Roads and Maritime Services (RMS) in their letter dated 10th March 2017 with regards to the proposed mixed-use residential, retail and commercial development at 32-42 Brooks Parade, 2-10 Sharp Street & 5-11 Edgar Street, Belmont. This letter should be read in conjunction with the Traffic and Parking Impact Assessment by McLaren Traffic Engineering dated 28 November 2016, with the following sections intended to replace Sections 2 & 4 of that report.

1 Existing Traffic and Parking Conditions

1.1 Road Hierarchy

The characteristics of the road network servicing the site are provided in the following sub-sections.

1.1.1 Brooks Parade

- Classified STATE road (Road No. 527);
- Approximately 12m in width facilitating one lane in each direction;
- Signposted 50km/h; 40km/hr in areas of high pedestrian activity;
- Unrestricted kerbside parking permitted along both sides of the road.

1.1.2 Edgar Street

- Unclassified LOCAL road;
- Approximately 12m in width facilitating two-way passing;
- Signposted 50km/h speed limit;
- Unrestricted kerbside parking permitted along both sides of the road north of Herbert Street;
- 1-hour restricted kerbside parking along both sides of the road south of Herbert Street.

1.1.3 Sharp Street

- Unclassified LOCAL road;
- Approximately 12m in width facilitating two-way passing;
- Signposted 50km/h speed limit;
- 1-hour restricted kerbside parking along the south sides of the road.

1.1.4 Maude Street

- Unclassified LOCAL road;
- Approximately 12m in width facilitating one lane of traffic in each direction;
- No speed limit signposted - 50km/h local speed limit applies;
- Unrestricted kerbside parking permitted along both sides of the road.

1.1.5 Macquarie Street

- Classified STATE road (Road No. 527)
- Approximately 14m in width facilitating two lanes of traffic in each direction;
- Signposted 40km/h speed limit;
- Signposted 'No Stopping' along either side of the road, in the vicinity of Edgar Street.

1.2 Existing Traffic Management

- Roundabout controlled intersection of Herbert Street and Edgar Street;
- Priority-controlled "Give Way" intersection of Edgar Street and Maude Street;
- Priority-controlled "Give Way" intersection of Maude Street and Brooks Parade;
- Priority-controlled "Give Way" intersection of Sharp Street and Brooks Parade;
- Priority-controlled "Give Way" intersection of Edgar Street and Macquarie Street;
- Priority-controlled "Give Way" intersection of Sharp Street and Edgar Street.

1.3 Existing Traffic Conditions

Traffic surveys were conducted at the following intersections on Friday 9 June 2017 to provide an understanding of the existing traffic flow conditions around the site.

- Herbert Street / Edgar Street
- Macquarie Street / Edgar Street
- Sharp Street / Brooks Parade
- Maude Street / Brooks Parade

The complete survey data is provided in **Annexure A** for reference.

SIDRA INTERSECTION 7.0 was used to assess the existing performance of the identified intersections, with the results are summarised in **Table 1**, with detailed results provided in **Annexure B**.

It is important to note two observations from our traffic survey consultants;

- Firstly, a local 'rat run' was identified along Walter Street. It was observed that many vehicles travelling from the north from Brooks Parade would turn into Walter Street instead of continuing on along Macquarie Street to the Pacific Highway. It is assumed that this is to avoid the lights at the end of Macquarie Street and join the highway further south. This was also observed in the opposite direction.
- Secondly, while it was identified that the observed queuing on the right-hand turn from Maude St onto Brooks was about 6 vehicles in the peak hour, on some occasions reaching a queue length of 8 vehicles. The traffic surveyors also identified that right turning movements were possible in groups of 3-4 vehicles at a time, due to platooning effects caused by traffic lights further south along Macquarie Street. The SIDRA Intersection model is unable to realistically replicate this scenario, with results producing unrealistic delays of greater than 70 minutes, (refer to **Table 1)**, which is not reflective of the true operation of the intersection. Adjustments to headway to 2.5 seconds and critical gap to 3.45 seconds were able to replicate similar queue lengths to what was observed. While it is typical for drivers to accept lesser gaps as wait times increase, these adjustments were not deemed realistic for the right-hand manoeuvre to be completed and hence were not used in the final SIDRA INTERSECTION 7.0 analysis.

TABLE 1: EXISTING INTERSECTION PERFORMANCES (SIDRA INTERSECTION 7.0)

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement	95th Percentile Queue
EXISTING PERFORMANCE							
Edgar Street / Herbert Street	AM	0.09	5.5 (Worst: 8.2)	**A** (Worst: A)	Roundabout	RT from Herbert Street	0.4 veh (3m) Herbert Street
	PM	0.15	5.6 (Worst: 8.6)	**A** (Worst: A)		RT from Herbert Street	0.8 veh (5.5m) Edgar Street
Macquarie Street / Edgar Street	AM	0.11	2.3 (Worst: 10.4)	**N/A** (Worst: A)	Give Way	RT from Edgar Street	0.3 veh (2.2m) Macquarie Street
	PM	0.15	2.7 (Worst: 13.2)	**N/A** (Worst: A)		RT from Edgar Street	0.6 veh (4m) Macquarie Street
Brooks Parade / Sharp Street	AM	0.31	0.3 (Worst: 19)	**N/A** (Worst: B)	Give Way	RT from Sharp Street	0.1 veh (0.7m) Sharp Street
	PM	0.54	0.8 (Worst: >70)	**N/A** (Worst: F)		RT from Sharp Street	0.9 veh (6.1m) Sharp Street
Brooks Parade / Maude Street	AM	0.33	2.3 (Worst: 21.8)	**N/A** (Worst: B)	Give Way	RT from Maude Street	1.3 veh (8.9m) Maude Street
	PM	4.39	540 (Worst: >70)	**N/A** (Worst: F)		RT from Maude Street	200.6 veh (1404.3m) Maude Street

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

As shown, the relevant intersections are operating with a high level of efficiency with low average delays shown in the SIDRA Intersection model.

Again, it is noted that SIDRA Intersection was unable to realistically model the right-hand manoeuvre from Maude Street. The right-turn from Sharp Street, although performing at a Level of Service of F, experiences delays of approximately two-minutes, which are not unrealistic.

1.4 Public Transport

The subject site has access to existing bus routes 310 and 318 provided by Newcastle Buses which runs through Brooks Parade, with the nearest bus stop located near the intersection of Brooks Parade and Maude Street. Route 318 provides local access around Belmont whilst route 310 provides intercity access to Newcastle via Charlestown. The location of the site relative to the surrounding public transport infrastructure is provided in **Figure 1**.

FIGURE 1: PUBLIC TRANSPORT CONTEXT

Site Location

2 Traffic Assessment

The impact of the expected traffic generation levels associated with the subject proposal is discussed in the following sub-sections.

2.1 Traffic Generation

The *RTA (now RMS) Guide to Traffic Generation Developments* and the RMS Technical Direction *TDT2013/04a* details the following traffic generation rates:

High Density Residential Flat Dwellings – Regional Areas

AM Peak – 0.53 vehicle trips per unit

PM peak – 0.32 vehicle trips per unit

Commercial

2 trips per 100m^2

Retail

5.6 trips per 100m^2

The resulting traffic generation is summarised in **Table 2**.

TABLE 2: TRAFFIC GENERATION OF PROPOSED DEVELOPMENT

Type	Scale	Peak Hour	Trip Rate	Traffic Generation	Direction
Residential	130	AM	0.53 per unit	69 trips	14 in;55 out
		PM	0.32 per unit	42 trips	34 in; 8 out
Commercial / Retail	506m^2	AM	3.8 per 100m^2	19 trips	10 in; 9 out
		PM			9 in; 10 out
Total	**-**	**AM**	**-**	**88 trips**	**24 in; 64 out;**
		PM	**-**	**61 Trips**	**43 in; 18 out**

As shown above, the proposal is estimated to generate 88 vehicle trips (24 in; 64 out) in the AM peak hour and 61 vehicle trips (43 in; 18 out) in the PM peak hour. As a worst case scenario, it has been assumed that the retail peak hour traffic generation occurs in both the AM and PM peak hours, despite the likely retail uses would peak during the evening only.

2.2 Existing Traffic Generation

The site will demolish Ten (10) existing residential dwellings (3 along Edgar Street, 5 along Sharp Street and 2 along Brooks Parade) and three (3) commercial / retail properties along Brooks Parade. The resulting traffic generation from the existing properties is summarised in **Table 3** and the net traffic generation provided in **Table 4**.

TABLE 3: TRAFFIC GENERATION OF EXISTING SITE

Type	Scale	Peak Hour	Trip Rate	Traffic Generation	Direction
Residential	10	AM	1 per dwelling	10 trips	2 in;8 out
		PM			8 in; 2 out
Commercial / Retail	650m²	AM	3.8 per 100m²	25 trips	13 in; 12 out
		PM			12 in; 13 out
Total	**-**	**AM**	**-**	**35 Trips**	**15 in; 20 out**
		PM	**-**	**35 Trips**	**20 in; 15 out**

TABLE 4: CHANGE IN TRAFFIC GENERATION

Case	AM Trips		PM Trips	
	IN	OUT	IN	OUT
Existing	15	20	20	15
Future	24	64	43	18
Net Change	+9	+44	+23	+3
Total Change	+51		+26	

The net traffic generation of the proposal is up to 53 vehicle trips during the AM peak hour and 26 vehicle trips during the PM peak hour. This is equivalent to an additional 1 vehicle every 1.1 minutes in the AM and 1 vehicle every 2.3 minutes in the PM.

For the purpose of this assessment, it has been assumed that the peak hourly traffic volumes generated by the site occur during the recorded weekday commuter peak hour periods of 8:15 AM - 9:15 AM and 4.30 PM - 5.30 PM.

2.3 Traffic Assignment

It is assumed that the traffic from both retail/commercial and residential uses will have similar characteristics and distributions reflecting the existing traffic flow patterns. A diagrammatic representation of the traffic assignment for both the residential generation and retail/commercial generation is provided in **Annexure B**.

2.4 Traffic Impact

The traffic generation and assignment outlined in **Section 2.1** & **Section 2.3** above has been added to the existing traffic volumes recorded. SIDRA INTERSECTION 7.0 was used to assess the performance of the identified intersections surrounding the site. The purpose of this assessment is to compare the existing intersection operation to the future scenario under the increased traffic load. The results of this assessment are shown in each section bellow, with detailed SIDRA outputs provided in **Annexure C** for reference.

2.4.1 Edgar Street / Herbert Street

A comparison of the existing and future performance of the Edgar Street / Herbert Street intersection as shown in SIDRA Intersection modelling, is provided in **Table 5**.

TABLE 5: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 7.0)

EDGAR STREET / HERBERT STREET

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/veh)	Level of Service(3)	Control Type	Worst Movement	95th Percentile Queue
EXISTING PERFORMANCE							
Edgar Street / Herbert Street	AM	0.09	5.5 (Worst: 8.2)	**A** (Worst: A)	Roundabout	RT from Herbert Street	0.4 veh (3m) Herbert Street
	PM	0.15	5.6 (Worst: 8.6)	**A** (Worst: A)		RT from Herbert Street	0.8 veh (5.5m) Edgar Street
FUTURE PERFORMANCE							
Edgar Street / Herbert Street	AM	0.10	5.8 (Worst: 8.3)	**A** (Worst: A)	Roundabout	RT from Herbert Street	0.5 veh (3.6m) Herbert Street
	PM	0.17	5.8 (Worst: 8.7)	**A** (Worst: A)		RT from Herbert Street	0.9 veh (6.3m) Edgar Street

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

As shown the performance of the Edgar Street / Herbert Street intersection remains unaltered under the future scenario. The existing LoS has been retained with minimal increase in delays and additional capacity maintained.

2.4.2 Macquarie Street / Edgar Street

A comparison of the existing and future performance of the Macquarie Street / Edgar Street intersection as shown in SIDRA Intersection modelling, is provided in **Table 6**.

TABLE 6: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 7.0)

MACQUARIE STREET / EDGAR STREET

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement	95th Percentile Queue
EXISTING PERFORMANCE							
Macquarie Street / Edgar Street	AM	0.11	2.3 (Worst: 10.4)	**N/A** (Worst: A)	Give Way	RT from Edgar Street	0.3 veh (2.2m) Macquarie Street
	PM	0.15	2.7 (Worst: 13.2)	**N/A** (Worst: A)		RT from Edgar Street	0.6 veh (4m) Macquarie Street
FUTURE PERFORMANCE							
Macquarie Street / Edgar Street	AM	0.11	2.4 (Worst: 10.5)	**N/A** (Worst: A)	Give Way	RT from Edgar Street	0.4 veh (2.5m) Edgar Street
	PM	0.16	2.8 (Worst: 13.4)	**N/A** (Worst: A)		RT from Edgar Street	0.6 veh (4.1m) Macquarie St

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

As shown the performance of the Macquarie Street / Edgar Street intersection remains unaltered under the future scenario. The existing LoS has been retained with minimal increase in delays and additional capacity maintained.

2.4.3 Brooks Parade / Sharp Street

A comparison of the existing and future performance of the Brooks Parade / Sharp Street intersection as shown in SIDRA Intersection modelling, is provided in **Table 7**.

TABLE 7: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 7.0)

BROOKS PARADE / SHARP STREET

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement	95th Percentile Queue
EXISTING PERFORMANCE							
Brooks Parade / Sharp Street	AM	0.31	0.3 (Worst: 19)	**N/A** (Worst: B)	Give Way	RT from Sharp Street	0.1 veh (0.7m) Sharp Street
	PM	0.54	0.8 (Worst: >70)	**N/A** (Worst: F)		RT from Sharp Street	0.9 veh (6.1m) Sharp Street
FUTURE PERFORMANCE							
Brooks Parade / Sharp Street	AM	0.31	0.3 (Worst: 19.1)	**N/A** (Worst: B)	Give Way	RT from Sharp Street	0.1 veh (0.9m) Sharp Street
	PM	0.54	1.1 (Worst: >70)	**N/A** (Worst: F)		RT from Sharp Street	1.1 veh (7.6m) Sharp Street

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

As shown the performance of the Brooks Parade / Sharp Street intersection remains unaltered under the future scenario. The existing LoS has been retained with minimal increase in delays and additional capacity maintained. No improvements to this intersection are necessary as a result of the proposed development.

2.4.4 Brooks Parade / Maude Street

A comparison of the existing and future performance of the Brooks Parade / Maude Street intersection as shown in SIDRA Intersection modelling, is provided in **Table 8**.

TABLE 8: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 7.0)
BROOKS PARADE / MAUDE STREET

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement	95th Percentile Queue
EXISTING PERFORMANCE							
Brooks Parade / Maude Street	AM	0.33	2.3 (Worst: 21.8)	**N/A** (Worst: B)	Give Way	RT from Maude Street	1.3 veh (8.9m) Maude Street
	PM	4.39	540 (Worst: >70)	**N/A** (Worst: F)		RT from Maude Street	200.6 veh (1404.3m) Maude Street
FUTURE PERFORMANCE							
Brooks Parade / Maude Street	AM	0.36	2.4 (Worst: 22.4)	**N/A** (Worst: B)	Give Way	RT from: Maude Street	1.4 veh (9.8m) Maude Street
	PM	4.47	554.4 (Worst: >70)	**N/A** (Worst: F)		RT from Maude Street	202.9 veh (1420m) Maude Street

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

As shown the performance of the Brooks Parade / Maude Street intersection remains unaltered under the future scenario. The existing LoS has been retained with minimal increase in delays and additional capacity maintained. No improvements to this intersection are necessary as a result of the proposed development.

It should be noted that the SIDRA Intersection model was unable to realistically model the right hand turn manoeuvre from Maude Street. The delays estimated by the model for drivers making a right-turn from Maude Street were far in excess of that observed in the traffic surveys for both the existing and future traffic volume cases and it is expected that this intersection will continue to operate with a high level of service.

Please contact the undersigned should you require further information or assistance.

Yours faithfully
McLaren Traffic Engineering

Craig McLaren

Director
BE Civil. Graduate Diploma (Transport Eng) MAITPM MITE [1985]
RMS Accredited Level 3 Road Safety Auditor
RMS Accredited Traffic Control Planner, Auditor & Certifier (Orange Card)

ANNEXURE A: TRAFFIC COUNTS
(SHEET 1 of 4)

Curtis Traffic Surveys — Turning movement count

Job:	160703mcl
Day, date	21/07/16
Location:	Edgar St & Herbert St
Weather:	Fine
Client:	McLaren Traffic Engineering

N

Peak Hour Volumes: Edgar St 106 / 12; Herbert St 19 / 69; 51 / 14

Time Period	From Edgar St south through	From Edgar St south right	From Herbert St left	From Herbert St right	From Edgar St north left	From Edgar St north through	Total vehicles	Peak
07:00 to 07:15	6	1	7	1	3	6	24	0
07:15 to 07:30	6	1	12	0	3	8	30	0
07:30 to 07:45	11	0	5	1	2	10	29	0
07:45 to 08:00	11	7	8	1	6	10	43	0
08:00 to 08:15	17	1	12	2	1	20	53	0
08:15 to 08:30	14	3	14	1	3	25	60	0
08:30 to 08:45	13	6	14	7	3	27	70	0
08:45 to 09:00	7	4	29	9	5	34	88	0
Total	85	23	101	22	26	140		
Hourly summary								
07:00 to 08:00	34	9	32	3	14	34	126	0
07:15 to 08:15	45	9	37	4	12	48	155	0
07:30 to 08:30	53	11	39	5	12	65	185	0
07:45 to 08:45	55	17	48	11	13	82	226	0
08:00 to 09:00	51	14	69	19	12	106	271	0

Curtis Traffic Surveys — Turning movement count

Job:	160703mcl
Day, date	21/07/16
Location:	Edgar St & Herbert St
Weather:	Fine
Client:	McLaren Traffic Engineering

N

Peak Hour Volumes: Edgar St 163 / 13; Herbert St 31 / 122; 160 / 25

Time Period	From Edgar St south through	From Edgar St south right	From Herbert St left	From Herbert St right	From Edgar St north left	From Edgar St north through	Total vehicles	Peak
16:00 to 16:15	27	3	20	8	5	41	104	
16:15 to 16:30	30	3	28	9	5	40	115	
16:30 to 16:45	33	8	37	5	6	45	134	
16:45 to 17:00	40	6	21	3	3	33	106	
17:00 to 17:15	46	8	37	16	2	42	151	peak
17:15 to 17:30	41	3	27	7	2	43	123	
17:30 to 17:45	28	4	32	7	4	29	104	
17:45 to 18:00	27	4	23	3	1	22	80	
Total	272	39	225	58	28	295		
Hourly summary								
16:00 to 17:00	130	20	106	25	19	159	459	
16:15 to 17:15	149	25	123	33	16	160	506	
16:30 to 17:30	160	25	122	31	13	163	514	peak hour
16:45 to 17:45	155	21	117	33	11	147	484	
17:00 to 18:00	142	19	119	33	9	136	458	

ANNEXURE A: TRAFFIC COUNTS

(SHEET 2 of 4)

Curtis Traffic Surveys

Turning movement count

Job:	170602mcl (17_315)
Day, date	09/06/17
Location:	Macquarie St & Edgar St
Weather:	Fine
Client:	McLaren Traffic Engineering

N

Peak Hour Volumes: 52 / 373

Edgar St: 28 / 98 / 64 / 112

Macquarie S

Time Period	From Macquarie St east through	right	From Edgar St left	right	From Macquarie St west left	through	Total vehicles	Peak
07:00 to 07:15	42	3	7	3	2	65	122	
07:15 to 07:30	50	4	5	4	2	68	133	
07:30 to 07:45	46	8	11	6	7	77	155	
07:45 to 08:00	37	4	5	5	6	81	138	
08:00 to 08:15	41	7	8	6	5	79	146	
08:15 to 08:30	35	12	15	7	6	80	155	
08:30 to 08:45	22	10	23	5	6	76	142	
08:45 to 09:00	29	16	28	3	16	86	178	
09:00 to 09:15	30	16	26	8	12	95	187	
09:15 to 09:30	31	22	21	12	18	116	220	peak
Total	363	102	149	59	80	823		
Hourly summary								
07:00 to 08:00	175	19	28	18	17	291	548	
07:15 to 08:15	174	23	29	21	20	305	572	
07:30 to 08:30	159	31	39	24	24	317	594	
07:45 to 08:45	135	33	51	23	23	316	581	
08:00 to 09:00	127	45	74	21	33	321	621	
08:15 to 09:15	116	54	92	23	40	337	662	
08:30 to 09:30	112	64	98	28	52	373	727	peak hour

Curtis Traffic Surveys

Turning movement count

Job:	170602mcl (17_315)
Day, date	09/06/17
Location:	Macquarie St & Edgar St
Weather:	Fine
Client:	McLaren Traffic Engineering

N

Peak Hour Volumes: 29 / 353

Edgar St: 62 / 142 / 91 / 280

Macquarie S

Time Period	From Macquarie St east through	right	From Edgar St left	right	From Macquarie St west left	through	Total vehicles	Peak
14:30 to 14:45	51	15	35	10	8	78	197	
14:45 to 15:00	42	16	37	8	9	83	195	
15:00 to 15:15	46	15	42	9	10	88	210	
15:15 to 15:30	56	20	40	13	12	84	225	
15:30 to 15:45	62	21	38	13	11	90	235	
15:45 to 16:00	65	26	40	12	5	75	223	
16:00 to 16:15	70	25	38	11	6	85	235	
16:15 to 16:30	69	23	34	14	5	87	232	
16:30 to 16:45	75	21	40	16	8	84	244	
16:45 to 17:00	66	22	30	21	10	97	246	peak
17:00 to 17:15	52	23	29	18	8	79	209	
17:15 to 17:30	61	18	32	20	9	82	222	
17:30 to 17:45	50	12	30	15	4	76	187	
17:45 to 18:00	48	8	24	17	5	68	170	
Total	813	265	489	197	110	1156		
Hourly summary								
14:30 to 15:30	195	66	154	40	39	333	827	
14:45 to 15:45	206	72	157	43	42	345	865	
15:00 to 16:00	229	82	160	47	38	337	893	
15:15 to 16:15	253	92	156	49	34	334	918	
15:30 to 16:30	266	95	150	50	27	337	925	
15:45 to 16:45	279	95	152	53	24	331	934	
16:00 to 17:00	280	91	142	62	29	353	957	peak hour
16:15 to 17:15	262	89	133	69	31	347	931	
16:30 to 17:30	254	84	131	75	35	342	921	
16:45 to 17:45	229	75	121	74	31	334	864	
17:00 to 18:00	211	61	115	70	26	305	788	

ANNEXURE A: TRAFFIC COUNTS

(SHEET 3 of 4)

Curtis Traffic Surveys

Turning movement count

Job:	170602mcl (17_315)
Day, date	09/06/17
Location:	Brooks Pd & Maude St
Weather:	Fine
Client:	McLaren Traffic Engineering

N

Peak Hour Volumes

Brooks Pd: 513 (→) 97; 520 (↑) 12

Maude St: 86; 44

Time Period	From Brooks Pd south through	From Brooks Pd south right	From Maude St left	From Maude St right	From Brooks Pd north left	From Brooks Pd north through	Total vehicles	Peak
07:00 to 07:15	65	1	2	15	4	58	145	
07:15 to 07:30	85	1	1	3	6	71	167	
07:30 to 07:45	95	2	2	5	8	85	197	
07:45 to 08:00	110	3	5	7	15	105	245	
08:00 to 08:15	125	2	6	9	22	135	299	
08:15 to 08:30	124	1	7	12	24	137	305	
08:30 to 08:45	122	2	12	16	25	138	315	
08:45 to 09:00	140	3	10	25	26	125	329	peak
09:00 to 09:15	134	6	15	33	22	113	323	
09:15 to 09:30	125	7	10	28	26	108	304	
Total	1125	28	70	153	178	1075		
Hourly summary								
07:00 to 08:00	355	7	10	30	33	319	754	
07:15 to 08:15	415	8	14	24	51	396	908	
07:30 to 08:30	454	8	20	33	69	462	1046	
07:45 to 08:45	481	8	30	44	86	515	1164	
08:00 to 09:00	511	8	35	62	97	535	1248	
08:15 to 09:15	520	12	44	86	97	513	1272	peak hour
08:30 to 09:30	521	18	47	102	99	484	1271	

Curtis Traffic Surveys

Turning movement count

Job:	170602mcl (17_315)
Day, date	09/06/17
Location:	Brooks Pd & Maude St
Weather:	Fine
Client:	McLaren Traffic Engineering

N

Peak Hour Volumes

Brooks Pd: 771 (→) 101; 985 (↑) 72

Maude St: 196; 109

Time Period	From Brooks Pd south through	From Brooks Pd south right	From Maude St left	From Maude St right	From Brooks Pd north left	From Brooks Pd north through	Total vehicles	Peak
14:30 to 14:45	121	8	8	29	27	109	302	
14:45 to 15:00	127	4	9	29	25	106	300	
15:00 to 15:15	132	5	7	31	18	108	301	
15:15 to 15:30	140	3	10	46	17	125	341	
15:30 to 15:45	133	2	14	49	20	110	328	
15:45 to 16:00	137	1	13	56	21	125	353	
16:00 to 16:15	181	4	9	34	19	115	362	
16:15 to 16:30	195	5	12	41	25	165	443	
16:30 to 16:45	254	15	21	45	23	185	543	
16:45 to 17:00	235	18	25	56	24	195	553	
17:00 to 17:15	272	27	38	53	28	206	624	peak
17:15 to 17:30	224	12	25	42	26	185	514	
17:30 to 17:45	167	6	10	35	22	130	370	
17:45 to 18:00	175	4	8	32	21	125	365	
Total	2493	114	209	578	316	1989		
Hourly summary								
14:30 to 15:30	520	20	34	135	87	448	1244	
14:45 to 15:45	532	14	40	155	80	449	1270	
15:00 to 16:00	542	11	44	182	76	468	1323	
15:15 to 16:15	591	10	46	185	77	475	1384	
15:30 to 16:30	646	12	48	180	85	515	1486	
15:45 to 16:45	767	25	55	176	88	590	1701	
16:00 to 17:00	865	42	67	176	91	660	1901	
16:15 to 17:15	956	65	96	195	100	751	2163	
16:30 to 17:30	985	72	109	196	101	771	2234	peak hour
16:45 to 17:45	898	63	98	186	100	716	2061	
17:00 to 18:00	838	49	81	162	97	646	1873	

ANNEXURE A: TRAFFIC COUNTS

(SHEET 4 of 4)

Curtis Traffic Surveys	Turning movement count	N	Brooks Pd	Sharp St
Job:	170602mcl (17_315)		582 ↓ 17	
Day, date	09/06/17	Peak Hour Volumes		6
Location:	Brooks Pd & Sharp St			5
Weather:	Fine		526 3	
Client:	McLaren Traffic Engineering			

	From Brooks Pd south		From Sharp St		From Brooks Pd north			
Time Period	through	right	left	right	left	through	Total vehicles	Peak
07:00 to 07:15	65	1	1	1	3	70	141	
07:15 to 07:30	84	0	1	2	0	74	161	
07:30 to 07:45	96	1	0	1	2	88	188	
07:45 to 08:00	113	0	1	0	1	111	226	
08:00 to 08:15	126	0	0	1	5	139	271	
08:15 to 08:30	124	1	0	1	5	144	275	
08:30 to 08:45	122	0	0	2	4	150	278	
08:45 to 09:00	142	1	2	1	5	145	296	peak
09:00 to 09:15	138	1	3	2	3	143	290	
09:15 to 09:30	129	0	2	3	4	132	270	
Total	1139	5	10	14	32	1196		
Hourly summary								
07:00 to 08:00	358	2	3	4	6	343	716	
07:15 to 08:15	419	1	2	4	8	412	846	
07:30 to 08:30	459	2	1	3	13	482	960	
07:45 to 08:45	485	1	1	4	15	544	1050	
08:00 to 09:00	514	2	2	5	19	578	1120	
08:15 to 09:15	526	3	5	6	17	582	1139	peak hour
08:30 to 09:30	531	2	7	8	16	570	1134	

Curtis Traffic Surveys	Turning movement count	N	Brooks Pd	Sharp St
Job:	170602mcl (17_315)		955 ↓ 12	
Day, date	09/06/17	Peak Hour Volumes		9
Location:	Brooks Pd & Sharp St			4
Weather:	Fine		1048 2	
Client:	McLaren Traffic Engineering			

	From Brooks Pd south		From Sharp St		From Brooks Pd north			
Time Period	through	right	left	right	left	through	Total vehicles	Peak
14:30 to 14:45	128	0	0	1	3	135	267	
14:45 to 15:00	129	1	4	2	4	131	271	
15:00 to 15:15	134	0	2	3	3	136	278	
15:15 to 15:30	142	1	3	1	2	169	318	
15:30 to 15:45	133	0	1	2	4	155	295	
15:45 to 16:00	137	0	1	1	3	178	320	
16:00 to 16:15	180	0	1	5	7	142	335	
16:15 to 16:30	197	1	2	3	5	201	409	
16:30 to 16:45	265	0	1	4	4	226	500	
16:45 to 17:00	251	1	0	2	3	248	505	
17:00 to 17:15	298	0	1	1	2	257	559	peak
17:15 to 17:30	234	1	2	2	3	224	466	
17:30 to 17:45	173	0	0	0	4	161	338	
17:45 to 18:00	178	0	0	1	3	154	336	
Total	2579	5	18	28	50	2517		
Hourly summary								
14:30 to 15:30	533	2	9	7	12	571	1134	
14:45 to 15:45	538	2	10	8	13	591	1162	
15:00 to 16:00	546	1	7	7	12	638	1211	
15:15 to 16:15	592	1	6	9	16	644	1268	
15:30 to 16:30	647	1	5	11	19	676	1359	
15:45 to 16:45	779	1	5	13	19	747	1564	
16:00 to 17:00	893	2	4	14	19	817	1749	
16:15 to 17:15	1011	2	4	10	14	932	1973	
16:30 to 17:30	1048	2	4	9	12	955	2030	peak hour
16:45 to 17:45	956	2	3	5	12	890	1868	
17:00 to 18:00	883	1	3	4	12	796	1699	

MOVEMENT SUMMARY

Site: 101 [Edgar / Herbert Street EX AM]

Edgar Street / Herbert Street
Existing
AM
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Edgar Street											
2	T1	54	0.0	0.051	4.9	LOS A	0.3	1.8	0.10	0.53	53.8
3	R2	15	0.0	0.051	7.7	LOS A	0.3	1.8	0.10	0.53	53.4
Approach		68	0.0	0.051	5.5	LOS A	0.3	1.8	0.10	0.53	53.7
East: Herbert Street											
4	L2	73	0.0	0.080	5.8	LOS A	0.4	2.7	0.27	0.57	52.3
6	R2	20	0.0	0.080	8.2	LOS A	0.4	2.7	0.27	0.57	52.7
Approach		93	0.0	0.080	6.3	LOS A	0.4	2.7	0.27	0.57	52.3
North: Edgar Street											
7	L2	13	0.0	0.086	5.3	LOS A	0.4	3.0	0.08	0.50	53.4
8	T1	112	0.0	0.086	4.8	LOS A	0.4	3.0	0.08	0.50	54.3
Approach		124	0.0	0.086	4.9	LOS A	0.4	3.0	0.08	0.50	54.2
All Vehicles		285	0.0	0.086	5.5	LOS A	0.4	3.0	0.15	0.53	53.5

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.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: 101 [Edgar / Herbert Street EX PM]

Edgar Street / Herbert Street
Existing
PM
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Edgar Street											
2	T1	168	0.0	0.141	4.9	LOS A	0.8	5.5	0.15	0.51	53.8
3	R2	26	0.0	0.141	7.7	LOS A	0.8	5.5	0.15	0.51	53.4
Approach		195	0.0	0.141	5.3	LOS A	0.8	5.5	0.15	0.51	53.7
East: Herbert Street											
4	L2	128	0.0	0.147	6.2	LOS A	0.8	5.3	0.36	0.60	52.0
6	R2	33	0.0	0.147	8.6	LOS A	0.8	5.3	0.36	0.60	52.4
Approach		161	0.0	0.147	6.7	LOS A	0.8	5.3	0.36	0.60	52.1
North: Edgar Street											
7	L2	14	0.0	0.132	5.4	LOS A	0.7	4.8	0.12	0.49	53.3
8	T1	172	0.0	0.132	4.9	LOS A	0.7	4.8	0.12	0.49	54.1
Approach		185	0.0	0.132	4.9	LOS A	0.7	4.8	0.12	0.49	54.1
All Vehicles		541	0.0	0.147	5.6	LOS A	0.8	5.5	0.20	0.53	53.4

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.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: 101 [Edgar / Herbert Street FU AM]

Edgar Street / Herbert Street
Future
AM
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Edgar Street											
1	L2	4	0.0	0.059	5.4	LOS A	0.3	2.1	0.13	0.53	52.8
2	T1	55	0.0	0.059	4.9	LOS A	0.3	2.1	0.13	0.53	53.6
3	R2	18	0.0	0.059	7.7	LOS A	0.3	2.1	0.13	0.53	53.2
Approach		77	0.0	0.059	5.6	LOS A	0.3	2.1	0.13	0.53	53.5
East: Herbert Street											
4	L2	76	0.0	0.091	5.9	LOS A	0.5	3.2	0.30	0.58	52.2
5	T1	7	0.0	0.091	5.5	LOS A	0.5	3.2	0.30	0.58	53.0
6	R2	20	0.0	0.091	8.3	LOS A	0.5	3.2	0.30	0.58	52.6
Approach		103	0.0	0.091	6.4	LOS A	0.5	3.2	0.30	0.58	52.4
North: Edgar Street											
7	L2	13	0.0	0.103	5.5	LOS A	0.5	3.6	0.20	0.50	53.0
8	T1	113	0.0	0.103	5.1	LOS A	0.5	3.6	0.20	0.50	53.8
9	R2	4	0.0	0.103	7.9	LOS A	0.5	3.6	0.20	0.50	53.4
Approach		129	0.0	0.103	5.2	LOS A	0.5	3.6	0.20	0.50	53.7
West: Driveway											
10	L2	15	0.0	0.050	5.7	LOS A	0.2	1.7	0.24	0.55	52.4
11	T1	29	0.0	0.050	5.3	LOS A	0.2	1.7	0.24	0.55	53.2
12	R2	15	0.0	0.050	8.0	LOS A	0.2	1.7	0.24	0.55	52.8
Approach		59	0.0	0.050	6.1	LOS A	0.2	1.7	0.24	0.55	52.9
All Vehicles		368	0.0	0.103	5.8	LOS A	0.5	3.6	0.22	0.54	53.1

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.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: 101 [Edgar / Herbert Street FU PM]

Edgar Street / Herbert Street
Future
PM
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Edgar Street											
1	L2	9	0.0	0.161	5.5	LOS A	0.9	6.3	0.21	0.52	52.8
2	T1	169	0.0	0.161	5.1	LOS A	0.9	6.3	0.21	0.52	53.6
3	R2	29	0.0	0.161	7.9	LOS A	0.9	6.3	0.21	0.52	53.2
Approach		208	0.0	0.161	5.5	LOS A	0.9	6.3	0.21	0.52	53.5
East: Herbert Street											
4	L2	132	0.0	0.168	6.3	LOS A	0.9	6.2	0.38	0.60	52.0
5	T1	18	0.0	0.168	5.9	LOS A	0.9	6.2	0.38	0.60	52.8
6	R2	33	0.0	0.168	8.7	LOS A	0.9	6.2	0.38	0.60	52.4
Approach		182	0.0	0.168	6.7	LOS A	0.9	6.2	0.38	0.60	52.2
North: Edgar Street											
7	L2	14	0.0	0.143	5.4	LOS A	0.8	5.3	0.15	0.50	53.1
8	T1	173	0.0	0.143	5.0	LOS A	0.8	5.3	0.15	0.50	53.9
9	R2	9	0.0	0.143	7.7	LOS A	0.8	5.3	0.15	0.50	53.5
Approach		196	0.0	0.143	5.1	LOS A	0.8	5.3	0.15	0.50	53.9
West: Driveway											
10	L2	2	0.0	0.008	6.3	LOS A	0.0	0.3	0.38	0.55	52.0
11	T1	4	0.0	0.008	5.9	LOS A	0.0	0.3	0.38	0.55	52.8
12	R2	2	0.0	0.008	8.7	LOS A	0.0	0.3	0.38	0.55	52.4
Approach		8	0.0	0.008	6.7	LOS A	0.0	0.3	0.38	0.55	52.5
All Vehicles		595	0.0	0.168	5.8	LOS A	0.9	6.3	0.24	0.54	53.2

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.
Roundabout Capacity Model: SIDRA Standard.
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 SUMMARY

Site: 1.1 [EX - Macquarie Street and Edgar Street - AM]

Macquarie Street and Edgar Street
Exisiting
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Macquarie Street East											
5	T1	112	0.0	0.057	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	64	0.0	0.068	7.5	LOS A	0.3	1.9	0.45	0.66	52.1
Approach		176	0.0	0.068	2.7	NA	0.3	1.9	0.16	0.24	56.9
North: Edgar Street North											
7	L2	98	0.0	0.085	6.2	LOS A	0.3	2.2	0.26	0.57	52.8
9	R2	28	0.0	0.055	10.4	LOS A	0.2	1.4	0.56	0.76	49.8
Approach		126	0.0	0.085	7.1	LOS A	0.3	2.2	0.33	0.61	52.1
West: Macquarie Street West											
10	L2	52	0.0	0.110	5.6	LOS A	0.0	0.0	0.00	0.15	57.1
11	T1	373	0.0	0.110	0.0	LOS A	0.0	0.0	0.00	0.06	59.4
Approach		425	0.0	0.110	0.7	NA	0.0	0.0	0.00	0.07	59.1
All Vehicles		727	0.0	0.110	2.3	NA	0.3	2.2	0.10	0.21	57.2

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 1.2 [EX - Macquarie Street and Edgar Street - PM]

Macquarie Street and Edgar Street
Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Macquarie Street East											
5	T1	280	0.0	0.118	0.3	LOS A	0.6	4.0	0.08	0.08	59.1
6	R2	91	0.0	0.118	7.3	LOS A	0.6	4.0	0.43	0.43	53.7
Approach		371	0.0	0.118	2.0	NA	0.6	4.0	0.16	0.16	57.6
North: Edgar Street North											
7	L2	142	0.0	0.124	6.2	LOS A	0.5	3.3	0.27	0.58	52.8
9	R2	62	0.0	0.153	13.2	LOS A	0.6	3.9	0.67	0.86	48.0
Approach		204	0.0	0.153	8.3	LOS A	0.6	3.9	0.39	0.66	51.2
West: Macquarie Street West											
10	L2	29	0.0	0.098	5.5	LOS A	0.0	0.0	0.00	0.09	57.6
11	T1	353	0.0	0.098	0.0	LOS A	0.0	0.0	0.00	0.04	59.6
Approach		382	0.0	0.098	0.4	NA	0.0	0.0	0.00	0.05	59.4
All Vehicles		957	0.0	0.153	2.7	NA	0.6	4.0	0.15	0.22	56.8

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 1.1 [FU - Macquarie Street and Edgar Street - AM]

Macquarie Street and Edgar Street
Future
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Macquarie Street East											
5	T1	112	0.0	0.057	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	70	0.0	0.075	7.5	LOS A	0.3	2.0	0.45	0.66	52.1
Approach		182	0.0	0.075	2.9	NA	0.3	2.0	0.17	0.25	56.7
North: Edgar Street North											
7	L2	112	0.0	0.097	6.2	LOS A	0.4	2.5	0.26	0.57	52.8
9	R2	29	0.0	0.057	10.5	LOS A	0.2	1.4	0.56	0.76	49.8
Approach		141	0.0	0.097	7.1	LOS A	0.4	2.5	0.32	0.61	52.1
West: Macquarie Street West											
10	L2	53	0.0	0.110	5.6	LOS A	0.0	0.0	0.00	0.15	57.1
11	T1	373	0.0	0.110	0.0	LOS A	0.0	0.0	0.00	0.06	59.4
Approach		426	0.0	0.110	0.7	NA	0.0	0.0	0.00	0.07	59.1
All Vehicles		749	0.0	0.110	2.4	NA	0.4	2.5	0.10	0.22	57.1

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 1.2 [FU - Macquarie Street and Edgar Street - PM]

Macquarie Street and Edgar Street
Future
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Macquarie Street East											
5	T1	280	0.0	0.124	0.2	LOS A	0.6	4.0	0.06	0.07	59.2
6	R2	103	0.0	0.124	7.3	LOS A	0.6	4.0	0.44	0.49	53.3
Approach		383	0.0	0.124	2.2	NA	0.6	4.0	0.16	0.18	57.5
North: Edgar Street North											
7	L2	147	0.0	0.128	6.2	LOS A	0.5	3.4	0.27	0.58	52.8
9	R2	63	0.0	0.159	13.4	LOS A	0.6	4.1	0.68	0.87	47.9
Approach		210	0.0	0.159	8.4	LOS A	0.6	4.1	0.39	0.66	51.2
West: Macquarie Street West											
10	L2	31	0.0	0.099	5.5	LOS A	0.0	0.0	0.00	0.10	57.5
11	T1	353	0.0	0.099	0.0	LOS A	0.0	0.0	0.00	0.04	59.6
Approach		384	0.0	0.099	0.5	NA	0.0	0.0	0.00	0.05	59.4
All Vehicles		977	0.0	0.159	2.8	NA	0.6	4.1	0.15	0.23	56.7

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 2.1 [EX - Brooks Parade and Sharp Street - AM]

Brooks Parade and Sharp Street
Exisiting
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brooks Parade South											
2	T1	526	0.0	0.270	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
3	R2	3	0.0	0.003	7.8	LOS A	0.0	0.1	0.53	0.61	51.4
Approach		529	0.0	0.270	0.1	NA	0.0	0.1	0.00	0.00	59.9
East: sharp Street East											
4	L2	5	0.0	0.030	7.8	LOS A	0.1	0.7	0.69	0.81	47.7
6	R2	6	0.0	0.030	19.0	LOS B	0.1	0.7	0.69	0.81	47.3
Approach		11	0.0	0.030	13.9	LOS A	0.1	0.7	0.69	0.81	47.5
North: Brooks Parade North											
7	L2	17	0.0	0.308	5.6	LOS A	0.0	0.0	0.00	0.02	58.2
8	T1	582	0.0	0.308	0.0	LOS A	0.0	0.0	0.00	0.02	59.8
Approach		599	0.0	0.308	0.2	NA	0.0	0.0	0.00	0.02	59.7
All Vehicles		1139	0.0	0.308	0.3	NA	0.1	0.7	0.01	0.02	59.7

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 2.2 [EX - Brooks Parade and Sharp Street - PM]

Brooks Parade and Sharp Street
Exisiting
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brooks Parade South											
2	T1	1048	0.0	0.537	0.1	LOS A	0.0	0.0	0.00	0.00	59.8
3	R2	2	0.0	0.004	11.4	LOS A	0.0	0.1	0.72	0.73	48.9
Approach		1050	0.0	0.537	0.1	NA	0.0	0.1	0.00	0.00	59.8
East: sharp Street East											
4	L2	4	0.0	0.318	32.0	LOS C	0.9	6.1	0.97	1.01	21.4
6	R2	9	0.0	0.318	142.0	LOS F	0.9	6.1	0.97	1.01	21.3
Approach		13	0.0	0.318	108.2	LOS F	0.9	6.1	0.97	1.01	21.3
North: Brooks Parade North											
7	L2	12	0.0	0.496	5.6	LOS A	0.0	0.0	0.00	0.01	58.2
8	T1	955	0.0	0.496	0.1	LOS A	0.0	0.0	0.00	0.01	59.8
Approach		967	0.0	0.496	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2030	0.0	0.537	0.8	NA	0.9	6.1	0.01	0.01	59.1

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 2.1 [FU - Brooks Parade and Sharp Street - AM]

Brooks Parade and Sharp Street
Future
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brooks Parade South											
2	T1	526	0.0	0.270	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
3	R2	4	0.0	0.004	7.8	LOS A	0.0	0.1	0.54	0.62	51.4
Approach		530	0.0	0.270	0.1	NA	0.0	0.1	0.00	0.00	59.9
East: sharp Street East											
4	L2	6	0.0	0.039	7.9	LOS A	0.1	0.9	0.70	0.82	47.5
6	R2	8	0.0	0.039	19.1	LOS B	0.1	0.9	0.70	0.82	47.1
Approach		14	0.0	0.039	14.3	LOS A	0.1	0.9	0.70	0.82	47.3
North: Brooks Parade North											
7	L2	19	0.0	0.309	5.6	LOS A	0.0	0.0	0.00	0.02	58.1
8	T1	582	0.0	0.309	0.0	LOS A	0.0	0.0	0.00	0.02	59.8
Approach		601	0.0	0.309	0.2	NA	0.0	0.0	0.00	0.02	59.7
All Vehicles		1145	0.0	0.309	0.3	NA	0.1	0.9	0.01	0.02	59.6

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 2.2 [FU - Brooks Parade and Sharp Street - PM]

Brooks Parade and Sharp Street
Future
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brooks Parade South											
2	T1	1048	0.0	0.537	0.1	LOS A	0.0	0.0	0.00	0.00	59.8
3	R2	1	0.0	0.002	11.4	LOS A	0.0	0.0	0.72	0.69	48.9
Approach		1049	0.0	0.537	0.1	NA	0.0	0.0	0.00	0.00	59.8
East: sharp Street East											
4	L2	5	0.0	0.390	40.9	LOS C	1.1	7.6	0.98	1.02	20.3
6	R2	11	0.0	0.390	151.9	LOS F	1.1	7.6	0.98	1.02	20.2
Approach		16	0.0	0.390	117.2	LOS F	1.1	7.6	0.98	1.02	20.2
North: Brooks Parade North											
7	L2	14	0.0	0.497	5.6	LOS A	0.0	0.0	0.00	0.01	58.2
8	T1	955	0.0	0.497	0.1	LOS A	0.0	0.0	0.00	0.01	59.8
Approach		969	0.0	0.497	0.2	NA	0.0	0.0	0.00	0.01	59.7
All Vehicles		2034	0.0	0.537	1.1	NA	1.1	7.6	0.01	0.01	58.9

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 3.1 [EX - Brooks Parade and Maude Street - AM]

Brooks Parade and Maude Street
Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Brooks Parade South East											
22	T1	520	0.0	0.267	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
23	R2	12	0.0	0.013	8.0	LOS A	0.1	0.4	0.54	0.66	51.5
Approach		532	0.0	0.267	0.2	NA	0.1	0.4	0.01	0.01	59.7
NorthEast: Maude Street North East											
24	L2	44	0.0	0.045	7.5	LOS A	0.2	1.2	0.48	0.67	52.1
26	R2	86	0.0	0.330	21.8	LOS B	1.3	8.9	0.84	0.98	42.9
Approach		130	0.0	0.330	17.0	LOS B	1.3	8.9	0.72	0.88	45.6
NorthWest: Brooks Parade North west											
27	L2	97	0.0	0.315	5.6	LOS A	0.0	0.0	0.00	0.09	57.5
28	T1	513	0.0	0.315	0.0	LOS A	0.0	0.0	0.00	0.09	59.1
Approach		610	0.0	0.315	0.9	NA	0.0	0.0	0.00	0.09	58.8
All Vehicles		1272	0.0	0.330	2.3	NA	1.3	8.9	0.08	0.14	57.5

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 3.2 [EX - Brooks Parade and Maude Street - PM]

Brooks Parade and Maude Street
Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Brooks Parade South East											
22	T1	985	0.0	0.505	0.1	LOS A	0.0	0.0	0.00	0.00	49.9
23	R2	72	0.0	0.117	9.8	LOS A	0.4	3.1	0.69	0.86	43.5
Approach		1057	0.0	0.505	0.7	NA	0.4	3.1	0.05	0.06	49.4
NorthEast: Maude Street North East											
24	L2	109	0.0	0.160	8.8	LOS A	0.6	4.1	0.62	0.82	44.2
26	R2	196	0.0	4.386	6143.5	LOS F	200.6	1404.3	1.00	5.75	0.6
Approach		305	0.0	4.386	3951.1	LOS F	200.6	1404.3	0.87	3.99	0.9
NorthWest: Brooks Parade North west											
27	L2	101	0.0	0.450	4.6	LOS A	0.0	0.0	0.00	0.06	49.1
28	T1	771	0.0	0.450	0.1	LOS A	0.0	0.0	0.00	0.06	49.6
Approach		872	0.0	0.450	0.6	NA	0.0	0.0	0.00	0.06	49.5
All Vehicles		2234	0.0	4.386	540.0	NA	200.6	1404.3	0.14	0.60	5.9

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 3.1 [FU - Brooks Parade and Maude Street - AM]

Brooks Parade and Maude Street
Future
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Brooks Parade South East											
22	T1	522	0.0	0.268	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
23	R2	12	0.0	0.013	8.0	LOS A	0.1	0.4	0.54	0.66	51.5
Approach		534	0.0	0.268	0.2	NA	0.1	0.4	0.01	0.01	59.7
NorthEast: Maude Street North East											
24	L2	44	0.0	0.045	7.5	LOS A	0.2	1.2	0.48	0.67	52.1
26	R2	92	0.0	0.356	22.4	LOS B	1.4	9.8	0.85	0.99	42.6
Approach		136	0.0	0.356	17.6	LOS B	1.4	9.8	0.73	0.89	45.3
NorthWest: Brooks Parade North west											
27	L2	98	0.0	0.317	5.6	LOS A	0.0	0.0	0.00	0.10	57.5
28	T1	515	0.0	0.317	0.0	LOS A	0.0	0.0	0.00	0.10	59.1
Approach		613	0.0	0.317	0.9	NA	0.0	0.0	0.00	0.10	58.8
All Vehicles		1283	0.0	0.356	2.4	NA	1.4	9.8	0.08	0.15	57.4

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.

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

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

SIDRA Standard Delay Model 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 SUMMARY

Site: 3.2 [FU - Brooks Parade and Maude Street - PM]

Brooks Parade and Maude Street
Future
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Brooks Parade South East											
22	T1	987	0.0	0.506	0.1	LOS A	0.0	0.0	0.00	0.00	49.9
23	R2	72	0.0	0.118	9.9	LOS A	0.4	3.1	0.69	0.86	43.5
Approach		1059	0.0	0.506	0.8	NA	0.4	3.1	0.05	0.06	49.4
NorthEast: Maude Street North East											
24	L2	109	0.0	0.160	8.8	LOS A	0.6	4.1	0.63	0.82	44.2
26	R2	197	0.0	4.471	6298.0	LOS F	202.9	1420.0	1.00	5.71	0.6
Approach		306	0.0	4.471	4057.7	LOS F	202.9	1420.0	0.87	3.97	0.9
NorthWest: Brooks Parade North west											
27	L2	104	0.0	0.452	4.6	LOS A	0.0	0.0	0.00	0.06	49.1
28	T1	773	0.0	0.452	0.1	LOS A	0.0	0.0	0.00	0.06	49.5
Approach		877	0.0	0.452	0.6	NA	0.0	0.0	0.00	0.06	49.5
All Vehicles		2242	0.0	4.471	554.4	NA	202.9	1420.0	0.14	0.60	5.8

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.

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

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

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

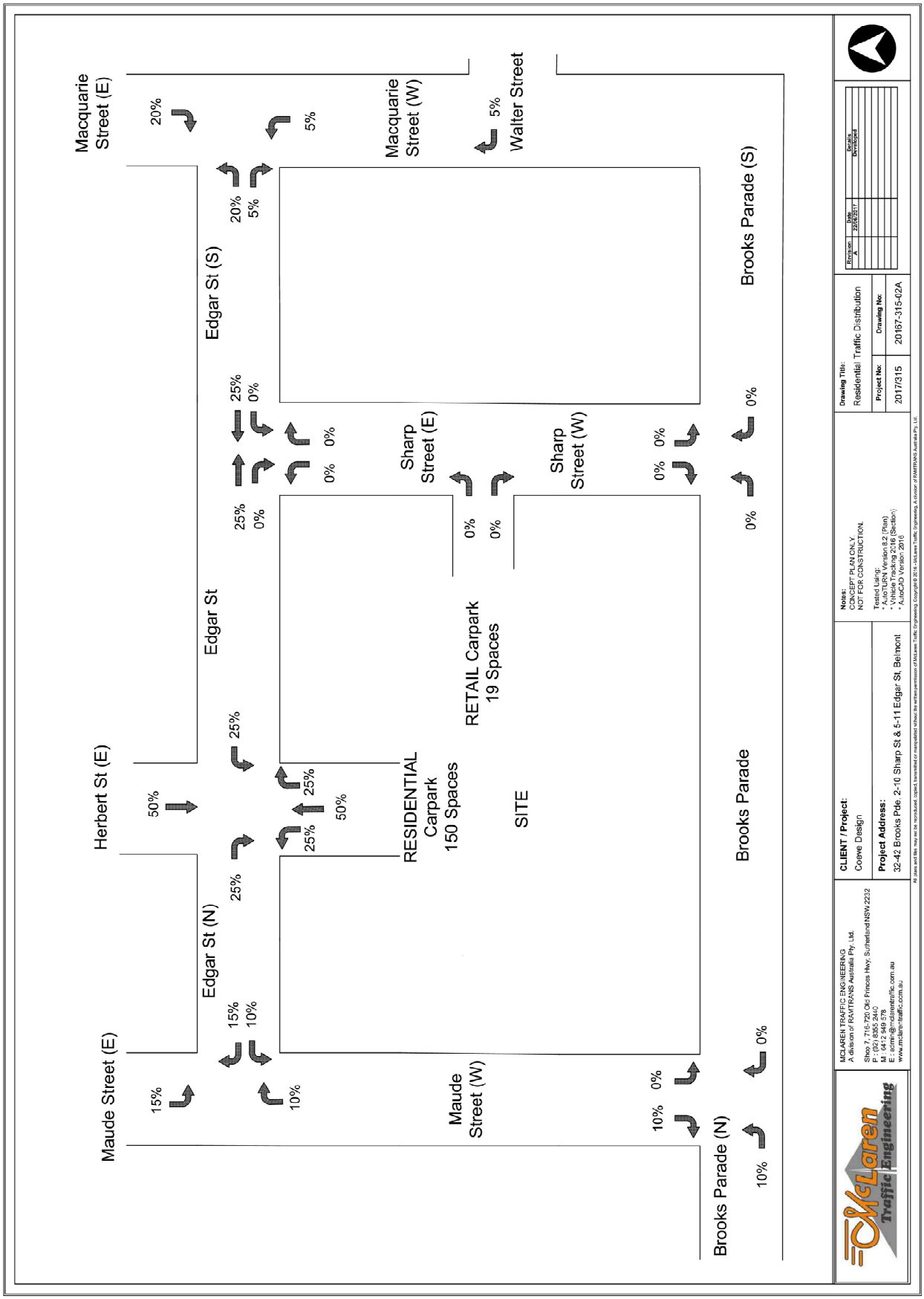
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

ANNEXURE C: TRAFFIC ASSIGNMENT

RESIDENTIAL

(SHEET 1 OF 2)



ANNEXURE C: TRAFFIC ASSIGNMENT

RETAIL/COMMERCIAL

(SHEET 2 OF 2)