



**TRAFFIC AND PARKING IMPACT ASSESSMENT OF  
PROPOSED CHILD CARE CENTRE  
AT 11 LEWIS STREET, BALGOWLAH HEIGHTS**



**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](http://www.mclarentraffic.com.au)  
Email: [admin@mclarentraffic.com.au](mailto:admin@mclarentraffic.com.au)**

**Division of RAMTRANS Australia ABN: 45067491678 RPEQ: 19457**

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

**Development Type:** Proposed Child Care Centre

**Site Address:** 11 Lewis Street, Balgowlah Heights

**Prepared for:** Oxford Number 1 Pty Ltd

**Document reference:** 200851.01DD

Status	Issue	Prepared By	Checked By	Date
Draft	A	LS	TS	11 <sup>th</sup> December 2020
Draft	B	LS		14 <sup>th</sup> December 2020
Draft	C	LS		15 <sup>th</sup> December 2020
Final	A	LS		17 <sup>th</sup> December 2020
Draft	D	TS		19 <sup>th</sup> August 2021

Please be aware that all information and material contained in this report is the property of McLaren Traffic Engineering. The information contained in this document is confidential and intended solely for the use of the client for the purpose for which it has been prepared and no representation is made or if to be implied as being made to any third party. Any third party wishing to distribute this document in whole or in part for personal or commercial use must obtain written confirmation from McLaren Traffic Engineering prior to doing so. Failure to obtain written permission may constitute an infringement of copyright and may be liable for legal action.

## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	Description and Scale of Development.....	1
1.2	State Environmental Planning Policy (Infrastructure) 2007.....	1
1.3	Site Description.....	1
1.4	Site Context .....	1
<b>2</b>	<b>EXISTING TRAFFIC AND PARKING CONDITIONS .....</b>	<b>3</b>
2.1	Road Hierarchy.....	3
2.1.1	Lewis Street .....	3
2.1.2	Ernest Street .....	3
2.1.3	Beatrice Street .....	3
2.2	Existing Traffic and Pedestrian Management .....	3
2.3	Existing Traffic Environment .....	4
2.3.1	Existing Intersection Performances .....	5
2.4	Public Transport.....	5
2.5	Future Road and Infrastructure Upgrades .....	6
<b>3</b>	<b>PARKING ASSESSMENT .....</b>	<b>7</b>
3.1	Council Car Parking Requirement .....	7
3.1.1	Staff Parking Shortfall - Journey to Work Data .....	7
3.1.2	Car Parking Shortfall - Vacant Parent Spaces for Staff use .....	9
3.2	Visitor Drop-off / Pick-up Spaces .....	9
3.3	Disabled Parking.....	9
3.4	Bicycle & Motorcycle Parking Requirements .....	9
3.5	Servicing & Loading.....	10
3.6	Car Park Design & Compliance .....	10
<b>4</b>	<b>TRAFFIC ASSESSMENT .....</b>	<b>11</b>
4.1	Traffic Generation .....	11
4.2	Traffic Assignment .....	12
4.3	Traffic Impact.....	12
<b>5</b>	<b>POTENTIAL PUBLIC DOMAIN IMPROVEMENTS .....</b>	<b>14</b>
5.1	Removal of Pram Ramp .....	14
5.2	RMS Pedestrian Fencing.....	14
5.3	Footpath Extension.....	14
<b>6</b>	<b>CONCLUSION .....</b>	<b>15</b>

## **1 INTRODUCTION**

*McLaren Traffic Engineering* was commissioned by *Oxford Number 1 Pty Ltd* to provide a traffic and parking impact assessment of the proposed Child Care Centre at 11 Lewis Street, Balgowlah Heights. Reduced plans of the proposed development are provided in **Annexure A** for reference.

### **1.1 *Description and Scale of Development***

The proposed development has the following characteristics relevant to traffic and parking:

- A total of 57 children and 11 staff members as per the following:
  - 12 children between 0-2 years old (3 staff assigned – Ratio 1:4);
  - 15 children between 2-3 years old (3 staff assigned – Ratio 1:5);
  - 30 children between 3-5 years old (3 staff assigned – Ratio 1:10);
  - Two (2) administrative cooking staff members. These two (2) additional staff are not required but provided by the operator for easy operations.
- A basement parking area with vehicular access via a proposed two-way driveway from Lewis Street, accommodating a total of 16 car spaces with 12 of the spaces provided via six (6) car stackers. The car parking area includes:
  - Six (6) parent car spaces, including one (1) disabled car space
    - Two (2) of these spaces are located beneath stackers;
  - 10 staff car spaces within the remaining spaces of the car stackers;
  - The proposal provides car parking at a ratio of 1:3.6 children

### **1.2 *State Environmental Planning Policy (Infrastructure) 2007***

The proposed development does not qualify as a traffic generating development with relevant size and/or capacity under *Clause 104* of the *SEPP (Infrastructure) 2007*. Accordingly, formal referral to the Transport for New South Wales (TfNSW) is not necessary and Northern Beaches Council officers can assess accordingly.

### **1.3 *Site Description***

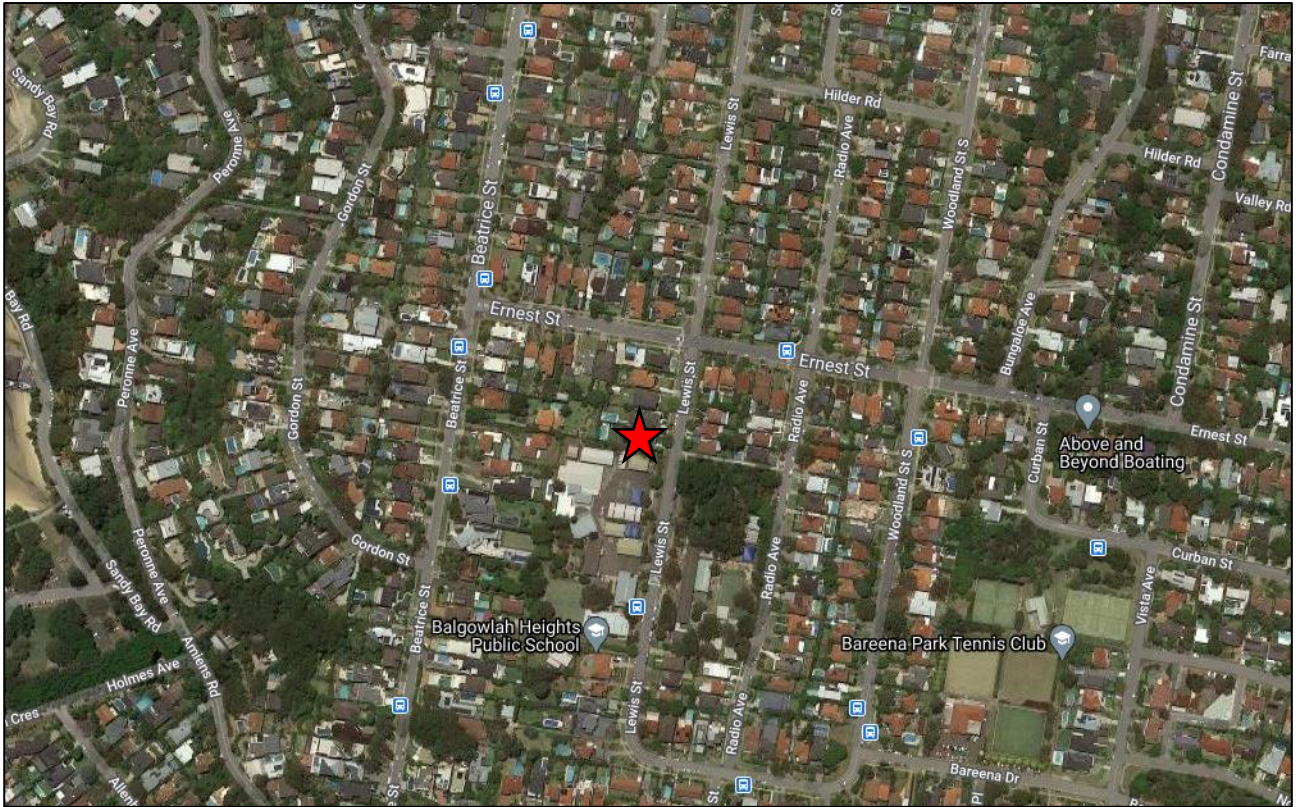
The subject development is currently zoned *R2 – Low Density Residential* under the *Manly Local Environmental Plan 2013* and is occupied by a residential dwelling. The site has a single frontage to Lewis Street to the east. Vehicular access to the existing site is provided via a domestic driveway to Lewis Street.

The site is generally surrounded by low to medium density residential developments with Balgowlah Heights Public School located to the south and south-east of the site.

### **1.4 *Site Context***

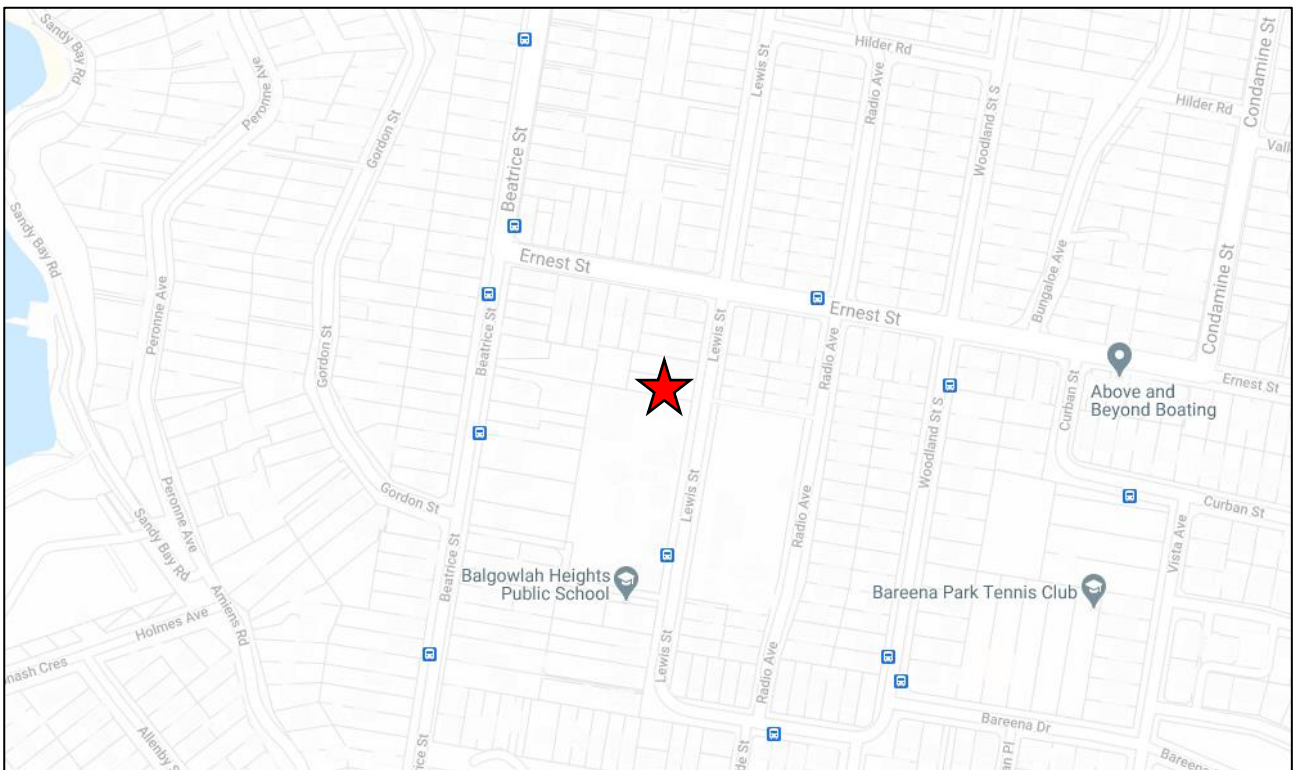
The location of the site is shown on an aerial photo and a street map in **Figure 1** and **Figure 2** respectively.





 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***

The road network servicing the site has characteristics as described in the following sub-sections.

#### **2.1.1 Lewis Street**

- Unclassified LOCAL Road;
- Approximately 10m wide two-way carriageway facilitating one traffic flow lane in each direction and kerbside parking;
- Signposted 50km/h speed limit;
- Signposted 40km/h school zone limit applies;
- Generally, unrestricted kerbside parking available on both sides of the road, with a signposted drop-off / pick up area and “No Parking” restrictions during the hours of 8:00AM-9:30AM and 2:30PM-4:00PM school days along the western side of the road to the south of the subject site.

#### **2.1.2 Ernest Street**

- Unclassified LOCAL Road;
- Approximately 10m wide two-way carriageway facilitating one traffic flow lane in each direction and kerbside parking;
- Signposted 50km/h speed limit;
- Unrestricted kerbside parking available on both sides of the road.

#### **2.1.3 Beatrice Street**

- Unclassified LOCAL Road;
- Approximately 10m wide two-way carriageway facilitating one traffic flow lane in each direction and kerbside parking;
- Signposted 50km/h speed limit;
- Unrestricted kerbside parking available on both sides of the road.

### **2.2 *Existing Traffic and Pedestrian Management***

- “STOP” controlled intersection of Lewis Street / Ernest Street;
- “GIVE-WAY” controlled intersection of Ernest Street / Beatrice Street;
- Raised “wombat” pedestrian crossing across Lewis Street approximately 100m walking distance to the south of the site;
- Pedestrian “zebra” crossing across Ernest Street approximately 70m walking distance to the north of the site;
- Pedestrian footpaths available along the western side of Lewis Street.

## 2.3 Existing Traffic Environment

Intersection turning movement counts were conducted at the intersection of Lewis Street / Ernest Street from 7:00 AM to 9:30 AM and 2:30 PM to 6:00 PM on Tuesday 17<sup>th</sup> November 2020 representing a typical operating weekday.

Additionally, pedestrian counts were conducted at the site driveway and the intersection of Lewis Street / Ernest Street from 7:00 AM to 9:30 AM and 2:30 PM to 6:00 PM on Tuesday 17<sup>th</sup> November 2020 representing a typical operating weekday.

Automatic Traffic Count (ATC) surveys were undertaken over a period of seven days from the 17<sup>th</sup> November 2020 to 24<sup>th</sup> November 2020 (inclusive) across both directions of travel of Lewis Street at the proposed site driveway location to determine the existing characteristics of Avoca Drive in terms of:

- Peak traffic volumes and speeds;
- Daily traffic volumes and speeds;
- Classification of vehicles.

It is noted that these surveys were undertaken during a period where the COVID-19 pandemic caused impacts to the otherwise typical behaviour of traffic and pedestrian activity. The full survey results are shown in **Annexure B** for reference, with a summary of the tube surveys provided in **Table 1**.

**TABLE 1: 7-DAY TUBE SURVEY RESULTS**

Road	Direction	Peak Hour Volume		Average Daily Volume	85 <sup>th</sup> Percentile Speed	Heavy Vehicles
		Time	Volume			
Lewis Street	Northbound	Weekday AM (8am – 9am)	135	742	39.5km/h	3.1%
		Weekday PM (3 pm – 4 pm)	92		40.6km/h	
		Weekend (9am – 10am)	36	418	48.4km/h	1.6%
	Southbound	Weekday AM (8am – 9am)	81	590	41.6km/h	3.4%
		Weekday PM (3 pm – 4 pm)	46		44.2km/h	
		Weekend (12pm – 1pm)	41	413	51.5km/h	1.5%
	Combined	Weekday AM (8am – 9am)	217	1332	40.6km/h	3.2%
		Weekday PM (3 pm – 4 pm)	139		42.4km/h	
		Weekend (12pm – 1pm)	76	822	49.7km/h	1.5%



### 2.3.1 Existing Intersection Performances

The performance of the intersection of Lewis Street / Ernest Street under the existing traffic conditions has been assessed using SIDRA INTERSECTION 8.0. Full SIDRA results are reproduced in **Annexure C**, and results summarised in **Table 2**.

**TABLE 2: EXISTING INTERSECTION PERFORMANCES (SIDRA INTERSECTION 8.0)**

Intersection	Peak Hour	Degree of Saturation <sup>(1)</sup>	Average Delay <sup>(2)</sup> (sec/veh)	Level of Service <sup>(3)</sup>	Control Type	Worst Movement
<b>EXISTING PERFORMANCE</b>						
Lewis Street / Ernest Street	AM	0.21	4.8 (Worst: 11.7)	<b>NA</b> (Worst: A)	Stop	RT from Lewis Street
	PM	0.18	4.2 (Worst: 10.8)	<b>NA</b> (Worst: A)		RT from Lewis 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.

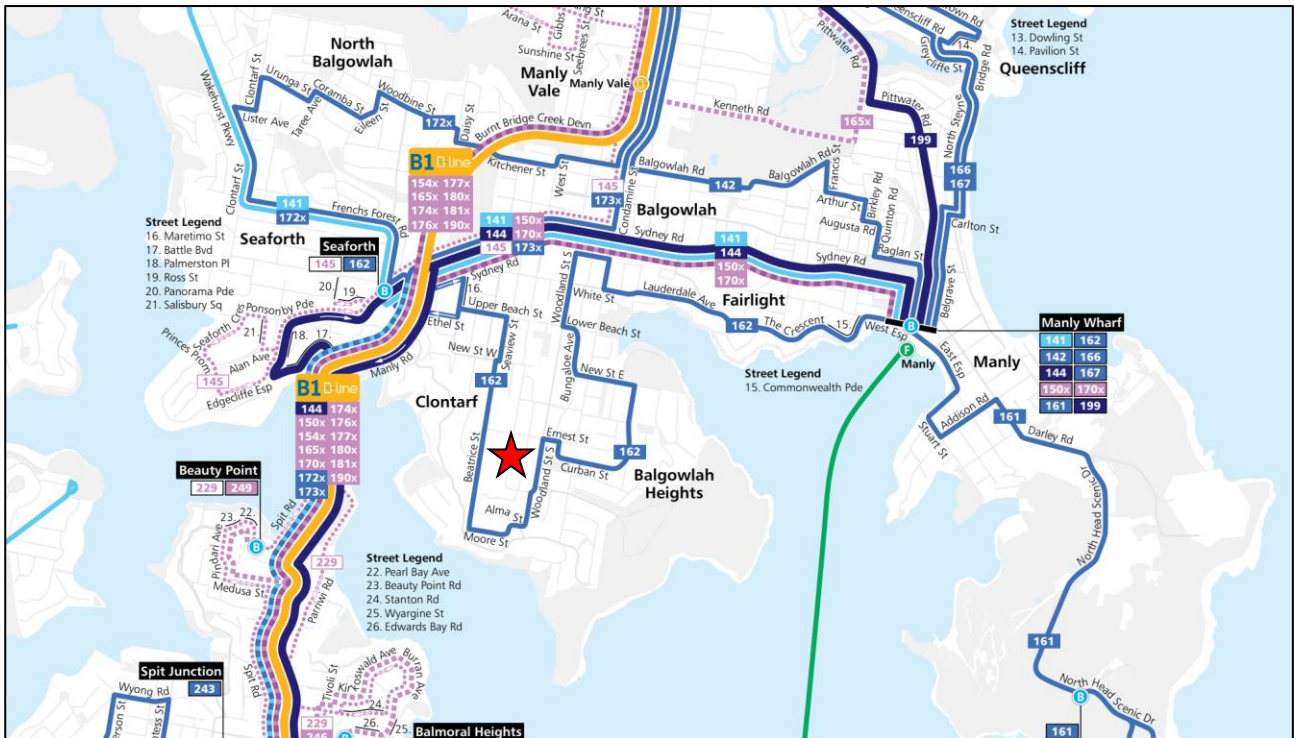
As shown above, the relevant intersection is currently performing at a high level of efficiency, with a worst movement level of service (LoS) of “A” condition in both the AM & PM peak hour periods. The level of service “A” performance is characterised by low approach delays and spare capacity.

### 2.4 Public Transport

The subject site has access to existing bus stops (ID: 2093102 and 2093125) located approximately 130m walking distance to the south of site on Lewis Street and 260m walking distance to the west of the site on Beatrice Street. In total, the bus stops service existing bus Routes 162 (Seaforth to Manly) and 171X (Balgowlah to City Wynyard) provided by State Transit.

The location of the site subject to the surrounding public transport network is shown in **Figure 3**.





Site Location

**FIGURE 3: PUBLIC TRANSPORT NETWORK MAP**

## 2.5 Future Road and Infrastructure Upgrades

From Northern Beaches Council Development Application tracker and the RMS Projects website, it appears that there are no future planned road or public transport changes that will affect traffic conditions within the immediate vicinity of the subject site.

### 3 **PARKING ASSESSMENT**

#### 3.1 **Council Car Parking Requirement**

Reference is made to Northern Beaches Council's *Mainly Development Control Plan (DCP) 2013, Schedule 3 – Parking and Access* which designates the following parking rates applicable to the proposed development:

#### ***Schedule 3 – Part A1 – Parking Rates and Requirements for Vehicles***

##### ***Child Care Centres***

- *1 parking space for each employee and provision of onsite drop off and pick up points. Both the parking and collection areas are to be conveniently located to allow safe movement of children to and from the centre.*

##### ***Application of Parking Rates/Requirements:***

*All calculations of required parking rates are to be rounded up to the next whole number.*

**Table 3** presents the parking requirements of the proposal according to the Council's above car parking rates.

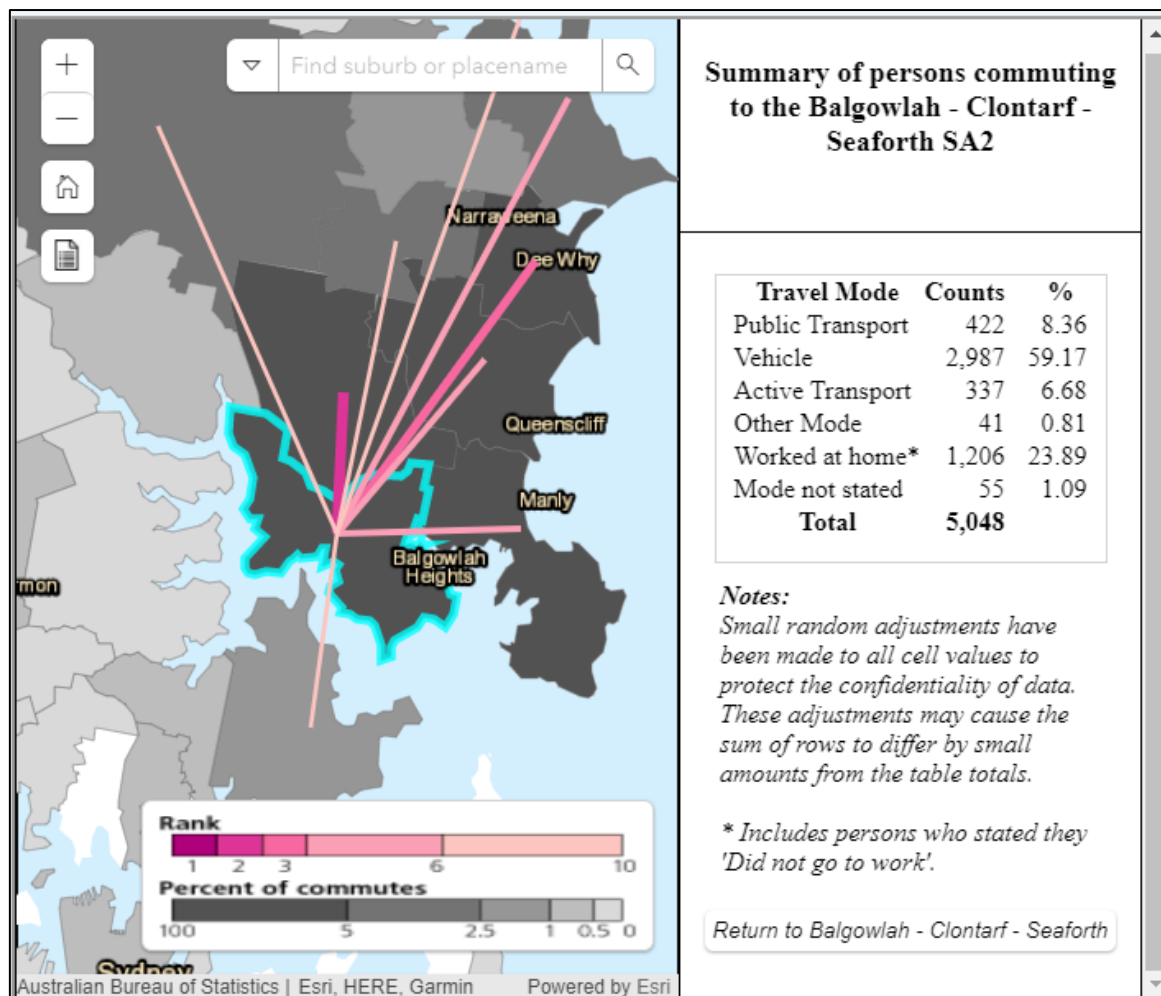
**TABLE 3: DCP PARKING RATES**

Land Use	Scale	Rate	Spaces Required	Spaces Provided
Child Care Centre	57 Children; 11 staff members	1 per staff, plus on-site pick-up and drop off facilities	11 spaces plus on-site pick-up and drop off facilities	16

As shown above, the DCP requires a total **11** car parking spaces plus on-site pick-up and drop-off facilities. The proposed plans detail a total of **16** car parking spaces, with six (**6**) for parent use to drop-off / pick-up their children and **10** for staff use which represents a numerical shortfall of one (1) staff space from the DCP. Justification for this shortfall is provided in the following subsection.

##### 3.1.1 **Staff Parking Shortfall - Journey to Work Data**

From the *Australian Bureau of Statistics (ABS) Journey to Work* data from the *2016 Australian Census*, the following snap shot within **Figure 4** has been extracted of which contains journey to work data for workers commuting to the Balgowlah Heights area.



**FIGURE 4: ABS JTW DATA – BALGOWLAH – CLONTARF - SEAFORTH**

The table to the right of the image indicates that 59.17% of persons commuting to Balgowlah Heights did so using private vehicles (i.e. drove). It should be noted that the total includes people who 'worked from home' and including this data leading to skewed results. As such the 23.89% of people who 'worked from home' have been discounted, resulting in a total of 77.74% of people commuting to work by private vehicle.

By applying this journey to work data to the child care centre staff, it can be reasonably expected that 77.74% of staff will drive to and from work using their own private vehicle. Applying this rate with consideration for the 11 staff proposed to work within the child care centre, results in a expected volume of **9** (rounded up from 8.55) staff driving motor vehicles to work. The provision of **10** staff spaces exceeds the expected volume of staff expected to require parking by one (1) space. As such, it is acceptable to provide **10** car parking spaces for child care centre staff use, reduced from the DCP requirement of 11.

In the unlikely event that all 11 staff are to drive to the centre, the following parking management outlined in **Section 3.1.2** can be put in place.

### 3.1.2 Car Parking Shortfall - Vacant Parent Spaces for Staff use

The parent drop-off peak occurs between 7am – 9am and pick-up peak between 4pm – 6pm, while the centre staff will arrive periodically from 7am until 10am, with peak staff parking demand at 10am. In the afternoon staff gradually leave from 2pm until close. Hence, it is acceptable for some staff (one staff) to utilise a vacant visitor space between the peak periods of visitor parking demand. A plan of management may be required in order to ensure that all visitor car parking spaces are vacant during the parent parking peaks. In any case, this is not considered necessary, as it is unlikely that all staff of the centre will drive to the site.

### 3.2 **Visitor Drop-off / Pick-up Spaces**

The Manly Development Control Plan requires the provision of on-site drop-off and pick-up points. A total of six (6) spaces have been provided for parents/carers to drop-off and pick-up children. This provision satisfies the requirements of the DCP and is acceptable.

### 3.3 **Disabled Parking**

Northern Beaches Council's *Manly DCP 2013* does not outline disabled car parking rates for child care centre developments. As such, reference is made to the *National Construction Code 2019*, containing the BCA, *Table D3.5* which classifies a child care centre as a Class 9b building and as such, requires the provision of disabled parking at a rate of:

*Class 9b 1 space for every 50 carparking spaces or part thereof.*

In accordance with the BCA requirements, one (1) disabled car parking space is to be provided. The proposed car parking layout details the provision of one (1) disabled carparking space as per with *AS2890.6:2009*, complying with BCA requirements.

### 3.4 **Bicycle & Motorcycle Parking Requirements**

Reference is made to Northern Beaches Council's *Manly DCP 2013, Schedule 3 – Part A2 – Parking rate and Requirements for Bicycles* which designates the following bicycle parking rates applicable to the proposed child care centre:

***Other development which generates requirements for vehicular parking:*** *bicycle parking stands are required at a minimum rate of one stand for every three car parking spaces with a minimum provision of one stand for each premise.*

As there are proposed to be **16** car parking spaces as part of the proposed development, six (6) bicycle parking spaces are required to be provided (rounded up from 5.33). The proposed development provides six (6) bicycle parking spaces, meeting the requirement.

Northern Beaches Council's *Manly DCP 2013* does not outline a motorcycle parking rate for child care centres and as such does not require these facilities. No motorcycle parking has been provided, in accordance with Council's requirements.



### 3.5 Servicing & Loading

The *Manly DCP 2013* does not specify any requirement of loading and unloading facilities for child care centres. It is expected that all deliveries will be undertaken within the proposed car parking area outside peak drop off/ pick up times, under a plan of management if necessary. A van (standard B99 design vehicle) or similar can be accommodated within the car parking area, utilising vacant visitor spaces. This is common practice for child care centres and will not noticeably affect operation of the site. It is reiterated that deliveries and other arrivals of similar nature are low in frequency and can be easily managed.

It is expected that waste collection will occur from the Lewis Street frontage outside of road network and site peak hours, consistent with the existing operation of the site.

### 3.6 Car Park Design & Compliance

The car parking layout as depicted in **Annexure A**, have been assessed to achieve the relevant clauses and objectives of *AS2890.1:2004* and *AS2890.6:2009*. Any required changes to comply with the standards are addressed in the following subsections. Swept Path Testing has been undertaken, with the results reproduced within **Annexure D** for reference.

The design achieves:

- 5.5m width two-way driveway facilitating access to Lewis Street;
- Minimum 5.5m ramp access width between kerbs and minimum 6.1m width between walls;
- Parking aisles greater than 5.8m in width;
- Minimum 5.4m length, 2.4m width spaces for staff;
- Minimum 5.4m length, 2.6m width spaces for parents / visitors;
- Minimum 5.4m length, 2.4m width disabled spaces with adjacent associated 5.4m length, 2.4m width shared space;
- Minimum headroom clearance of 2.5m provided over disabled and adaptable parking areas.

Whilst the plans have been assessed to comply with the relevant standards, subject to the required changes outlined above, it is usual and expected that a design certificate be required at the Construction Certificate stage to account for any changes following the development application.

## 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*

Traffic generation rates for the relevant land uses are provided in the *Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (2002)* and recent supplements and are as follows:

#### 3.11.3 *Child care centres*

##### *Long-day care*

7.00-9.00am	0.8 peak vehicle trips per child
2.30-4.00pm	0.3 peak vehicle trips per child
4.00-6.00pm	0.7 peak vehicle trips per child

The resulting traffic generation is summarised in **Table 4**.

**TABLE 4: ESTIMATED TRAFFIC GENERATION**

Use	Scale	Peak	Generation Rate	Trips <sup>(1)</sup>
Long-day care	57 Children	AM	0.8 per child	46 (23 IN , 23 OUT)
		PM	0.7 per child	40 (20 IN , 20 OUT)

Note: (1) Assumes 50/50 split of inbound and outbound traffic.

As shown, the expected traffic generation associated with the proposed development is in the order of **46** vehicle trips in the AM peak period (23 IN , 23 OUT) and **40** vehicle trips in the PM peak period (20 IN, 20 OUT). Note that this traffic generation is considered to be conservative as it does not incorporate the traffic generation of the existing site use.

It is noted that it is conservative to expect that 10% of enrolled children will have a sibling attending the neighbouring Balgowlah Heights Public School and as such, will not contribute to additional traffic generation associated with the site as the parent will already be in the road network to drop off their primary school-aged child.

The 10% correlation rate, therefore, means that the traffic generation associated with 51 children are accessing the site. By applying the same traffic generation rates as above, this is equivalent to 41 vehicle trips in the AM peak hour period (21 IN, 20 OUT), and 36 vehicle trips in the PM peak hour period (18 IN, 18 OUT). Nevertheless, for conservative analysis, the full scale of traffic generation of the proposed child care centre has been assessed for its impact on the road network as below.

## 4.2 Traffic Assignment

The road network and the locations of residential areas surrounding the site have been assessed and the following traffic assignment shown in **Figure 5** has been assumed for all traffic to and from the site in both the AM and PM peak hour periods.



**FIGURE 5: EXPECTED TRAFFIC DISTRIBUTION (BOTH AM AND PM PERIODS)**

## 4.3 Traffic Impact

The traffic generation outlined in **Section 4.1 & 4.2** above has been added to the surveyed 2020 traffic volumes. SIDRA INTERSECTION 8.0 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 assessment are shown in **Table 5**.

**TABLE 5: INTERSECTION PERFORMANCE (SIDRA INTERSECTION 8.0)**

Intersection	Peak Hour	Degree of Saturation <sup>(1)</sup>	Average Delay <sup>(2)</sup> (sec/veh)	Level of Service <sup>(3)</sup>	Control Type	Worst Movement
EXISTING PERFORMANCE						
Lewis Street / Ernest Street	AM	0.21	4.8 (Worst: 11.7)	NA (Worst: A)	Stop	RT from Lewis Street
	PM	0.18	4.2 (Worst: 10.8)	NA (Worst: A)		RT from Lewis Street
FUTURE PERFORMANCE						
Lewis Street / Ernest Street	AM	0.23	5.1 (Worst: 12)	NA (Worst: A)	Stop	RT from Lewis Street
	PM	0.18	4.5 (Worst: 11.1)	NA (Worst: A)		RT from Lewis Street
Lewis Street / Site Driveway	AM	0.08	1.5 (Worst: 9.3)	NA (Worst: A)	Stop	RT from Site Driveway
	PM	0.05	1.8 (Worst: 9)	NA (Worst: A)		LT from Site Driveway

**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 in **Table 5**, the intersection of Lewis Street / Ernest Street retains the same worst movement Level of Service under future conditions with minimal delays and additional capacity, indicating that there will be negligible impact on the existing road network as a result of the proposed development.

Additionally, the intersection of the site driveway and Lewis Street operates with a worst movement Level of Service “A” under the proposed design with minimal delays and additional spare capacity. The development’s traffic impact is therefore supportable in terms of traffic flow efficiency and road safety considerations.



## **5 Potential Public Domain Improvements**

The proposal is supportable in its current form, however, additional measures that could be adopted to address concerns raised by Council and residents are raised in the following subsections. If required by Council, these works could be undertaken prior to occupation at the cost of the applicant and at no cost to Council.

### **5.1 *Removal of Pram Ramp***

The pram ramp crossing on the eastern side of Lewis Street opposite the driveway of 11 Lewis Street could be removed.

### **5.2 *RMS Pedestrian Fencing***

Type 1 pedestrian fencing (as specified in the RMS R0800 Fencing Series Drawings) could be erected 5m either side of the location of the midpoint of the existing pram ramp crossing which is to be removed (as suggested in **Section 5.1**). If installed, the fencing shall be offset approximately 0.5m from the kerb and be no greater than 10m in total length.

### **5.3 *Footpath Extension***

The footpath on the eastern side of Lewis Street could be extended in a northerly direction to connect to the existing Ernest Street footpath. If installed, the footpath shall generally be 1.5m in width but may reduce to no less than 1.2m in width according to the following:

- a) From the existing termination of the Lewis Street footpath to the southern edge of the driveway of 30 Lewis Street, the footpath shall be 1.5m in width and placed between any street trees and the property boundary.
- b) Between the northern edge of the driveway of 30 Lewis Street to the existing telegraph pole aligned with the boundary of 65 Ernest Street, the footpath shall be 1.5m in width, with the western edge of the footpath parallel to the kerb and at an offset to the kerb equal to the offset of the eastern extent of the telegraph pole from the kerb.
- c) From the existing telegraph pole aligned with the boundary of 65 Ernest Street to the existing footpath along Ernest Street, the footpath shall be 1.2m in width with no offset to the kerb. The connection to the existing footpath along Ernest Street shall occur to the east of the existing telegraph pole at the corner of Ernest Street and Lewis Street. Along this length of footpath there shall be minimal fill and no retaining structures used to achieve the necessary footpath width and a maximum cross fall of 2.5%.
- d) The existing School Zone signage on the eastern side of the road shall be relocated slightly to the east as necessary (subject to Transport for NSW consent) to facilitate the construction of the footpath detailed in c. above.

## 6 CONCLUSION

The following outcomes of this traffic and parking impact assessment are relevant to note:

- The Manly DCP requires a total of **11** staff spaces to be provided whilst the proposal includes **10** staff car parking spaces within a proposed basement carpark, representing a numerical shortfall of one (1) staff space from the DCP requirements. Based on ABS Census data, the site would require nine (**9**) staff spaces, such that the provision of **10** staff spaces is acceptable.
- The DCP also requires the provision of on-site drop-off and pick-up points for parents/visitors. Six (**6**) spaces are provided for parents/carers to use when dropping-off or picking-up children, meeting the requirement of the DCP.
- The Council's DCP requires that six (**6**) bicycle parking spaces are to be provided (rounded up from 5.33). The proposed development provides six (**6**) spaces, meeting the DCP requirements.
- Servicing and loading will be undertaken within the proposed car parking area outside peak drop off/ pick up times, under a plan of management if necessary. A van (standard B99 design vehicle) or similar can be accommodated within the car parking area, utilising vacant visitor spaces. This is common practice for child care centres and will not noticeably affect operation of the site. It is reiterated that deliveries and other arrivals of similar nature are low in frequency and can be easily managed. It is expected that waste collection will occur from the Lewis Street frontage outside of road network and site peak hours.
- The parking areas of the site have been assessed against the relevant sections of AS2890.1 and AS2890.6 and have been found to satisfy the objectives of each standard. Swept Path Testing has been undertaken, with the results reproduced in **Annexure D**.
- The traffic generation of the proposed development has been estimated to be some **46** vehicle trips in the AM peak period (23 IN , 23 OUT) and **40** vehicle trips in the PM peak period (20 IN, 20 OUT). The impacts of the traffic generation have been modelled using SIDRA INTERSECTION 8.0, indicating that there will be no detrimental impact to the performance of the intersections surrounding the site as a result of the generated traffic.

In view of the foregoing, the subject proposed Child Care Centre at 11 Lewis Street, Balgowlah Heights (as depicted in **Annexure A**) is fully supportable in terms of its traffic and parking impacts subject to the required changes outlined in **Section 3.6**.



**ANNEXURE A: PROPOSED PLANS**  
**(3 SHEETS)**



**ANNEXURE B: TRAFFIC SURVEY DATA**  
**(5 SHEETS)**



# TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY [trafficsurvey.com.au](http://trafficsurvey.com.au)



## Intersection of Ernest St and Lewis St, Balgowlah Heights

GPS: -33.804476, 151.258554

Date: Tue 17/11/20  
Weather: Overcast  
Suburban: Balgowlah Heights  
Customer: McLaren

North: Lewis St  
East: Ernest St  
South: Lewis St  
West: Ernest St

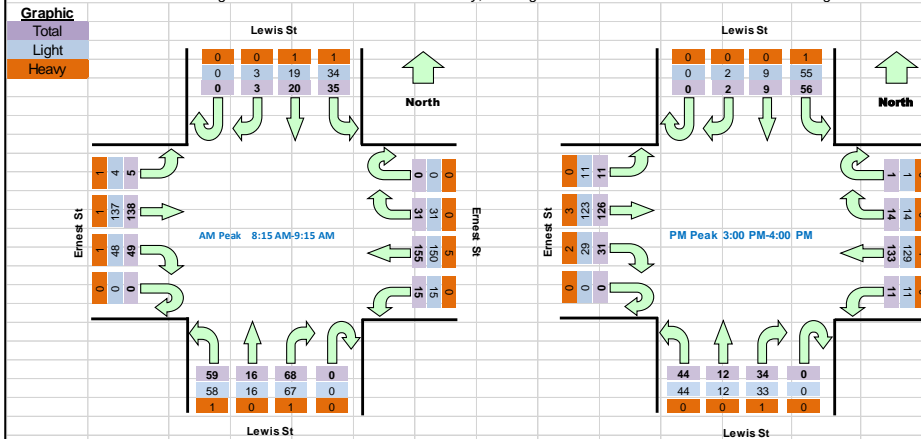
Survey AM: 7:00 AM-9:30 AM  
Period PM: 2:30 PM-6:00 PM  
Traffic AM: 8:15 AM-9:15 AM  
Peak PM: 3:00 PM-4:00 PM

### All Vehicles

Time		North Approach Lewis St				East Approach Ernest St				South Approach Lewis St				West Approach Ernest St				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
7:00	7:15	0	1	2	3	0	5	23	3	0	3	2	3	0	4	23	1	400	
7:15	7:30	0	0	2	4	0	10	28	1	0	4	4	8	0	10	17	0	434	
7:30	7:45	0	1	5	8	0	6	46	8	0	2	4	10	0	11	20	1	460	
7:45	8:00	0	0	1	7	1	9	39	3	0	6	5	10	0	8	27	1	499	
8:00	8:15	0	2	3	9	0	6	36	4	0	6	1	4	0	5	30	1	581	
8:15	8:30	0	1	3	8	0	7	39	2	0	5	1	11	0	6	29	2	594	Peak
8:30	8:45	0	0	6	10	0	8	43	5	0	18	6	15	0	11	39	0	576	
8:45	9:00	0	0	9	8	0	10	42	5	0	35	5	19	0	22	42	2		
9:00	9:15	0	2	2	9	0	6	31	3	0	10	4	14	0	10	28	1		
9:15	9:30	0	2	3	9	0	10	27	3	0	2	1	8	0	3	24	4		
14:30	14:45	0	0	3	4	0	9	21	3	0	1	2	2	0	7	22	2	463	
14:45	15:00	0	1	2	0	1	5	22	4	0	4	5	8	1	8	33	1	480	
15:00	15:15	0	0	0	17	0	4	44	3	0	20	5	20	0	13	36	1	484	Peak
15:15	15:30	0	1	2	18	0	4	37	2	0	9	4	13	0	5	30	4	446	
15:30	15:45	0	1	4	12	1	2	19	2	0	1	0	5	0	4	40	2	439	
15:45	16:00	0	0	3	9	0	4	33	4	0	4	3	6	0	9	20	4	438	
16:00	16:15	0	2	4	10	0	4	32	2	0	4	3	10	0	9	38	7	439	
16:15	16:30	0	1	1	14	0	8	40	1	0	2	2	10	0	6	35	2	446	
16:30	16:45	0	0	3	18	0	0	19	0	0	5	1	9	0	4	31	2	454	
16:45	17:00	0	0	0	12	0	0	26	0	0	8	0	10	0	8	36	0	456	
17:00	17:15	0	2	7	12	0	7	27	2	0	13	3	19	0	13	25	2	450	
17:15	17:30	0	0	6	18	0	2	36	3	0	7	3	12	0	8	34	1		
17:30	17:45	0	1	6	9	0	4	24	2	0	4	1	7	1	5	29	1		
17:45	18:00	0	1	4	6	0	5	25	2	0	4	3	6	0	5	29	4		

Peak Time		North Approach Lewis St				East Approach Ernest St				South Approach Lewis St				West Approach Ernest St				Peak total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L		
8:15	9:15	0	3	20	35	0	31	155	15	0	68	16	59	0	49	138	5	594	
15:00	16:00	0	2	9	56	1	14	133	11	0	34	12	44	0	31	126	11	484	

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.



Pedestrians Crossing										
Time		North Approach Lewis St		East Approach Ernest St		South Approach Lewis St		West Approach Ernest St		Hourly Total
Period Start	Period End	Westbound	Eastbound	Southbound	Northbound	Westbound	Eastbound	Southbound	Northbound	
7:00	7:15	0	0	0	0	0	0	1	3	32
7:15	7:30	1	1	0	0	0	2	3	3	38
7:30	7:45	1	0	0	0	1	3	5	0	33
7:45	8:00	1	0	0	0	1	1	3	2	54
8:00	8:15	1	2	0	0	1	1	1	4	108
8:15	8:30	0	0	0	0	1	0	3	1	110
8:30	8:45	2	0	0	0	0	1	25	3	112
8:45	9:00	6	1	0	0	0	0	44	11	
9:00	9:15	1	0	0	0	0	0	4	7	
9:15	9:30	1	1	0	0	1	1	1	2	
14:30	14:45	0	0	0	0	0	1	2	1	164
14:45	15:00	0	0	0	0	2	1	7	0	168
15:00	15:15	2	22	0	0	3	0	11	81	163
15:15	15:30	4	1	0	0	5	0	2	19	53
15:30	15:45	0	1	0	0	0	0	3	4	23
15:45	16:00	0	0	0	0	0	2	2	1	21
16:00	16:15	0	1	0	0	0	3	5	0	16
16:15	16:30	0	0	0	1	0	0	0	0	12
16:30	16:45	2	1	0	0	0	1	1	1	20
16:45	17:00	0	0	0	0	0	0	0	0	18
17:00	17:15	0	0	0	0	4	1	0	0	26
17:15	17:30	0	1	0	0	1	2	1	4	
17:30	17:45	0	0	0	0	0	0	2	2	
17:45	18:00	0	0	0	0	1	0	2	5	
Peak Time		North Approach Lewis St		East Approach Ernest St		South Approach Lewis St		West Approach Ernest St		Peak hour total
Period Start	Period End	Westbound	Eastbound	Southbound	Northbound	Westbound	Eastbound	Southbound	Northbound	
8:15	9:15	9	1	0	0	1	1	76	22	110
15:00	16:00	6	24	0	0	8	2	18	105	163

<div>TRANS TRAFFIC SURVEY</div> <div>TURNING MOVEMENT SURVEY</div> <div>Intersection of Ernest St and Lewis St, Balgowlah Heights</div>						<div><div><div>QUALITY PLAN CERTIFICATE</div><div>DNV-GL</div><div>2013-2041</div></div><div><div>SAFETY SYSTEM CERTIFICATION</div><div>DNV-GL</div><div>AS/NZS 4801</div></div><div><div>ENVIRONMENTAL SYSTEM CERTIFICATION</div><div>DNV-GL</div><div>ISO 14001</div></div></div>		
GPS-33.804476, 151.258554								
Date: Tue 17/11/20		North: Lewis St		Survey		AM: 7:00 AM-9:30 AM		
Weather: Overcast		East: Ernest St		Period		PM: 2:30 PM-6:00 PM		
Suburban: Balgowlah Heights		South: Lewis St		Traffic		AM: 8:15 AM-9:15 AM		
Customer: McLaren		West: Ernest St		Peak		PM: 2:45 PM-3:45 PM		
Pedestrians								
Time		South Approach Lewis St		Hourly Total				
Period Start	Period End	NB	SB	Hour	Peak			
7:00	7:15	4	2	37				
7:15	7:30	5	2	47				
7:30	7:45	16	0	59				
7:45	8:00	3	5	92				
8:00	8:15	6	10	180				
8:15	8:30	7	12	187	Peak			
8:30	8:45	10	39	175				
8:45	9:00	14	82					
9:00	9:15	12	11					
9:15	9:30	5	2					
14:30	14:45	1	2	184				
14:45	15:00	0	7	198	Peak			
15:00	15:15	154	14	197				
15:15	15:30	4	2	36				
15:30	15:45	6	11	35				
15:45	16:00	5	1	23				
16:00	16:15	3	4	20				
16:15	16:30	5	0	16				
16:30	16:45	5	0	22				
16:45	17:00	3	0	28				
17:00	17:15	2	1	42				
17:15	17:30	8	3					
17:30	17:45	6	5					
17:45	18:00	11	6					

## PEDESTRIAN COUNTS AT THE SITE DRIVEWAY

Site Lewis St

Direction 
[Back to Site Summary Page](#)

Day Date	Monday 23/11/2020	Tuesday 17/11/2020	Wednesday 18/11/2020	Thursday 19/11/2020	Friday 20/11/2020	Saturday 21/11/2020	Sunday 22/11/2020	7 days		Weekday		Weekend	
AM Peak	08:00	08:00	08:00	08:00	08:00	10:00	11:00	Total	Average	Total	Average	Total	Average
PM Peak	17:00	15:00	17:00	17:00	15:00	12:00	17:00	N/A	08:00	N/A	08:00	N/A	10:00
00:00	0	2	0	1	2	3	5	13	2	5	1	8	4
01:00	1	1	0	0	1	1	0	4	1	3	1	1	1
02:00	0	0	1	0	0	0	4	5	1	1	0	4	2
03:00	1	0	0	0	2	0	2	5	1	3	1	2	1
04:00	2	0	0	1	0	1	2	6	1	3	1	3	2
05:00	7	10	6	8	5	7	2	45	6	36	7	9	5
06:00	26	36	36	38	31	16	15	198	28	167	33	31	16
07:00	116	112	117	104	112	34	29	624	89	561	112	63	32
08:00	233	202	213	220	216	50	44	1178	168	1084	217	94	47
09:00	76	100	87	87	77	59	65	551	79	427	85	124	62
10:00	52	62	67	60	60	79	62	442	63	301	60	141	71
11:00	55	78	72	72	57	61	67	462	66	334	67	128	64
12:00	36	62	49	73	59	86	65	430	61	279	56	151	76
13:00	60	58	64	60	57	64	54	417	60	299	60	118	59
14:00	95	88	92	96	73	68	64	576	82	444	89	132	66
15:00	137	131	140	128	158	46	58	798	114	694	139	104	52
16:00	91	121	96	97	92	67	61	625	89	497	99	128	64
17:00	138	128	147	134	125	64	66	802	115	672	134	130	65
18:00	58	70	103	81	75	61	54	502	72	387	77	115	58
19:00	35	34	50	43	38	38	25	263	38	200	40	63	32
20:00	21	22	8	21	37	13	13	135	19	109	22	26	13
21:00	25	9	9	13	23	13	8	100	14	79	16	21	11
22:00	1	4	20	8	12	16	3	64	9	45	9	19	10
23:00	2	4	7	7	9	15	3	47	7	29	6	18	9
Total	1268	1334	1384	1352	1321	862	771	8292	1185	6659	1332	1633	822
% Heavy	3.39%	3.52%	4.05%	3.55%	3.10%	1.74%	1.30%	3.14%		3.53%		1.53%	

Site Lewis St

Direction 
[Back to Site Summary Page](#)

Day Date	Monday 23/11/2020	Tuesday 17/11/2020	Wednesday 18/11/2020	Thursday 19/11/2020	Friday 20/11/2020	Saturday 21/11/2020	Sunday 22/11/2020	7 days		Weekday		Weekend	
AM Peak	08:00	08:00	08:00	08:00	08:00	08:00	09:00	Total	Average	Total	Average	Total	Average
PM Peak	15:00	15:00	15:00	15:00	15:00	12:00	14:00	N/A	08:00	N/A	08:00	N/A	09:00
00:00	0	1	0	0	1	2	2	6	1	2	0	4	2
01:00	0	0	0	0	0	1	0	1	0	0	0	1	1
02:00	0	0	0	0	0	0	3	3	0	0	0	3	2
03:00	1	0	0	0	1	0	0	2	0	2	0	0	0
04:00	2	0	0	1	0	1	1	5	1	3	1	2	1
05:00	4	5	1	6	2	2	1	21	3	18	4	3	2
06:00	15	26	21	22	14	12	9	119	17	98	20	21	11
07:00	72	62	61	58	61	18	16	348	50	314	63	34	17
08:00	157	124	139	137	120	38	29	744	106	677	135	67	34
09:00	48	58	49	53	49	35	37	329	47	257	51	72	36
10:00	30	30	40	37	34	36	32	239	34	171	34	68	34
11:00	31	47	42	39	26	25	34	244	35	185	37	59	30
12:00	22	33	22	35	29	39	30	210	30	141	28	69	35
13:00	29	31	30	30	31	30	25	206	29	151	30	55	28
14:00	34	36	42	42	37	34	33	258	37	191	38	67	34
15:00	93	80	91	86	112	21	28	511	73	462	92	49	25
16:00	58	71	59	63	54	30	29	364	52	305	61	59	30
17:00	78	67	83	68	61	35	26	418	60	357	71	61	31
18:00	28	29	52	35	34	31	24	233	33	178	36	55	28
19:00	18	11	23	17	20	17	13	119	17	89	18	30	15
20:00	11	11	4	7	17	5	8	63	9	50	10	13	7
21:00	16	2	1	6	10	6	1	42	6	35	7	7	4
22:00	1	1	5	3	4	7	2	23	3	14	3	9	5
23:00	1	1	5	3	6	10	2	28	4	16	3	12	6
Total	749	726	770	748	723	435	385	4536	647	3716	742	820	418
% Heavy	3.07%	3.72%	3.64%	3.61%	2.90%	1.61%	1.56%	3.06%		3.39%		1.59%	



Site Lewis St

Direction Southbound
[Back to Site Summary Page](#)

Day Date	Monday 23/11/2020	Tuesday 17/11/2020	Wednesday 18/11/2020	Thursday 19/11/2020	Friday 20/11/2020	Saturday 21/11/2020	Sunday 22/11/2020	7 days		Weekday		Weekend	
AM Peak	08:00	08:00	08:00	08:00	08:00	10:00	11:00	Total	Average	Total	Average	Total	Average
PM Peak	14:00	17:00	17:00	17:00	17:00	12:00	17:00	N/A	08:00	N/A	08:00	N/A	10:00
								N/A	17:00	N/A	17:00	N/A	12:00
00:00	0	1	0	1	1	1	3	7	1	3	1	4	2
01:00	1	1	0	0	1	0	0	3	0	3	1	0	0
02:00	0	0	1	0	0	0	1	2	0	1	0	1	1
03:00	0	0	0	0	1	0	2	3	0	1	0	2	1
04:00	0	0	0	0	0	0	1	1	0	0	0	1	1
05:00	3	5	5	2	3	5	1	24	3	18	4	6	3
06:00	11	10	15	16	17	4	6	79	11	69	14	10	5
07:00	44	50	56	46	51	16	13	276	39	247	49	29	15
08:00	76	78	74	83	96	12	15	434	62	407	81	27	14
09:00	28	42	38	34	28	24	28	222	32	170	34	52	26
10:00	22	32	27	23	26	43	30	203	29	130	26	73	37
11:00	24	31	30	33	31	36	33	218	31	149	30	69	35
12:00	14	29	27	38	30	47	35	220	31	138	28	82	41
13:00	31	27	34	30	26	34	29	211	30	148	30	63	32
14:00	61	52	50	54	36	34	31	318	45	253	51	65	33
15:00	44	51	49	42	46	25	30	287	41	232	46	55	28
16:00	33	50	37	34	38	37	32	261	37	192	38	69	35
17:00	60	61	64	66	64	29	40	384	55	315	63	69	35
18:00	30	41	51	46	41	30	30	269	38	209	42	60	30
19:00	17	23	27	26	18	21	12	144	21	111	22	33	17
20:00	10	11	4	14	20	8	5	72	10	59	12	13	7
21:00	9	7	8	7	13	7	7	58	8	44	9	14	7
22:00	0	3	15	5	8	9	1	41	6	31	6	10	5
23:00	1	3	2	4	3	5	1	19	3	13	3	6	3
Total	519	608	614	604	598	427	386	3756	533	2943	590	813	413
% Heavy	3.85%	3.29%	4.56%	3.48%	3.34%	1.87%	1.04%	3.22%		3.70%		1.48%	



**ANNEXURE C: SIDRA RESULTS**  
**(6 SHEETS)**

## MOVEMENT SUMMARY



### Site: 1 [EX AM - Ernest Street / Lewis Street]

Unsignalised intersection of Ernest Street and Lewis Street with pedestrian (Zebra) crossing across Ernest Street.

Existing Conditions in AM Peak Period

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lewis Street (S)												
1	L2	62	1.7	0.198	9.2	LOS A	0.8	5.4	0.44	0.94	0.44	50.7
2	T1	17	0.0	0.198	10.3	LOS A	0.8	5.4	0.44	0.94	0.44	50.5
3	R2	72	1.5	0.198	11.3	LOS A	0.8	5.4	0.44	0.94	0.44	50.2
Approach		151	1.4	0.198	10.3	LOS A	0.8	5.4	0.44	0.94	0.44	50.4
East: Ernest Street (E)												
4	L2	16	0.0	0.207	6.2	LOS A	1.0	7.5	0.25	0.22	0.25	56.3
8	T1	163	3.2	0.207	0.7	LOS A	1.0	7.5	0.25	0.22	0.25	57.8
6	R2	33	0.0	0.207	6.0	LOS A	1.0	7.5	0.25	0.22	0.25	55.7
Approach		212	2.5	0.207	1.9	NA	1.0	7.5	0.25	0.22	0.25	57.3
North: Lewis Street (N)												
7	L2	37	2.9	0.064	8.7	LOS A	0.2	1.7	0.30	0.92	0.30	51.2
8	T1	21	5.0	0.064	10.4	LOS A	0.2	1.7	0.30	0.92	0.30	50.8
9	R2	3	0.0	0.064	11.7	LOS A	0.2	1.7	0.30	0.92	0.30	50.8
Approach		61	3.4	0.064	9.4	LOS A	0.2	1.7	0.30	0.92	0.30	51.0
West: Ernest Street (W)												
10	L2	5	20.0	0.197	6.1	LOS A	1.0	6.8	0.24	0.26	0.24	55.2
2	T1	145	0.7	0.197	0.7	LOS A	1.0	6.8	0.24	0.26	0.24	57.6
12	R2	52	2.0	0.197	6.5	LOS A	1.0	6.8	0.24	0.26	0.24	55.4
Approach		202	1.6	0.197	2.3	NA	1.0	6.8	0.24	0.26	0.24	57.0
All Vehicles		625	2.0	0.207	4.8	NA	1.0	7.5	0.30	0.47	0.30	54.7

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: 1 [EX PM - Ernest Street / Lewis Street]

Unsignalised intersection of Ernest Street and Lewis Street with pedestrian (Zebra) crossing across Ernest Street.

Existing Conditions in PM Peak Period

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lewis Street (S)												
1	L2	46	2.3	0.112	9.0	LOS A	0.4	3.0	0.38	0.91	0.38	51.1
2	T1	13	0.0	0.112	9.6	LOS A	0.4	3.0	0.38	0.91	0.38	50.9
3	R2	36	2.9	0.112	10.5	LOS A	0.4	3.0	0.38	0.91	0.38	50.5
Approach		95	2.2	0.112	9.7	LOS A	0.4	3.0	0.38	0.91	0.38	50.8
East: Ernest Street (E)												
4	L2	12	0.0	0.168	6.2	LOS A	0.8	5.9	0.24	0.18	0.24	56.6
8	T1	140	3.0	0.168	0.7	LOS A	0.8	5.9	0.24	0.18	0.24	58.1
6	R2	16	0.0	0.168	6.0	LOS A	0.8	5.9	0.24	0.18	0.24	56.0
Approach		167	2.5	0.168	1.5	NA	0.8	5.9	0.24	0.18	0.24	57.8
North: Lewis Street (N)												
7	L2	60	1.8	0.063	8.6	LOS A	0.2	1.7	0.25	0.89	0.25	51.5
8	T1	9	0.0	0.063	9.5	LOS A	0.2	1.7	0.25	0.89	0.25	51.3
9	R2	2	0.0	0.063	10.8	LOS A	0.2	1.7	0.25	0.89	0.25	51.1
Approach		72	1.5	0.063	8.8	LOS A	0.2	1.7	0.25	0.89	0.25	51.5
West: Ernest Street (W)												
10	L2	12	0.0	0.175	5.8	LOS A	0.8	6.0	0.23	0.23	0.23	56.3
2	T1	133	2.4	0.175	0.6	LOS A	0.8	6.0	0.23	0.23	0.23	57.8
12	R2	33	6.5	0.175	6.4	LOS A	0.8	6.0	0.23	0.23	0.23	55.3
Approach		177	3.0	0.175	2.1	NA	0.8	6.0	0.23	0.23	0.23	57.2
All Vehicles		511	2.5	0.175	4.2	NA	0.8	6.0	0.26	0.43	0.26	55.3

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.

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 [FU AM - Ernest Street / Lewis Street]

Unsignalised intersection of Ernest Street and Lewis Street with pedestrian (Zebra) crossing across Ernest Street.

Future Conditions in AM Peak Period

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lewis Street (S)												
1	L2	75	1.4	0.227	9.2	LOS A	0.9	6.3	0.45	0.94	0.45	50.6
2	T1	21	0.0	0.227	10.5	LOS A	0.9	6.3	0.45	0.94	0.45	50.4
3	R2	77	1.4	0.227	11.6	LOS A	0.9	6.3	0.45	0.94	0.45	50.1
Approach		173	1.2	0.227	10.4	LOS A	0.9	6.3	0.45	0.94	0.45	50.4
East: Ernest Street (E)												
4	L2	21	0.0	0.209	6.2	LOS A	1.1	7.7	0.25	0.22	0.25	56.2
8	T1	163	3.2	0.209	0.7	LOS A	1.1	7.7	0.25	0.22	0.25	57.7
6	R2	33	0.0	0.209	6.0	LOS A	1.1	7.7	0.25	0.22	0.25	55.6
Approach		217	2.4	0.209	2.0	NA	1.1	7.7	0.25	0.22	0.25	57.2
North: Lewis Street (N)												
7	L2	37	2.9	0.071	8.7	LOS A	0.3	1.9	0.30	0.92	0.30	51.1
8	T1	25	4.2	0.071	10.5	LOS A	0.3	1.9	0.30	0.92	0.30	50.8
9	R2	3	0.0	0.071	12.0	LOS A	0.3	1.9	0.30	0.92	0.30	50.7
Approach		65	3.2	0.071	9.6	LOS A	0.3	1.9	0.30	0.92	0.30	50.9
West: Ernest Street (W)												
10	L2	5	20.0	0.206	6.1	LOS A	1.0	7.1	0.24	0.28	0.24	55.0
2	T1	145	0.7	0.206	0.7	LOS A	1.0	7.1	0.24	0.28	0.24	57.4
12	R2	64	1.6	0.206	6.5	LOS A	1.0	7.1	0.24	0.28	0.24	55.2
Approach		215	1.5	0.206	2.5	NA	1.0	7.1	0.24	0.28	0.24	56.7
All Vehicles		669	1.9	0.227	5.1	NA	1.1	7.7	0.30	0.49	0.30	54.5

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: 1 [FU PM - Ernest Street / Lewis Street]

Unsignalised intersection of Ernest Street and Lewis Street with pedestrian (Zebra) crossing across Ernest Street.

Future Conditions in PM Peak Period

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lewis Street (S)												
1	L2	57	1.9	0.134	9.0	LOS A	0.5	3.6	0.39	0.91	0.39	51.0
2	T1	17	0.0	0.134	9.7	LOS A	0.5	3.6	0.39	0.91	0.39	50.8
3	R2	40	2.6	0.134	10.7	LOS A	0.5	3.6	0.39	0.91	0.39	50.5
Approach		114	1.9	0.134	9.7	LOS A	0.5	3.6	0.39	0.91	0.39	50.8
East: Ernest Street (E)												
4	L2	16	0.0	0.171	6.2	LOS A	0.8	6.0	0.24	0.19	0.24	56.5
8	T1	140	3.0	0.171	0.7	LOS A	0.8	6.0	0.24	0.19	0.24	58.0
6	R2	16	0.0	0.171	6.0	LOS A	0.8	6.0	0.24	0.19	0.24	55.9
Approach		172	2.5	0.171	1.6	NA	0.8	6.0	0.24	0.19	0.24	57.7
North: Lewis Street (N)												
7	L2	60	1.8	0.068	8.6	LOS A	0.3	1.9	0.26	0.90	0.26	51.5
8	T1	14	0.0	0.068	9.6	LOS A	0.3	1.9	0.26	0.90	0.26	51.3
9	R2	2	0.0	0.068	11.1	LOS A	0.3	1.9	0.26	0.90	0.26	51.1
Approach		76	1.4	0.068	8.9	LOS A	0.3	1.9	0.26	0.90	0.26	51.4
West: Ernest Street (W)												
10	L2	12	0.0	0.183	5.8	LOS A	0.9	6.2	0.24	0.26	0.24	56.0
2	T1	133	2.4	0.183	0.7	LOS A	0.9	6.2	0.24	0.26	0.24	57.6
12	R2	43	4.9	0.183	6.4	LOS A	0.9	6.2	0.24	0.26	0.24	55.2
Approach		187	2.8	0.183	2.3	NA	0.9	6.2	0.24	0.26	0.24	56.9
All Vehicles		548	2.3	0.183	4.5	NA	0.9	6.2	0.27	0.46	0.27	55.0

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 [FU AM - Lewis Street / Site Driveway]

Intersection of the Site Driveway and Lewis Street with pedestrian footpath treated as a zebra crossing.

Future Conditions in the AM Peak Period

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lewis Street (S)												
1	L2	2	0.0	0.075	6.1	LOS A	0.0	0.1	0.01	0.01	0.01	58.3
2	T1	142	0.0	0.075	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	59.9
Approach		144	0.0	0.075	0.1	NA	0.0	0.1	0.01	0.01	0.01	59.9
North: Lewis Street (N)												
8	T1	85	0.0	0.060	0.3	LOS A	0.2	1.1	0.17	0.13	0.17	58.2
9	R2	22	0.0	0.060	6.4	LOS A	0.2	1.1	0.17	0.13	0.17	56.1
Approach		107	0.0	0.060	1.6	NA	0.2	1.1	0.17	0.13	0.17	57.8
West: Site Driveway												
10	L2	22	0.0	0.023	9.1	LOS A	0.1	0.6	0.36	0.86	0.36	51.5
12	R2	2	0.0	0.023	9.3	LOS A	0.1	0.6	0.36	0.86	0.36	51.0
Approach		24	0.0	0.023	9.2	LOS A	0.1	0.6	0.36	0.86	0.36	51.4
All Vehicles		276	0.0	0.075	1.5	NA	0.2	1.1	0.10	0.13	0.10	58.2

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 [FU PM - Lewis Street / Site Driveway]

Intersection of the Site Driveway and Lewis Street with pedestrian footpath treated as a zebra crossing.

Future Conditions in the PM Peak Period

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lewis Street (S)												
1	L2	2	0.0	0.051	6.1	LOS A	0.0	0.1	0.01	0.01	0.01	58.2
2	T1	97	0.0	0.051	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	59.8
Approach		99	0.0	0.051	0.1	NA	0.0	0.1	0.01	0.01	0.01	59.8
North: Lewis Street (N)												
8	T1	48	0.0	0.038	0.3	LOS A	0.1	0.9	0.20	0.17	0.20	57.7
9	R2	19	0.0	0.038	6.2	LOS A	0.1	0.9	0.20	0.17	0.20	55.6
Approach		67	0.0	0.038	2.0	NA	0.1	0.9	0.20	0.17	0.20	57.1
West: Site Driveway												
10	L2	19	0.0	0.019	9.0	LOS A	0.1	0.5	0.33	0.85	0.33	51.6
12	R2	2	0.0	0.019	8.9	LOS A	0.1	0.5	0.33	0.85	0.33	51.1
Approach		21	0.0	0.019	8.9	LOS A	0.1	0.5	0.33	0.85	0.33	51.5
All Vehicles		187	0.0	0.051	1.8	NA	0.1	0.9	0.12	0.16	0.12	57.8

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.

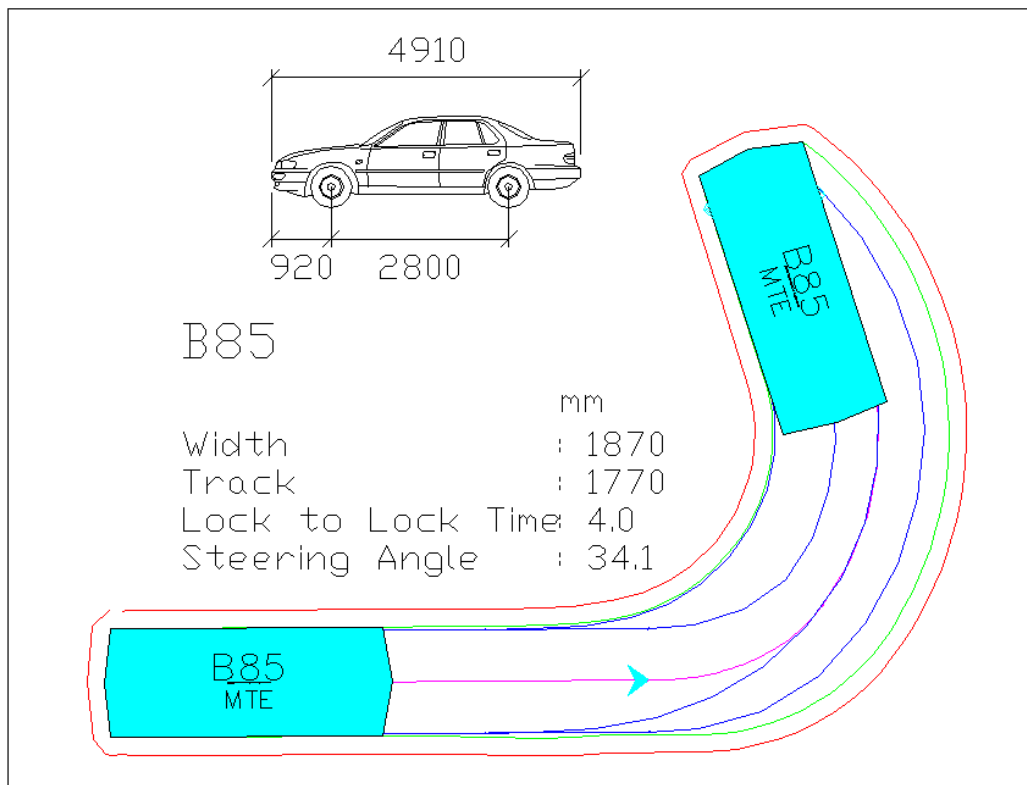
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

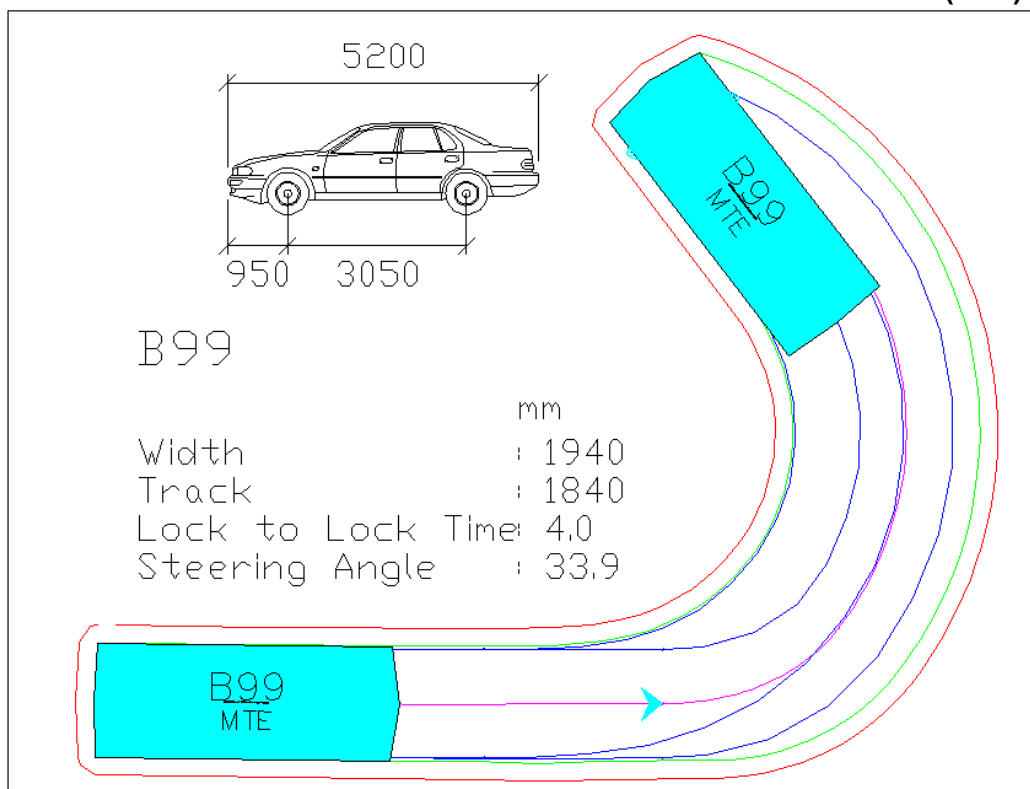
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



**ANNEXURE D: SWEEP PATH TESTING**  
**(2 SHEETS)**



**AUSTRALIAN STANDARD 85<sup>TH</sup> PERCENTILE SIZE VEHICLE (B85)**



**AUSTRALIAN STANDARD 99.8<sup>TH</sup> PERCENTILE SIZE VEHICLE (B99)**

All tests performed at 10km/h on public roads and 5km/h internally

Blue – Tyre Path  
 Green – Vehicle Body  
 Red – 300mm Clearance



