TRAFFIC & PARKING ASSESSMENT

MULTIPLE DWELLING RESIDENTIAL DEVELOPMENT

LOT 1 IN DP 204077
11 - 17 MOSBRI CRESCENT, THE HILL

PREPARED FOR: CRESCENT NEWCASTLE PTY LTD

JANUARY 2019

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11-17 MOSBRI CRESCENT, THE HILL

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This document has been authorised by

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CONTENTS

ATTACHMENTS

FIGURES

PHOTOGRAPHS

TABLES

1.0 INTRODUCTION

Intersect Traffic Pty Ltd has been engaged by Crescent Newcastle Pty Ltd to prepare a traffic and parking assessment report for a multiple dwelling residential development on Lot 1 in DP 204077; 11 – 17 Mosbri Crescent, The Hill. The proposed development requires the demolition of the existing NBN Television commercial buildings on the site, the construction of a residential complex with 242 car parking spaces and 172 residential dwelling units. The development concept plans are shown in ***Attachment A***.

The site has frontage to Mosbri Crescent and vehicular access is proposed via a combined entry / exit driveway at the northwest corner of the property at Mosbri Crescent. This new access will be the sole access servicing the on-site car parking areas on the ground and 1st floors and will replace three other accesses resulting in at least an increase of two on-road car parking spaces in Mosbri Crescent. In addition, the developer has provided an additional 36 car parking spaces above that required by the DCP.

This report is required to support a development application to Newcastle City Council and allow the Council to assess the proposal in respect of its impact on the local road network. This report presents the findings of the traffic assessment and includes the following;

1. An outline of the existing situation near the site.
2. An assessment of the traffic impacts of the proposed development including the predicted traffic generation and its impact on existing road and intersection capacities.
3. Reviews parking, public transport, pedestrian and cycle way requirements for the proposed development, including assessment against Council, standards and requirements.
4. Presentation of conclusions and recommendations.

2.0 SITE DESCRIPTION

The subject site currently contains a two-storey office and studio building (NBN Television) with external and under cover carparks and is located on the eastern side of Mosbri Crescent between Kitchener Parade and Swan Street. The site is located in a residential area of Newcastle adjoining the Darby Street entertainment precinct. It is approximately 400 metres east of Darby Street and approximately 800 metres south of Hunter Street in the Newcastle CBD. Its location within the context of surrounding commercial and residential buildings, parks, land and roads are shown in the location plan provided as ***Figure 1***, below.

Figure 1 – Site Location

The site contains the following property descriptors:

- Formal land title of Lot 1 in DP 204077;
- Postal address of 11 – 17 Mosbri Crescent, The Hill;
- Site area of approximately 1.23 hectares; and
- Land zoning of R3 – Medium Density Residential in accordance with Newcastle LEP (2012).

The site currently has road frontage to Mosbri Crescent to the west and Kitchener Parade to the north. It has three combined entry / exit vehicular accesses to Mosbri Crescent (ranging from approximately 7, 8.8 and 10.5 metres in width) and pedestrian accesses to Mosbri Crescent. ***Photographs 1 & 2*** shows the existing development on the site and one of the existing vehicular accesses at the site.

Photograph 1 – Development site at Darby Street

Photograph 2 – Development site and driveway access.

3.0 EXISTING ROAD NETWORK

3.1 Darby Street

Darby Street is a local collector road under a functional road hierarchy and is therefore under the care and control of Newcastle City Council. Near the site Darby Street runs northeast connecting the Darby Street entertainment area to Hunter Street and other streets for access to the CBD shops, foreshore and beaches. To the southwest it provides connection to the southern inner suburbs of Bar Beach and The Junction for access to other destinations and southern suburbs like Merewether.

Near the site Darby Street is a two-lane two-way sealed urban road. The 13-metre carriageway has a travel lane and a restricted parking lane in each direction with concrete kerb and gutter and longitudinal drainage along its outer edges. Each of the lanes is approximately 3.2 metres wide and a 40 km/h speed limit applies to this section of road being a high pedestrian activity area. On-street parking along Darby Street is time restricted to 2-hour periods between 9am – 5pm Monday to Friday and 9am – 1pm Saturday. At the time of inspection Darby Street was observed to be in good condition. ***Photograph 3*** below shows Darby Street north of Queen Street.

Photograph 3 – Darby Street near the site

3.2 Queen Street

Queen Street east of Darby Street is a local collector road under a functional road hierarchy and therefore is under the care and control of Newcastle City Council. Queen Street is 220 metres long and runs west from Swan Street crossing Darby Street through to Dawson Street. Vehicular access is barricaded 60 metre short of Dawson Street. Nearest the site Queen Street is a two-lane two-way sealed urban road. The 13-metre carriageway has a travel lane and a restricted parking lane with concrete kerb and gutter and longitudinal drainage along its outer edges. A 50 km/h speed limit applies to the road. On-street parking along the south side of Queen Street is time restricted to 2-hour periods between 9am – 5pm Monday to Friday and 9am – 1pm Saturday. At

the time of inspection Queen Street was observed to be in fair to good condition. ***Photograph 4*** below shows Queen Street at the Darby Street intersection.

Photograph 4 – Queen Street near the site

3.3 Swan Street

Swan Street is a local collector road under a functional road hierarchy and therefore is under the care and control of Newcastle City Council. Swan Street is 330 metres long and initially runs southeast from Queen Street for 100 metres to Brooks Street and then a further 230 metres eastwards, crossing Kitchener Parade 110 metres east of Brooks Street, to end and intersect with the southern end of Mosbri Crescent and Hillview Crescent. Near the site Swan Street is a two-lane two-way sealed urban road. The 9-metre carriageway has a travel lane and an unrestricted parking lane in both directions with concrete kerb and gutter and longitudinal drainage along its outer edges. A 50 km/h speed limit applies to the road. At the time of inspection Swan Street was observed to be in fair condition. ***Photograph 5*** below shows Swan Street near the site.

3.4 Kitchener Parade

Kitchener Parade is a local road under a functional road hierarchy and therefore is under the care and control of Newcastle City Council. Kitchener Parade is 580 metres long and meanders south from its northern end at Brown Street crossing the northern end of Mosbri Crescent and then Swan Street and ending at its southern end at its intersection with Nesca Parade. Near the site Kitchener Parade is a two-lane two-way sealed urban road. The 12-metre carriageway has a travel lane and an unrestricted parking lane in both directions with concrete kerb and gutter and longitudinal drainage along its outer edges. A 50 km/h speed limit applies to the road. At the time of inspection Kitchener Parade was observed to be in fair condition. ***Photograph 6*** below shows Kitchener Parade near the site.

Photograph 5 – Swan Street near the site

Photograph 6 – Kitchener Parade near the site

3.5 Mosbri Crescent

Mosbri Crescent is a local road under a functional road hierarchy and therefore is under the care and control of Newcastle City Council. Mosbri Crescent is 250 metres long and runs east from Kitchener Parade in an arc to the south and ends at its intersection with Swan Street and Hillview Crescent at its southern end. Near the site Mosbri Crescent is a two-lane two-way sealed urban road. Its carriageway is 8.8 metres wide for its length except for approximately 60 metres at its southern-most end which is 7.5 metres wide. In each direction there is a travel lane and mostly unrestricted parking lane (except for a 10 metre No Parking zone at the front of the NBN building) with concrete kerb and gutter and longitudinal drainage along its outer edges. A 50 km/h speed limit applies to the road. At the time of inspection Mosbri Crescent was observed to be in fair to good condition. ***Photograph 7*** below shows Mosbri Crescent adjacent the site.

Photograph 7 – Mosbri Crescent near the site

4.0 ROAD NETWORK IMPROVEMENTS

As part of the construction of the Newcastle light rail two improvements are proposed for Darby Street. Road works are proposed at the signalised intersections of Darby Street / Hunter Street and Darby Street / King Street. These works include:

- Construction of a dedicated right turning lane in Hunter Street on its eastbound approach to Darby Street, and
- Construction of a left turn slip lane for northbound traffic in Darby Street into King Street westbound.

The Hunter Street intersection improvement will have a minimal effect on the Darby Street traffic as the new right turn lane will be installed to negate the loss of an eastbound traffic lane in Hunter Street. The slip lane construction for northbound traffic in Darby Street into King Street westbound will complement the existing southbound slip lane in Darby Street into King Street eastbound and will likely increase traffic flow along Darby Street northbound reducing congestion at the intersection. Further from the site the reduction in travel lanes in Hunter Street could reduce available spare capacity in the Newcastle CBD however a likely modal transport shift towards use of public transport on completion of the light rail will negate the negative transport impacts of the construction of the light rail.

It is understood Newcastle Council has plans to upgrade the pavements in Mosbri Crescent and Swan Street which may improve pedestrian and cycle facilities but will not increase the capacity of the local road network. Other local road network improvements may occur in the future under both Newcastle City Council and NSW RMS Works Programs.

5.0 TRAFFIC VOLUMES

Intersect Traffic Pty Ltd undertook manual traffic counts at the Swan Street / Kitchener Parade intersection on Monday 24th September 2018 (8.00 am to 9.00 am) and (4.30 pm to 5.30 pm) to determine peak hour traffic volumes during the expected local road network peaks and distributions on the local road network. Whilst undertaking this count the movements in and out of Mosbri Crescent at its intersection with Kitchener Parade were counted during the same peak time periods.

The resultant peak hourly traffic movements were:

- Swan Street west of Kitchener Parade – 222 vtph AM and 205 vtph PM;
- Swan Street east of Kitchener Parade – 69 vtph AM and 66 vtph PM;
- Kitchener Parade north of Swan Street – 154 vtph AM and 105 vtph PM;
- Kitchener Parade south of Swan Street – 131 vtph AM and 124 vtph PM; and
- Mosbri Crescent east of Kitchener Parade – 42 vtph AM and 38 vtph PM.

To determine the amount of traffic currently generated by NBN in the AM and PM peak hours firstly an estimate of the residential component traffic volumes in the AM and PM peak periods in Mosbri Crescent at its southern (Swan Street) end is needed. The number of single residences in Swan Street and Hillview Crescent east of Kitchener Parade (24) is multiplied by 0.9 for AM and PM and the number of residential flat units (40) is multiplied by 0.53 for AM and 0.32 for PM is calculated as below.

Residential traffic generated from Swan Street and Hillview Crescent east of Kitchener Parade is

- AM = 24 x 0.9 + 40 x 0.53 = 43 vtph and PM = 24 x 0.9 + 40 x 0.32 = 34 vtph

Next the residential component traffic volumes in the AM and PM peak periods in Mosbri Crescent at its western (Kitchener Parade) end needs to be calculated. The number of single residences in Mosbri Crescent (9) is multiplied by 0.9 for AM and PM and the number of residential flat units (18) is multiplied by 0.53 for AM and 0.32 for PM is calculated as below.

Total residential traffic generated from Mosbri Crescent:

- AM = 9 x 0.9 + 18 x 0.53 = 18 vtph and PM = 8 x 0.9 + 18 x 0.32 = 14 vtph

To determine the AM and PM peak hour traffic currently generated by the NBN building, the traffic calculated as generated by the existing residences is subtracted from the counts for Mosbri Crescent east of Kitchener Parade and Swan Street east of Kitchener Parade.

In the AM peak hour, the traffic counts total of 111 vtph - 69 in Swan Street & Hillview Crescent east of Kitchener Parade and 42 in Mosbri Crescent. As the residential movements during this period total 61 (43 + 18) this equates to 50 (111 – 61) vtph attributed to the AM peak hour traffic generated by NBN. Similarly, in the PM peak hour there is a total of 104 vtph - 66 in Swan Street & Hillview Crescent east of Kitchener Parade and 38 in Mosbri Crescent. Deducting the above calculated residential movements, 34 + 14 vtph, during this period this would equate to 56 (104 – 48) vtph attributed to the PM peak hour traffic generated by NBN. It is therefore concluded that the existing NBN building contributes approximately 60 vtph to the 2018 AM and PM peak hour traffic volumes generated on the local road network near the site.

Intersect Traffic Pty Ltd previously undertook manual traffic counts at the Darby Street / Queen Street intersection on Thursday 26th July 2018 (8.00 am to 9.00 am) and (4.15 pm to 5.30 pm) to determine peak hour traffic volumes during the expected local road network peaks and distributions on the local road network. The manual traffic count sheets sourced from these two Intersect Traffic counts are shown in ***Attachment B***. To estimate the peak mid-block traffic volumes for 2028, the 2018 values of all the above counts have been increased by applying a growth rate of 2% per annum for 10 years. The 2018 and 2028 mid-block peak hour volumes are as shown in ***Table 1*** below.

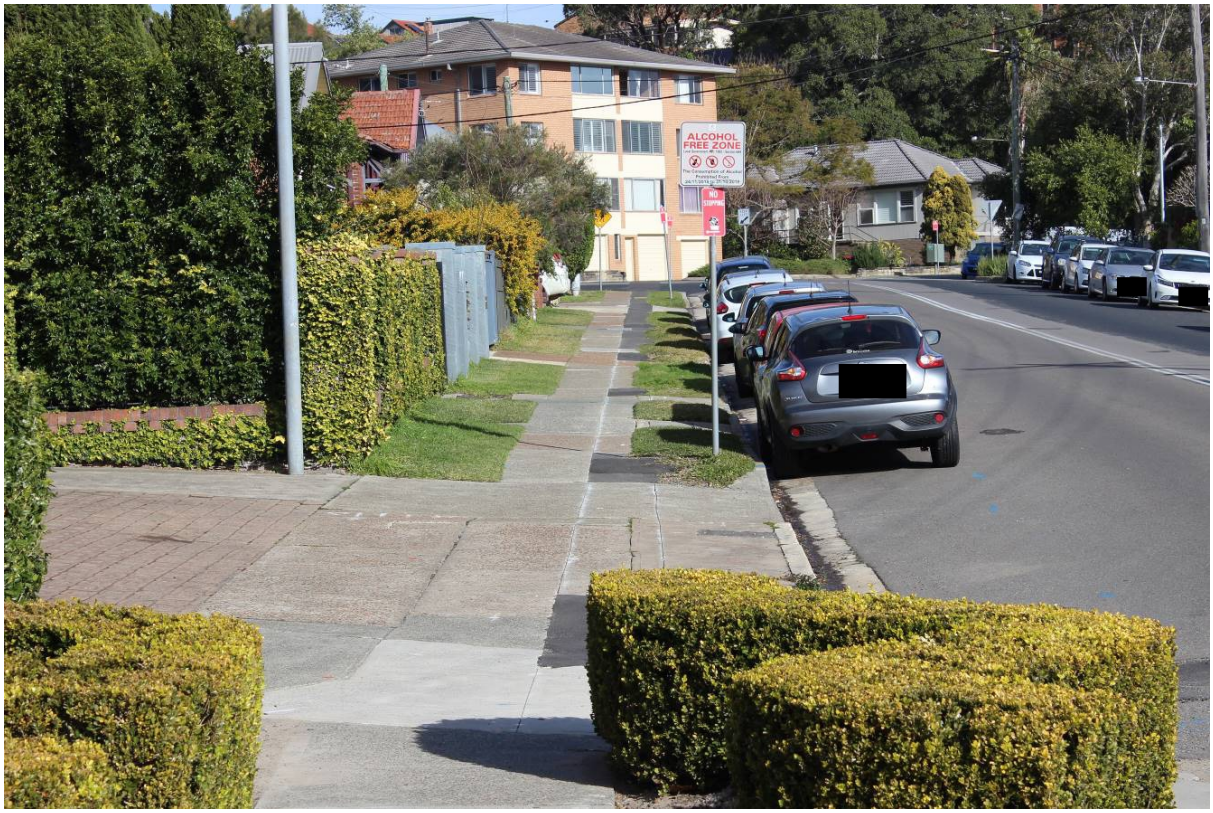
Previously Transport for NSW commissioned GHD to prepare the Newcastle Light Rail Technical Paper 1 - Traffic, transport and access assessment to examine the impacts of the light rail. The 2015 report included existing traffic counts and projected traffic volumes in Darby Street in 2018 and 2028 with the Light Rail proposal. An extract from the GHD report showing this traffic data is presented in ***Table 2*** below. These mid-block two-way peak hour traffic volumes have been adopted in this assessment.

Table 1 – 2018 and 2028 two-way traffic mid-block peak hour traffic volumes

Road	Section	2018 AM peak vtph	2018 PM peak vtph	2028 AM peak vtph	2028 PM peak vtph
Darby Street	North of Queen Street	843	879	1028	1071
Darby Street	South of Queen Street	753	751	918	915
Queen Street	East of Darby Street	249	278	304	339
Queen Street	West of Darby Street	59	80	72	98
Swan Street	West of Kitchener Parade	222	205	271	250
Swan Street	East of Kitchener Parade	69	66	84	80
Kitchener Parade	North of Swan Street	154	105	188	128
Kitchener Parade	South of Swan Street	131	124	160	151
Mosbri Crecent	North of Swan Street	37	34	45	41
Mosbri Crescent	East of Kitchener Parade	42	38	51	46

Table 2 – Peak Traffic Volumes - Summary Results

Darby Street Mid-block Peak Hour Traffic Volumes						
Location Year	2015AM	2015PM	2018AM	2018PM	2028AM	2028PM
King Street to Tyrell Street	1,067	1,159	1,082	1,156	1,163	1,277
Hunter Street to King Street	378	555	448	657	385	598



6.0 ROAD CAPACITY

The capacity of urban roads is generally determined by the capacity of intersections. However, Tables 4.3 and 4.4 of the RMS' *RTA Guide to Traffic Generating Developments* provides some guidance on mid-block capacities for urban roads and likely levels of service. These tables are reproduced below.

Table 4.3
Typical mid-block capacities for urban roads with interrupted flow

Type of Road	One-Way Mid-block Lane Capacity (pcu/hr)	
Median or inner lane:	Divided Road	1,000
	Undivided Road	900
Outer or kerb lane:	With Adjacent Parking Lane	900
	Clearway Conditions	900
	Occasional Parked Cars	600
4 lane undivided:	Occasional Parked Cars	1,500
	Clearway Conditions	1,800
4 lane divided:	Clearway Conditions	1,900

Table 4.4
Urban road peak hour flows per direction

Level of Service	One Lane (veh/hr)	Two Lanes (veh/hr)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Source: - RTA's Guide to Traffic Generating Developments (2002).

A desirable level of service on an urban road is generally considered to be a level of service (LoS) C or better for a local collector road such as Darby Street and local roads such as Queen Street, Swan Street, Kitchener Parade and Mosbri Crescent. Noting a LoS D on one lane of flow occurs when mid-block traffic volumes exceed 900 vtph then a two-way two-lane mid-block traffic volume threshold for a LoS C is 1,800 vtph. This means the two-way two-lane mid-block traffic volume threshold for a LoS C for Darby Street, Queen Street, Swan Street, Kitchener Parade and Mosbri Crescent is 1,800 vtph is a level of service (LoS) C and a one way one lane mid-block traffic volume threshold for a LoS D is 900 vtph.

However, for local streets with predominately residential dwellings along their length, such as Swan Street, Kitchener Parade and Mosbri Crescent, the environmental capacity of the road as a measure of acceptable residential amenity within the street also needs to be considered. The environmental road capacity thresholds accepted by NSW Roads and Maritime Service (NSW RMS) are provided within *Table 4.6* of the *RTA's Guide to Traffic Generating Developments (2002)* as reproduced below.

Table 4.6
Environmental capacity performance standards on residential streets

Road class	Road type	Maximum Speed (km/hr)	Maximum peak hour volume (veh/hr)
Local	Access way	25	100
	Street	40	200 environmental goal
			300 maximum
Collector	Street	50	300 environmental goal
			500 maximum

Note: Maximum speed relates to the appropriate design maximum speeds in new residential developments. In existing areas maximum speed relates to 85th percentile speed.

Source: - RTA's Guide to Traffic Generating Developments (2002).

For a local or collector road, the environmental capacity of the local road network is determined from the above table as 300 to 500 vtph. A maximum capacity of 500 vtph has therefore been determined for Swan Street and a maximum capacity of 300 vtph has been determined for Kitchener Parade and Mosbri Crescent.

Therefore, the mid-block road capacity of 1,800 vtph for Darby Street as a two-lane two-way urban road and the environmental capacities of 500 vtph for Swan Street and 300 vtph for Kitchener Parade and Mosbri Crescent as two-way two-lane urban roads have been adopted for this assessment.

From the traffic data sourced in ***Section 5*** and noting the likely technical two-way mid-block road capacities of Darby Street and Queen Street and the environmental capacities of Swan Street, Kitchener Parade and Mosbri Crescent all exceed existing and future traffic volumes on the road network it is considered that the adjacent road network is operating well within its technical and environmental capacity as relevant and has scope to cater for additional traffic generated by new development.

7.0 ALTERNATE TRANSPORT MODES

Newcastle Transport (Keolis Downer) provides public transport (bus) services in the area. A review of the route maps and timetables for the service indicates that the site does not have direct access to public transport. The nearest bus route is in Darby Street as shown in the bus route extract shown in ***Figure 2*** below.

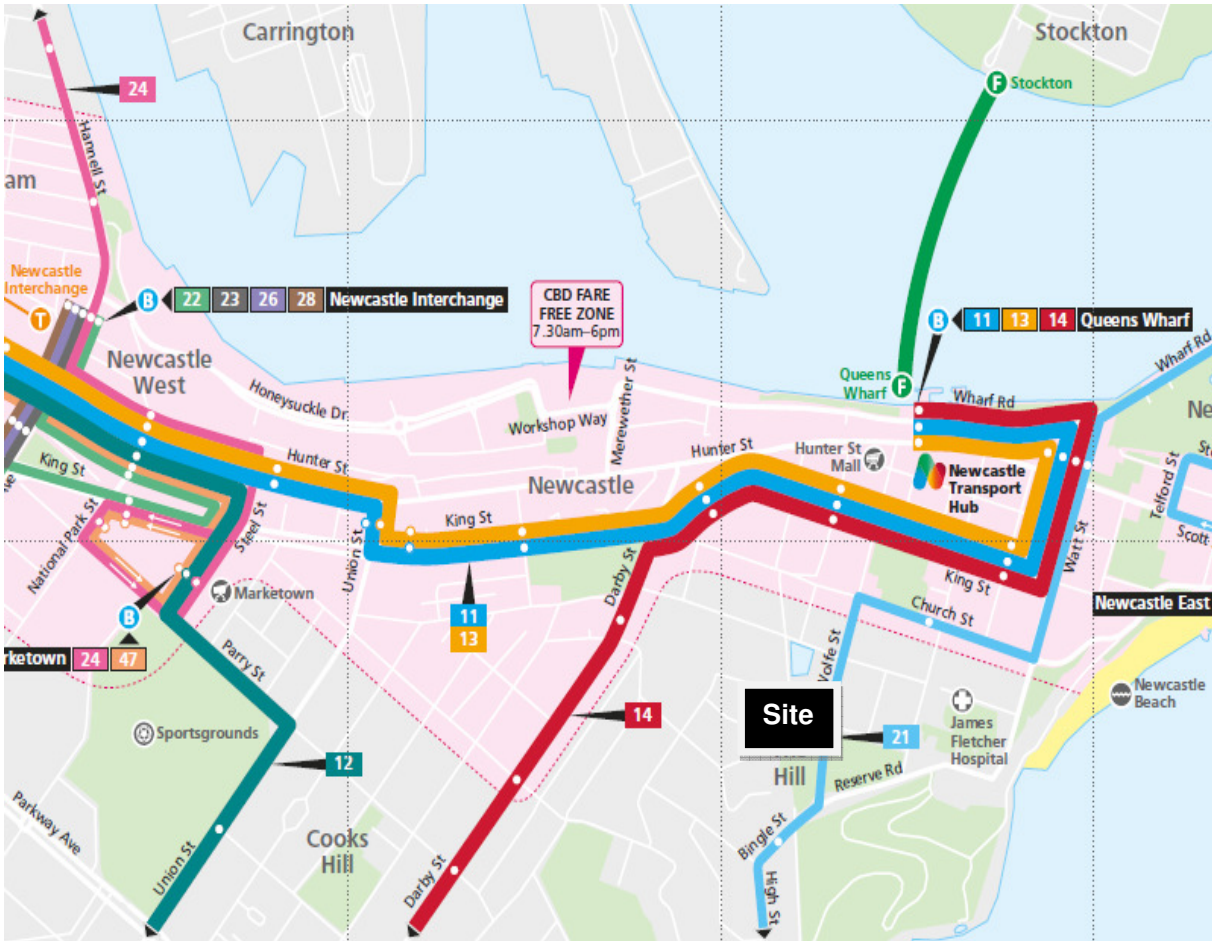
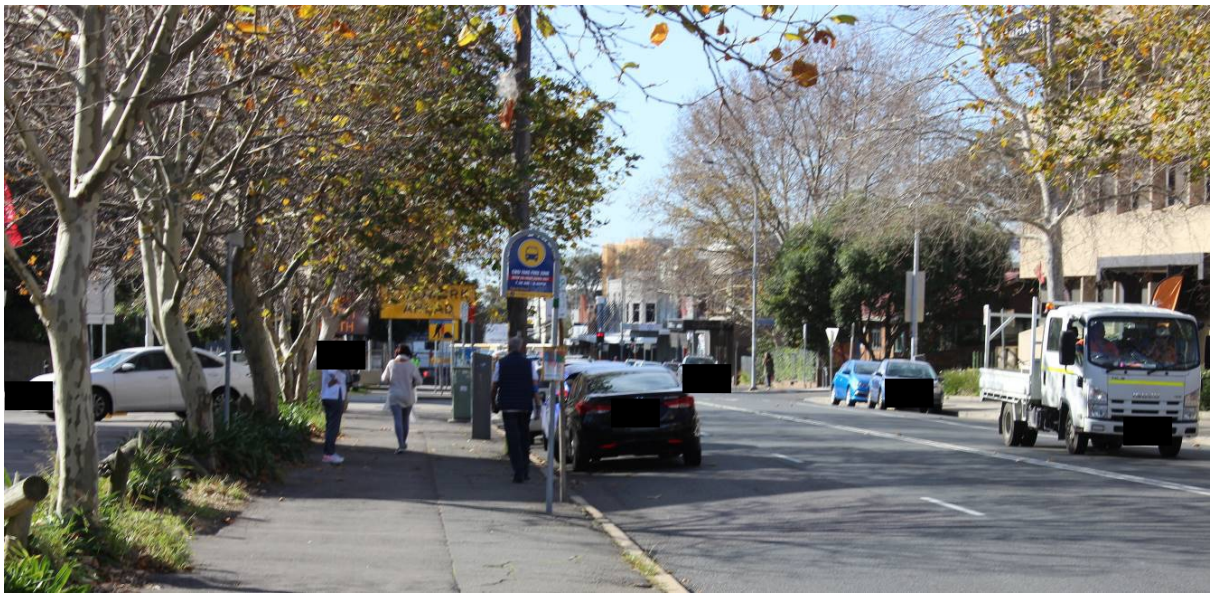


Figure 2 – Transport Newcastle bus routes

Route 14 (Swansea Heads to Newcastle via Belmont, Charlestown & Kotara) is the bus service route that travels along Darby Street west of the site while Route 21 (Broadmeadow to Newcastle East via Merewether) travels along Wolfe Street to the east of the site. These services provide access to the Newcastle CBD, The Junction, Broadmeadow, Merewether, Kotara (Westfield) and Charlestown (Square). They provide connections with other bus services from the bus interchanges at Charlestown, Kotara and Newcastle CBD to John Hunter Hospital, the University of Newcastle, and many parts of the Newcastle area including rail services. Hunter Valley Buses and Port Stephens Buses also provide regular bus services to and from Port Stephens, Newcastle Airport from Hunter Street Newcastle.

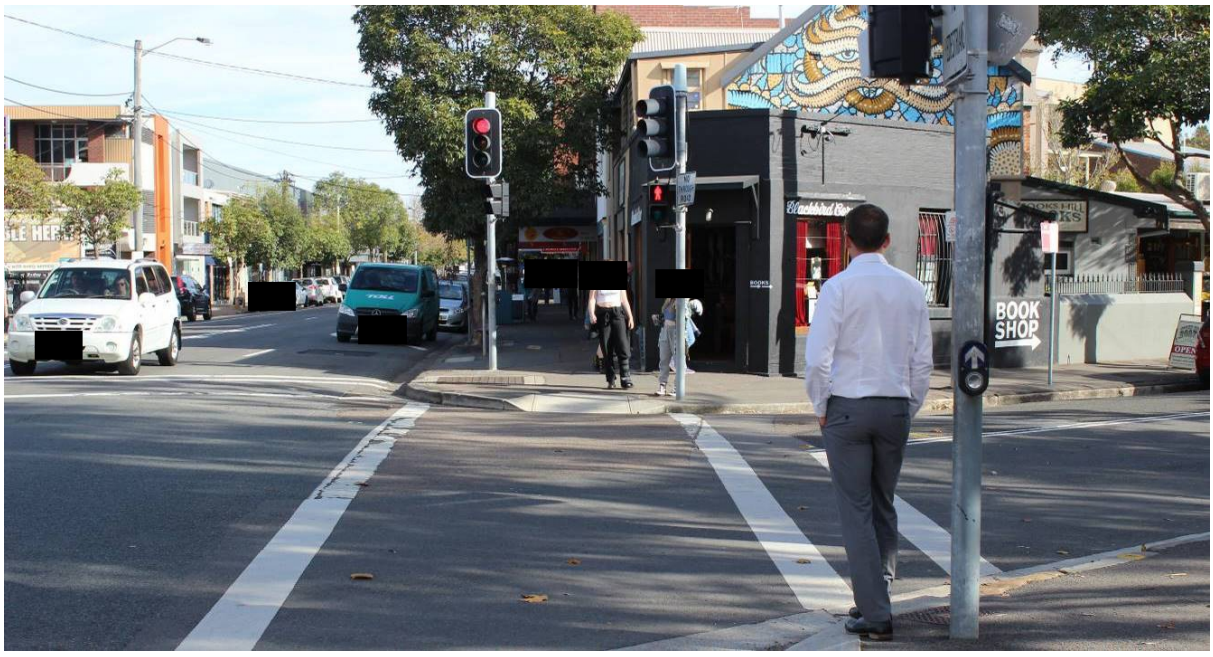
Bus stops on Darby Street are within 480 metres a little more than the usual acceptable convenient walking distance from the development site. The nearest bus stop for travellers north and south along Darby Street is located in the Darby Street on either side of the street just north of Queen Street. The bus stop on the western side of Darby Street north of Queen Street is shown in ***Photograph 8*** below. Bus stops on Wolfe Street are located approximately within 100 to 150 metres from the site (convenient walking distance) and will be facilitated with a pedestrian link from the site directly to Kitchener Parade.



Photograph 8 – Bus stop and footpath on Darby Street

A range of hard surface footpaths (concrete, bitumen and paving bricks) of widths approximately 3.7 metres, exist on both sides of Darby Street for pedestrians. They extend as full width paths on both sides of Darby Street to the north and south and adjoin King Street and Hunter Street to the north and local suburban / residential areas to the south. Darby Street footpaths also connect to a network of east / west footpaths and its many road intersections servicing the adjoining residential areas.

Pedestrians currently utilise formal road crossing facilities at the signalised intersections of Darby Street - with Queen Street, King Street 210 metres north of Queen Street and Hunter Street 350 metres north of Queen Street - and the signalised pedestrian crossing in Darby Street, 260 metres south of Queen Street. These facilities provide very good and safe access for the high volume of pedestrians utilising areas near the site. The signalised pedestrian crossing intersection near the development site is shown in ***Photograph 9*** below.



Photograph 9 – Signalised Pedestrian Crossing Darby Street / Queen Street

Nearer the site there are 1.2-metre-wide concrete footpaths on both sides of Mosbri Crescent, Swan Street and Kitchener Parade connecting to Queen Street and the surrounding residential streets. ***Photograph 10*** below shows a typical footpath near the development site.

Photograph 10 – Typical footpath near the site

Mosbri Crescent and the surrounding streets do not have any on-road cycle lanes nor are there any off-road cycleways near the site. Cyclists would be required to utilise the footpaths or share travel lanes with road traffic. For cyclists from the site that travel to Darby Street, they can take advantage of the wide parking lanes in Darby Street which provide room for cyclists and travelling vehicular traffic to share the roadway concurrently facilitating access for cyclists to and from the site, the CBD and locations south, east and west.

The nearest existing on-road cycleway is in Laman Street / Auckland Street, approximately 700 metres northwest of the site. It is accessed via Swan Street from the development to Darby Street via Queen Street and north to Laman Street or west to Queen Street west, Dawson Street and Laman Street. This on-road cycleway connects to King Street, Hunter Street and across the rail corridor to a major off-road cycleway which runs along the Newcastle harbour foreshore, approximately 1.5km north of the site. The off-road cycleway provides connection to the Newcastle foreshore and beaches and other western suburbs of Newcastle through the Newcastle cycle path network. The development site is within 700 metres of the Newcastle Council's Inner-City Bike Lane Study Area. The Study Area and the surrounding proposed and constructed cycleways near the site are shown in the extract from the Newcastle Cycling Action and Strategy Plan in ***Figure 3*** below.

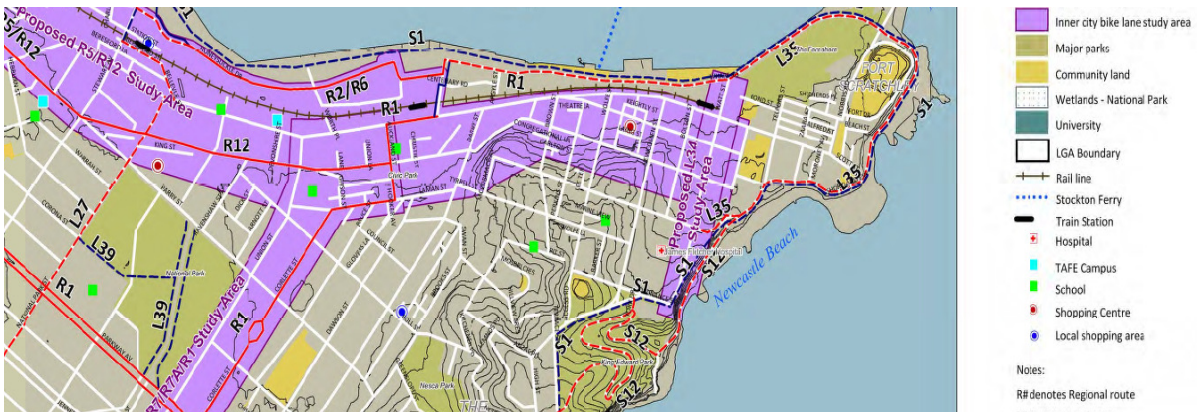


Figure 3 – Cycleway facilities near site

8.0 DEVELOPMENT PROPOSAL

The proposal involves the demolition of the existing NBN Television buildings and the car park on the site, the construction of a multiple dwelling residential complex with 4 separate buildings over 9 levels including 2 levels of car parking and a mixture of residential dwellings. The development concept plans are shown in ***Attachment A***.

Specifically, the development involves:

- Demolition of the existing buildings / structures and associated earthworks;
- Construction of 172 dwellings in 4 buildings comprising building A, B and C as well as the Terrace Houses building. Overall the development provides:
  - 40 x 3-bedroom dwellings;
  - 98 x 2-bedroom dwellings; and
  - 34 x 1-bedroom dwellings.
- Construction of 242 car parking spaces including 34 visitor car parks, 12 motorcycle parking spaces and storage areas within the car parking areas suitable for bike storage;
- Construction of a combined entry / exit driveway access (9 metres wide) at Mosbri Crescent;
- Provision of internal pedestrian linkage to both Mosbri Crescent and Kitchener Parade with an internal pathway and stairs connecting the two streets;
- Removal of the existing driveway at Mosbri Crescent and reinstatement of the kerb and footpath; and
- External landscaping, communal open space, services and site infrastructure to Newcastle Council requirements.

9.0 TRAFFIC GENERATION

The RMS' *RTA's Guide to Traffic Generating Development's* provides specific advice on the traffic generation potential of various land uses. However, the RMS issued a Technical Direction TDT 2013/04 in May 2013 that provided updated traffic generation rates for certain development types including residential flat buildings. The table below, reproduced from the Technical Direction, sets out the land use traffic generation rates for residential flat buildings for Sydney and regional areas.

Weekday Rates	Sydney Average	Sydney Range	Regional Average	Regional Range
AM peak (1 hour) vehicle trips per unit	0.19	0.07-0.32	0.53	0.39-0.67
AM peak (1 hour) vehicle trips per car space	0.15	0.09-0.29	0.35	0.32-0.37
AM peak (1 hour) vehicle trips per bedroom	0.09	0.03-0.13	0.21	0.20-0.22
PM peak (1 hour) vehicle trips per unit	0.15	0.06-0.41	0.32	0.22-0.42
PM peak (1hour) vehicle trips per car space	0.12	0.05-0.28	0.26	0.11-0.40
PM peak (1 hour) vehicle trips per bedroom	0.07	0.03-0.17	0.15	0.07-0.22
Daily vehicle trips per unit	1.52	0.77-3.14	4.58	4.37-4.78
Daily vehicle trips per car space	1.34	0.56-2.16	3.22	2.26-4.18
Daily vehicle trips per bedroom	0.72	0.35-1.29	1.93	1.59-2.26

The rates for the residential flats are calculated using the above Table's Regional Average trips per bedroom of 0.21 AM and 0.15 PM for the peak hour traffic and 1.93 for the daily traffic. Therefore, the following peak hour traffic generation calculations can be undertaken for the proposed development noting this traffic impact assessment is based on peak hour traffic volumes and average regional rates due to the site being close to the Newcastle City Centre area with good access to existing and future public transport.

Daily Traffic = {34 +(98 x 2) +(40 x 3)} x 1.93 per bedroom
= 353 x 1.93 = **676 vtpd** (rounded up).

Peak Hour Traffic (AM) = 350 bedrooms x 0.21 = **74 vtph** (rounded up); and
Peak Hour Traffic (PM) = 350 bedrooms x 0.15 = **53 vtph** (rounded up).

These volumes are utilised in the traffic assessment.

10.0 TRIP DISTRIBUTION

Before carrying out any traffic assessment the peak hour traffic generated by the development needs to be distributed through the adjoining road network. This involves making assumptions as to distribution patterns to and from the development based on likely origin / destinations and trip making decision making. The traffic distribution to and from the development has been determined as follows:

- In the AM peak 80% of trips will be outbound and 20% will be inbound trips;
- In the PM peak 30% of trips will be outbound and 70% will be inbound trips;
- In the AM and PM peak 100% of vehicles trips will enter and exit the development via Mosbri Crescent at the access at the western end of the site;
- 70% of traffic will have origin / destinations via Mosbri Crescent south of the access and Swan Street west of the southern end of Mosbri Crescent;
- 30% of traffic will have origin / destinations via Mosbri Crescent west of the access;
- This 30% of traffic west of the access will have origin / destinations in Kitchener Parade - 20% north and 10% south of the western end of Mosbri Crescent;

- This 10% of traffic in Kitchener Parade south of Mosbri Crescent will have origin / destinations via Swan Street (and Queen Street) west of Kitchener Parade;
- The 70% of traffic in Kitchener Parade west of southern end of Mosbri Crescent will have origin / destinations 60% via Swan Street (and Queen Street) west of Kitchener Parade and 10% via Kitchener Parade south of Swan Street;
- The 70% (60% plus 10%) traffic in Swan Street (and Queen Street) west of Kitchener Parade will have origin / destinations 50% via Darby Street north and 20% via Darby Street south.

Based on the assumptions listed above the resulting predicted peak hour trip distributions for traffic generated by the residential development is as shown below in ***Figure 4***.

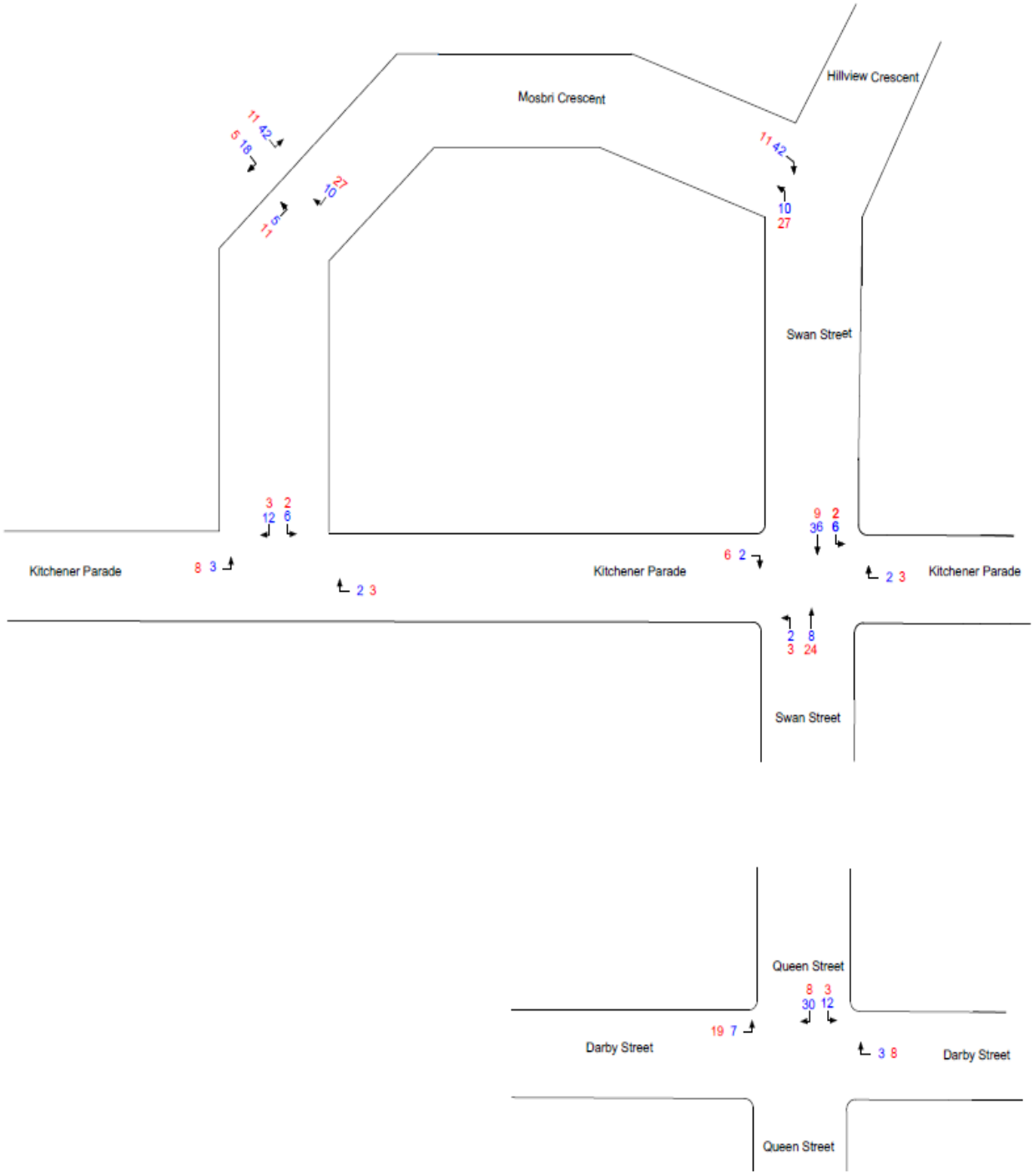


Figure 4 – Development Traffic Trip Distribution

11.0 TRAFFIC IMPACTS OF DEVELOPMENT

11.1 Road Network Mid-Block Capacity

It has previously been shown in ***Section 6*** of this report that the surrounding road network is currently operating within its relevant technical and environmental capacity. It is noted that the proposed development peak hour traffic is to be a likely maximum of:

- 37 vtph AM and 27 vtph PM in Darby Street north of Queen Street;
- 15 vtph AM and 10 vtph PM in Darby Street south of Queen Street;
- 52 vtph AM and 38 vtph PM in Queen Street and Swan Street east of Darby Street;
- 52 vtph AM and 38 vtph PM in Swan Street east of Kitchener Parade;
- 52 vtph AM and 38 vtph PM in Mosbri Crescent north of Swan Street;
- 8 vtph AM and 5 vtph PM in Kitchener Parade north of Swan Street;
- 8 vtph AM and 5 vtph PM in Kitchener Parade south of Swan Street;
- 15 vtph AM and 11 vtph PM in Kitchener Parade north of Mosbri Crescent; and
- 23 vtph AM and 16 vtph PM in Mosbri Crescent east of Kitchener Parade.

The mixed-use development proposed at 59 Darby Street for which Intersect Traffic undertook a traffic assessment is likely to increase peak traffic volumes on the affected road network by as shown below:

- 30 vtph AM and 27 vtph PM in Darby Street north of Queen Street;
- 9 vtph AM and 7 vtph PM in Darby Street south of Queen Street; and
- 39 vtph AM and 34 vtph PM in Queen Street east of Darby Street.

Further, another mixed-use development proposed at 113 – 125 Darby Street for which Intersect Traffic undertook a traffic assessment is also likely to increase peak traffic volumes on the affected road network by as shown below:

- 11 vtph AM and 9 vtph PM in Darby Street north of Queen Street;
- 10 vtph AM and 9 vtph PM in Darby Street south of Queen Street; and
- 7 vtph AM and 14 vtph PM in Queen Street east of Darby Street

Cumulatively all three developments will not result in the technical mid-block road capacity threshold for Darby Street, Queen Street, Swan Street, Kitchener Parade and Mosbri Crescent determined in ***Section 6*** being reached as shown in ***Table 3*** below.

Table 3 – Capacity and two-way traffic mid-block peak hour traffic volumes post development

Road	Section	Capacity vtph	2018 AM peak vtph	2018 PM peak vtph	2028 AM peak vtph	2028 PM peak vtph	Development	
							AM	PM
Darby Street	North of Queen Street	1800	921	942	1106	1134	78	63
Darby Street	South of Queen Street	1800	787	777	952	941	34	26
Queen Street	East of Darby Street	1800	347	364	402	425	98	86
Queen Street	West of Darby Street	1800	59	80	72	98	0	0
Swan Street	West of Kitchener Parade	500	320	291	369	336	98	86
Swan Street	East of Kitchener Parade	500	121	104	136	118	52	38
Kitchener Parade	North of Swan Street	300	162	110	196	133	8	5
Kitchener Parade	South of Swan Street	300	139	129	168	156	8	5
Mosbri Crescent	North of Swan Street	300	89	72	97	79	52	38
Mosbri Crescent	East of Kitchener Parade	300	65	56	74	64	23	18

Therefore, subject to satisfactory intersection performance the additional traffic from the proposed development will not adversely impact on the surrounding local and state road network.

11.2 Intersection Capacity

In assessing intersection performance, the main intersections impacted by the development will be the Darby Street / Queen Street signalised 4-way cross intersection and the Swan Street / Kitchener Parade Stop Sign controlled 4-way cross intersection. For this assessment it needs to be determined whether the intersections as currently constructed can cater for the additional traffic generated by this development or whether any upgrading works are necessary.

The impacts of the development are best assessed using the SIDRA INTERSECTION modelling software. This software package predicts likely delays, queue lengths and thus levels of service that will occur at intersections. Assessment is then based on the level of service requirements of the RMS shown below in Table 4.2 below. Assumptions made in this modelling were:

- The intersection layouts will remain as per current conditions.
- Traffic volumes used in the modelling were as collected by Intersect Traffic in 2018.
- Traffic generated by the development is distributed as per ***Figure 4.***
- Future traffic growth predicted using a very conservative 2.0% per annum background traffic growth rate.
- No discount has been made for the removal of the traffic of the existing NBN development which may currently contribute attract traffic up to 60 vtph in the peak hour;
- The model used was the model developed for the intersection by Intersect Traffic for the proposed development at 59 Darby Street, Cooks Hill which also included development traffic for the proposed development at 113 – 125 Darby Street, Cooks Hill, i.e. considers cumulative impacts of other developments.

Table 4.2
Level of service criteria for intersections

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

Source; - RTA's Guide to Traffic Generating Developments (2002).

The summarised 'all vehicles' results of the modelling for the intersections are provided in ***Table 4 and 5*** below. For the signalised intersection the average LoS is provided in the summary, whilst the Worst Leg LoS is provided for the Stop Sign controlled intersection. The Sidra Movement Summary Tables for the intersections are provided in ***Attachment C***.

Table 4 – Darby Street / Queen Street Signalised intersection – Sidra Modelling – Results Summary

Modelled Peak	Degree of Saturation (v/c)	Average Delay (s)	Average Level of Service	95% back of queue length (cars)
2018 AM with development	0.827	12.0	A	6.9
2018 PM with development	0.749	11.6	A	5.4
2028 AM with development	0.850	12.7	A	9.2
2028 PM with development	0.759	11.7	A	6.9

This modelling shows that the Darby Street / Queen Street Signalised 4-way intersection at Cooks Hill currently operates satisfactorily during both the AM and PM peak periods and would continue to do so post development through to 2028. Average delays and 95% back of queue lengths all remain at acceptable levels based on the RMS assessment criteria listed above.

Table 5 – Swan Street / Kitchener Parade Stop sign intersection – Sidra Modelling – Results Summary

Modelled Peak	Degree of Saturation (v/c)	Average Delay (s)	Worst Leg Level of Service	95% back of queue length (cars)
2018 AM with development	0.081	5.7	A	0.3
2018 PM with development	0.076	5.8	A	0.3
2028 AM with development	0.102	5.6	A	0.4
2028 PM with development	0.094	5.9	A	0.3

This modelling shows that the Swan Street / Kitchener Parade Stop sign controlled 4-way cross intersection at The Hill currently operates satisfactorily during both the AM and PM peak periods and would continue to do so post development through to 2028. Average delays and 95% back of queue lengths all remain at acceptable levels based on the RMS assessment criteria listed above.

The Kitchener Parade / Mosbri Crescent intersection will have approximate maximum 2028 traffic volumes of 196 vtph for Kitchener Parade and 74 vtph for Mosbri Crescent, whilst the Swan Street / Mosbri Crescent intersection will have approximate maximum 2028 traffic volumes of 136 vtph for Kitchener Parade and 78 vtph for Mosbri Crescent. Therefore, the traffic numbers through these intersections will not reach the traffic volume thresholds identified within *Austroads Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings* (see ***Table 6*** below) for uninterrupted flow conditions and for which further analysis of intersection performance is not required. It is therefore concluded that uninterrupted flow conditions will continue to operate at the Kitchener Parade / Mosbri Crescent intersection and the Swan Street / Mosbri Crescent intersection post development, and no further intersection assessment is required.

Table 6 – Austroads Traffic Volume Thresholds for Uninterrupted Flows at Intersections

Major road type[1]	Major road flow (vph)[2]	Minor road flow (vph)[3]
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

Source: - Austroads Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings

Further afield, the signalised intersection at King Street / Darby Street and the signalised intersection at Hunter Street / Darby Street both north of the Darby Street / Queen Street intersection were assessed by GHD in their 2015 report 'Newcastle Light Rail Technical Paper 1 - Traffic, transport and access assessment'. An extract from the report showing part of Table 5-6 demonstrating the change in service levels from 2018 with the Light Rail proposal and 2028 with and without the Light Rail proposal is shown below. The 2028 level of service with the light rail is acceptable and therefore, as the existing and proposed commercial traffic has been accounted for in the analysis, will not alter the previously analysed intersection performances.

Table 5-6 Summary of intersection performance in 2028

Location	2018 with proposal		2028 without proposal		2028 with proposal	
	AM peak	PM peak	AM peak	PM peak	AM peak	PM peak
Hunter Street / Darby Street	C	C	C	B	C	D
King Street / Darby Street	B	C	C	C	C	D

Source: GHD traffic modelling, 2015

Overall it is concluded that the proposed development does not adversely impact on the operation of adjoining intersections on the state and local road network.

11.3 Access

The on-site car parking for this development will be accessed via a new combined entry and exit access at Mosbri Crescent at the south-western corner of the site. Parking is to be provided to the ground level and level 1 floors of the development plus the basement area for the Mosbri Town houses.

Under Table 3.1 of Australian Standard *AS2890.1-2004 Parking facilities – Part 1 - Off-street car parking* a car park with between 101 and 300 car parking spaces accessed via a local road providing residential, domestic and employee parking (Class 1A) is required to have a Category 2 access facility. A Category 2 access facility is a combined entry / exit driveway between 6.0 metres and 9.0 metres wide. The proposed access will be 9.0 metres wide to accommodate a central security scan median and the provision of a combined entry / exit at least 9.0 metres wide with suitable landscaping will ensure suitable pedestrian and vehicular sight lines in accordance with the Australian Standard (AS2890.1-2004) exists for exiting vehicles from the access. Vehicular sight lines from the proposed access have been observed to exceed the AS2890.1-2004 requirement of 45 metres minimum within a 50 km/h speed zone (*Figure 3.2 of AS2890.1-2004*).

It is therefore concluded the proposed car park access arrangements are suitable to service the development and complies with Newcastle City Council and Australian Standard requirements.

11.4 On-site Parking

Regarding on-site parking the proposal is generally required to comply with *Chapter 7.03 Traffic Parking and Access* of Newcastle City Council's DCP (2012). The assessment is to be undertaken using rates provided in Table 1 identified within the Newcastle DCP (2012).

The peak parking demand rates applicable to this development as residential buildings specified within Council's DCP are as follows noting the site lies outside the Newcastle City Centre locality:

Residential Flats

Car parking:	*1 space per one, two- or three-bedroom dwelling; and* *1 space for the first 3 dwellings plus 1 space for every 5 or part thereof for visitors.*
Bike parking:	*1 space per dwelling + 1 space per 10 dwellings (Class 3) for visitors.*
Motorbike parking:	*1 space per 20 car spaces.*

Using the above rates, the following car parking requirement (rounded up) for the proposed development can be calculated as shown below;

Residential car parking spaces	*172 x 1*	*= 172*
Visitor parking spaces	*1 (first 5 units) + 33 (162 units / 5)*	*= 35*
Residents bike parking spaces	*172 dwellings / 1*	*= 172*
Visitor bike parking spaces	*172 dwellings / 10*	*= 17 Class 3*
Motorbike parking spaces	*172 / 20*	*= 9*

In summary the DCP requires 207 car parking spaces –172 residential and 35 visitors' spaces, 172 residential bicycle spaces, 17 visitor bicycle spaces and 9 motorbike spaces. The total off-street parking spaces proposed by the developer allows for 242 car parking spaces including 207 residential spaces and 35 visitor car spaces which is an additional parking space for 35 of the three-bedroom dwellings. Therefore. an additional 35 residential parks are provided.

This excess is however important because of the location of the site being within Mosbri Crescent, The Hill. There are a number of adjoining older style residential flat buildings in Mosbri Crescent that have generated a significant on-street car parking demand on Mosbri Crescent. Mosbri Crescent only has an 8.5-metre-wide carriageway width which only allows two-way traffic flow with limited on-street car parking generally on one side of the street only. Therefore, any additional on-street car parking demand in the street is likely to result in on-street parking on both sides of the street which in turn will allow only a single travel lane with two-way traffic flow. Not only will this reduce the road safety environment in the street but will reduce the residential amenity within the street for both existing and future residents.

A simple solution would be to prohibit parking on one side of the street however if the on-street parking demand is at a level whereby on-street car parking occurs on both sides of the street this traffic management strategy will only push the on-street parking demand onto adjoining streets. Therefore, there is significant advantage in providing additional on-site car parking in this large development as a means to ensuring the on-street car parking impact of the development is minimised. Market demands for residential apartments in the Newcastle Inner City area have consistently shown that the majority of buyers of three-bedroom units are also looking for the provision of two resident car parking spaces. Therefore, it is argued that the Newcastle Council DCP requirement for this development should be increased to closer to two spaces per three-bedroom unit.

The Newcastle DCP 2012 does allow the car parking rates to be varied within **Section 7.03.02 Parking Rates Section B**. The objective of this section *is to allow variations to on site provision of parking.* The approval of variations to the on-site parking rates within Table 1 of Section 7.03 Traffic, Parking and Access of the Newcastle DCP (2012) is subject to the variation to the parking rates being comprehensively justified in the Statement of Environmental Effects or a Traffic Impact Study. This advice has justified a variation to the Table 1 car parking rates for this development within the argument presented above regarding the constraints associated with on-street car parking and the car parking requirement for this development should be 242 car parks and not 207 car parking spaces as per Table 1 of Section 7.03 Traffic, Parking and Access of the Newcastle DCP (2012). Specifically, within the controls listed in the DCP as suitable for justifying a variation to the on-site car parking rates the following controls are relevant to this development as discussed in this statement;

> *(i) the availability of kerb-side parking opportunities in the vicinity of the proposed development* – i.e. none available and the significant impacts an increase in on-street car parking will have on road efficiency, safety and residential amenity.

Based on a DCP car parking requirement of 242 spaces as a justified variation to the Newcastle DCP (2012) parking rates the development by providing 242 car parking spaces provides sufficient and suitable on-site car parking.

Bicycle storage is to be provided in cages provided for each of the units. 17 visitor Class 3 spaces are also to be provided within the landscaped open space and 12 motorcycle spaces are proposed. Therefore, it is considered that the development is fully compliant with the DCP parking

requirements as determined above. Therefore, it is reasonable to conclude sufficient on-site parking is provided within the development.

Physical on-site construction / layout of the car park should comply with Australian Standard *AS2890.1-2004 Parking facilities – Part 1 - Off-street car parking* and Newcastle City Council's DCP (2012). Regarding the Newcastle DCP this document requires the following:

Parking area dimensions and parking layout shall comply with Australian Standard 2890.1-2004:

- *User Class 1A - **Bays at 90 degrees -** off-street parking - 2.4 metres wide and 5.4 metres long parking bays with aisles a minimum of 5.8 metres wide and blind aisle extensions a minimum of 1 metre long.*

It is noted from the development plans that the residential parking spaces and aisle widths comply with the standards and that manoeuvrability through the car park is satisfactory ensuring forward entry and exit from the site. Therefore, a review of the plans indicates the proposed on-site car parking areas appear to comply with the requirements of Australian Standard *AS2890.1-2004 Parking facilities – Part 1 - Off-street car parking* and *AS2890.5-1993 Parking facilities – Part 5 - On-street car parking* and Newcastle Council's DCP (2012).

11.5 Servicing

The development has been designed for on-site collection of waste by private contractor. The collection driver or building manager will wheel the waste bin(s) from the waste storage areas to the collection vehicle parked on the site. Waste collection will be programmed to ensure it is carried out during non-peak traffic generating periods for the development. It is considered that the waste collection arrangements proposed for the development are satisfactory and suitable for the development.

11.6 Pedestrian Facilities

The proposed development will generate additional pedestrian traffic as residents and visitors access the site from nearby residences, on-street car parking, bus stops, and shopping areas. A substantial and suitable concrete footpath network, with crossing facilities, already exists within this area therefore it is concluded that no nexus exists for additional pedestrian facilities because of this development. It is noted that suitable pedestrian linkages are provided within the development to facilitate pedestrian traffic to both Mosbri Crescent and Kitchener Parade with a pedestrian path and stairs through the site linking these streets.

11.7 Alternative Transport Mode Facilities

The proposed development is likely to generate an increase in patronage of the existing public transport system (buses and rail). It is noted however that the site already has excellent access to public transport with suitably frequent bus routes passing the site along Darby Street with connection to other bus routes and the Newcastle and Hunter rail transport system. Existing bus stops are already located adjacent to the development therefore it is concluded that the existing public transport services and infrastructure near the site is suitable for the development. The completion of the construction of the light rail will assist in providing an improved public transport system within the CBD and to the site. It is noted that the existing local road network within Swan Street, Kitchener Parade and Mosbri Crescent is not suitable for bus use and thus an extension of the service to the site is also not feasible. Changes to the existing public transport system or additional infrastructure are therefore not required.

The development may generate some increase in bicycle traffic however bicycle infrastructure already exists in the area and is considered satisfactory for the small increase in demand generated by this development.

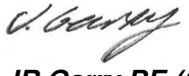
12.0 CONCLUSIONS

This traffic and parking assessment for a multiple dwelling residential development on Lot 1 in DP 204077; 11 – 17 Mosbri Crescent, The Hill has determined the following:

- The proposed development is likely to generate up to a maximum 74 vtph in the AM peak and 53 vtph in the PM peak and 676 vtpd during the weekday peak hour traffic.
- The state and local road network around the site has sufficient spare mid-block two-way capacity (technical and environmental as relevant) to cater for the development without the need for any upgrading of the road network therefore does not adversely impact on the state and local road network.
- The proposed development will not adversely impact on the operation of any local and state road network intersections near the site.
- The proposed vehicular access to the site at Mosbri Crescent is suitable and would appear to comply with *AS2890.1 – 2004 parking facilities – Part 1 Off street car parking.*
- The proposed development represents an excess of car parking against the requirements of Section 7.03 of Newcastle Council's DCP (2012) regarding the supply of on-site car parking. This excess is considered important given the constraints with on-street car parking in the area and the excess parking should be supported as a justified variation to Council's DCP parking rates and therefore not contribute to FSR calculations as well as a responsible response to the existing on-street car parking issues in Mosbri Crescent. Overall the development provides sufficient on-site car parking.
- The proposed on-site car parking layout is suitable and can comply with both Australian Standard *AS2890.1 – 2004 Parking facilities – Part 1 Off street car parking* and *Australian Standard 2890.5 -1993 Part 2 On-street parking* and Newcastle City Council's DCP (2012).
- Suitable bicycle storage areas and motor cycle parking has been provided within the car park area that are compliant with Newcastle City Council's DCP (2012).
- Waste collection arrangements proposed for the development are satisfactory and suitable for the development.
- Suitable public transport services already exist near the site along Darby Street and the local road network is not suitable for the extension of bus services to the site. Therefore, no nexus exists for the provision of additional public transport services or infrastructure are required at present.
- A suitable constructed pedestrian footpath network exists within the local road network near the site and it is not considered that the external pedestrian and bicycle traffic generated by the development would be significant enough as to provide a nexus for the provision of additional external pedestrian and bicycle paths (on or off road) to the site. Therefore, the existing pedestrian and cycle infrastructure near the site are considered satisfactory for the scale of development proposed and the proposed internal pedestrian linkage between Mosbri Crescent and Kitchener Parade through the site will complement the existing pedestrian footpath network.

13.0 RECOMMENDATION

Having carried out this traffic and parking assessment for a multiple dwelling residential development on Lot 1 in DP 204077; 11 – 17 Mosbri Crescent, The Hill, it is recommended that the proposal can be supported from a traffic impact perspective as it will not adversely impact on the state and local road network and complies with the relevant requirements of Newcastle City Council, NSW Roads and Maritime Services and Australian Standards.



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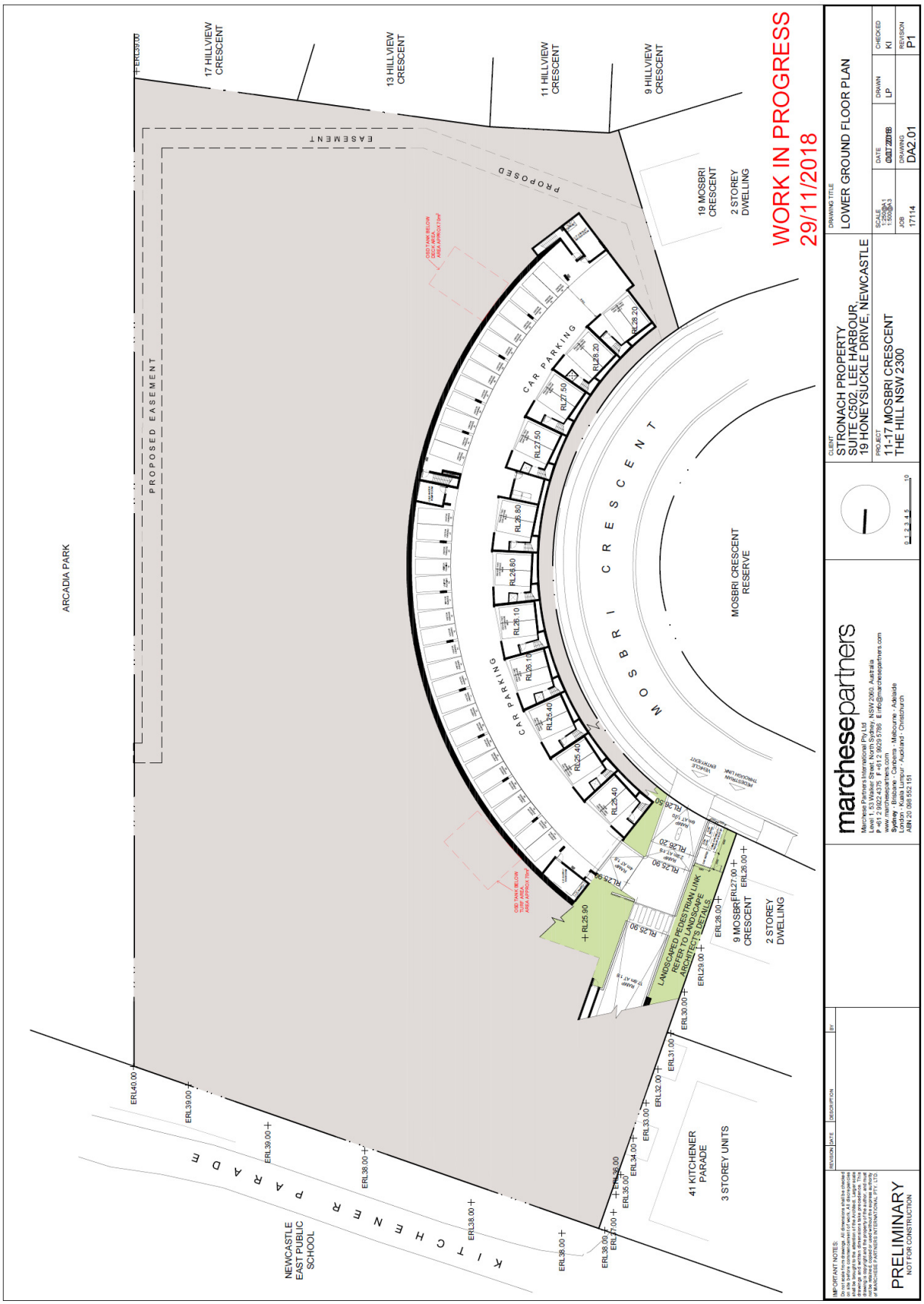
Director
Intersect Traffic Pty Ltd

ATTACHMENT A
DEVELOPMENT PLANS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13 HILLVIEW CRESCENT
11 HILLVIEW CRESCENT
9 HILLVIEW CRESCENT
19 MOSBRI CRESCENT
2 STOREY DWELLING
PROPOSED EASEMENT
EASEMENT
ARCADIA PARK
MOSBRI CRESCENT
MOSBRI CRESCENT RESERVE
CAR PARKING
CAR PARKING
9 MOSBRI CRESCENT
2 STOREY DWELLING
LANDSCAPED PEDESTRIAN LINK REFER TO LANDSCAPE ARCHITECT'S DETAILS
41 KITCHENER PARADE
3 STOREY UNITS
KITCHENER PARADE
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PRELIMINARY
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STRONACH PROPERTY
SUITE C502, LEE HARBOUR,
19 HONEYSUCKLE DRIVE, NEWCASTLE
11-17 MOSBRI CRESCENT
THE HILL NSW 2300
LOWER GROUND FLOOR PLAN
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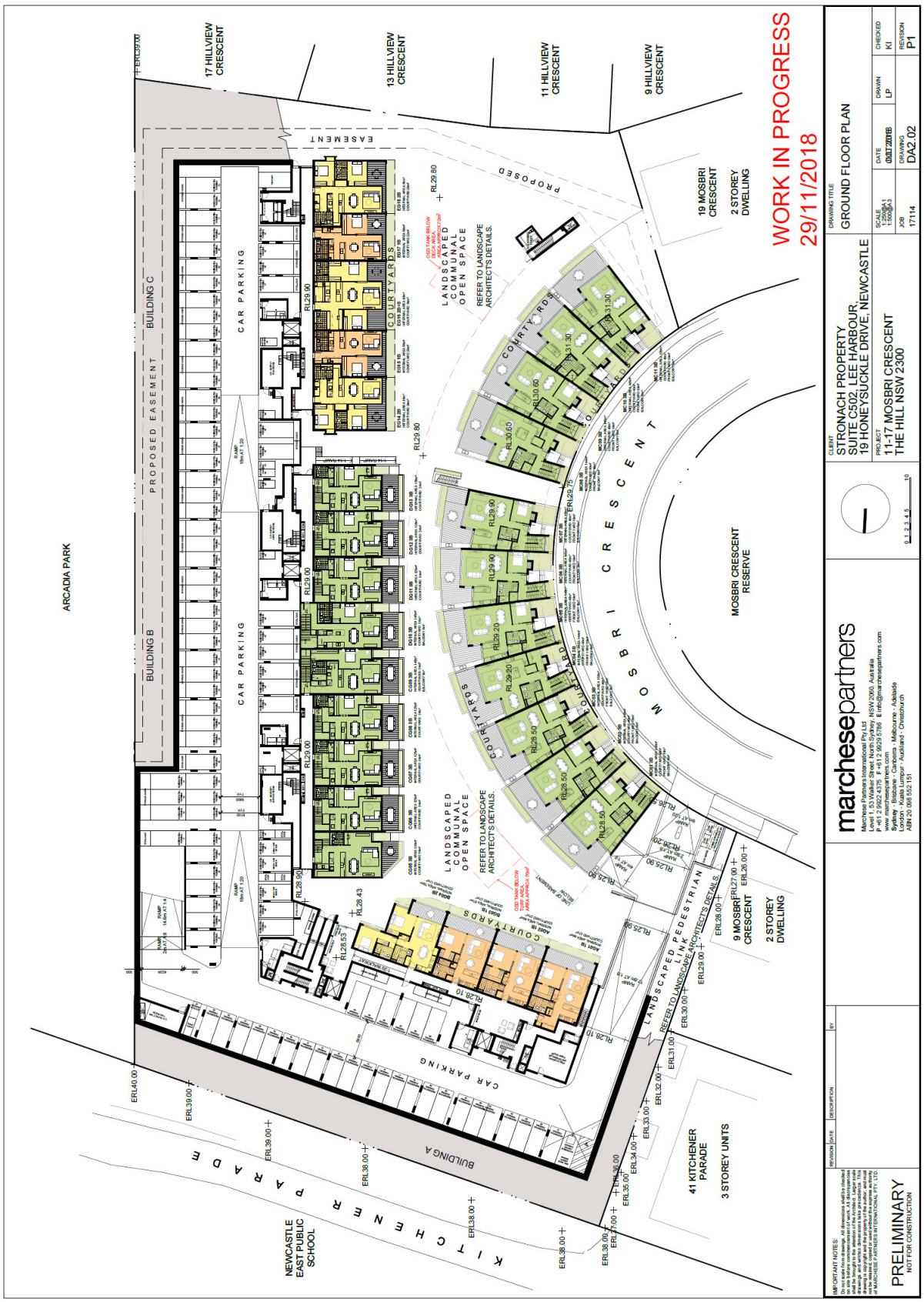
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2 STOREY DWELLING
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CAR PARKING
COURTYARDS
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REFER TO LANDSCAPE ARCHITECTS DETAILS.
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MOSBRI CRESCENT RESERVE
9 MOSBRI CRESCENT
2 STOREY DWELLING
LANDSCAPED PEDESTRIAN LINK
BUILDING A
CAR PARKING
41 KITCHENER PARADE
3 STOREY UNITS
KITCHENER PARADE
NEWCASTLE EAST PUBLIC SCHOOL


WORK IN PROGRESS
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17 HILLVIEW CRESCENT
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9 MOSBRI CRESCENT
2 STOREY DWELLING
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3 STOREY UNITS
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ARCADIA PARK
MOSBRI CRESCENT RESERVE
MOSBRI CRESCENT
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PROPOSED EASEMENT
BUILDING A
BUILDING B
BUILDING C
CAR PARKING
CAR PARKING
CAR PARKING
DRAWING TITLE
LEVEL 1 FLOOR PLAN
CLIENT
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PROJECT
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WORK IN PROGRESS
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11-17 MOSBRI CRESCENT
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MOSBRI CRESCENT RESERVE
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41 KITCHENER PARADE
3 STOREY UNITS
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17 HILLVIEW CRESCENT
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11 HILLVIEW CRESCENT
9 HILLVIEW CRESCENT
19 MOSBRI CRESCENT
2 STOREY DWELLING
ARCADIA PARK
BUILDING C
BUILDING B
BUILDING A
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MOSBRI CRESCENT RESERVE
9 MOSBRI CRESCENT
2 STOREY DWELLING
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NEWCASTLE EAST PUBLIC SCHOOL
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RL38.86
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PROJECT
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DA2.05
REVISION
P1


WORK IN PROGRESS
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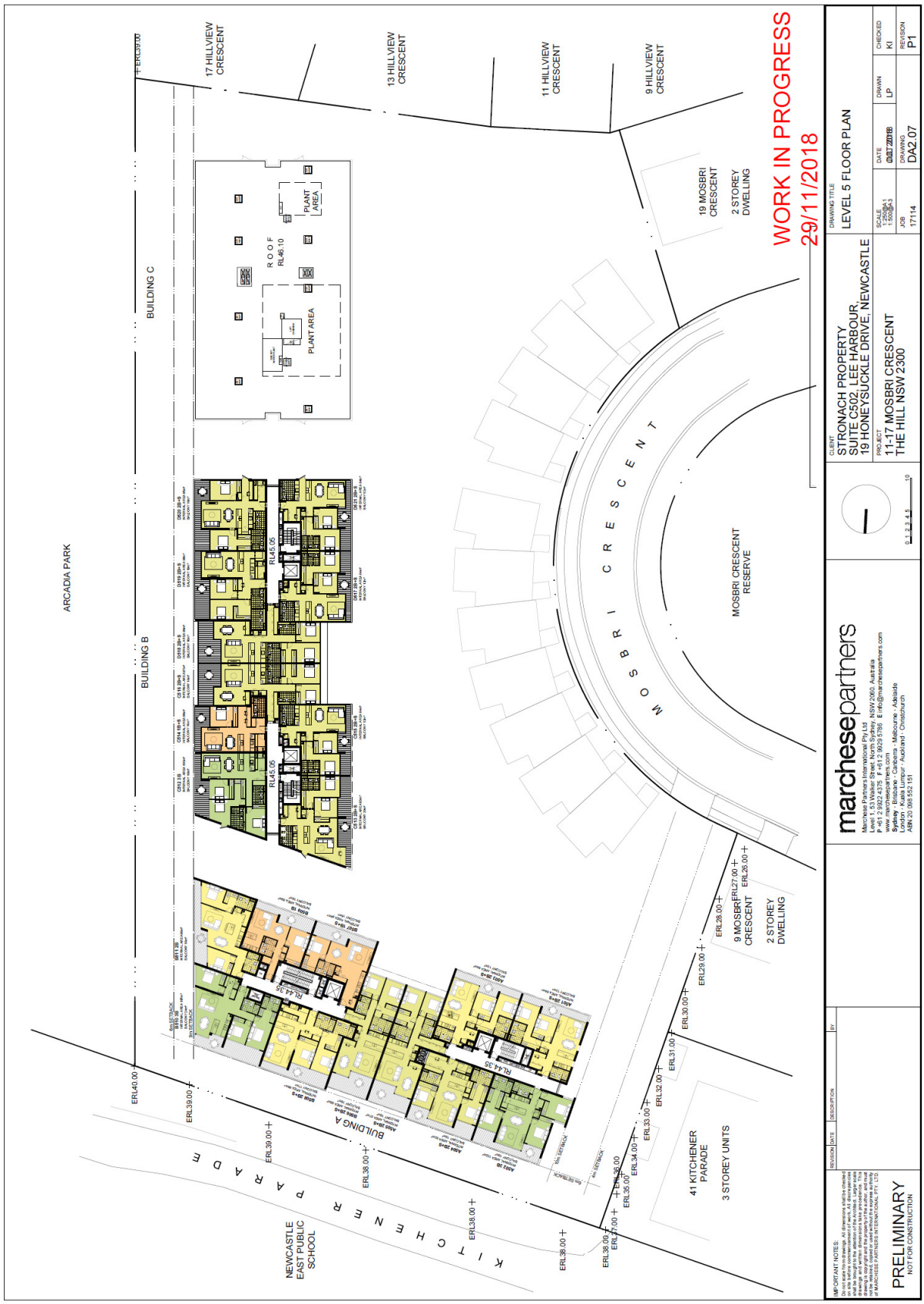
ARCADIA PARK
BUILDING B
BUILDING C
BUILDING A
17 HILLVIEW CRESCENT
13 HILLVIEW CRESCENT
11 HILLVIEW CRESCENT
9 HILLVIEW CRESCENT
19 MOSBRI CRESCENT
2 STOREY DWELLING
MOSBRI CRESCENT
MOSBRI CRESCENT RESERVE
9 MOSBRI CRESCENT
2 STOREY DWELLING
41 KITCHENER PARADE
3 STOREY UNITS
KITCHENER PARADE
NEWCASTLE EAST PUBLIC SCHOOL
RL42.75
RL41.95
RL41.15
RL41.25
RL41.75
marchesepartners
STRONACH PROPERTY
SUITE C502, LEE HARBOUR,
19 HONEYSUCKLE DRIVE, NEWCASTLE
11-17 MOSBRI CRESCENT
THE HILL NSW 2300
LEVEL 4 FLOOR PLAN
DA2.06
P1
PRELIMINARY
NOT FOR CONSTRUCTION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29/11/2018
17 HILLVIEW CRESCENT
13 HILLVIEW CRESCENT
11 HILLVIEW CRESCENT
9 HILLVIEW CRESCENT
19 MOSBRI CRESCENT
2 STOREY DWELLING
BUILDING C
BUILDING B
BUILDING A
ROOF RL46.10
PLANT AREA
PLANT AREA
RL45.05
RL45.05
RL44.35
RL44.35
ARCADIA PARK
MOSBRI CRESCENT
MOSBRI CRESCENT RESERVE
9 MOSBRI CRESCENT
2 STOREY DWELLING
41 KITCHENER PARADE
3 STOREY UNITS
KITCHENER PARADE
NEWCASTLE EAST PUBLIC SCHOOL
ERL40.00
ERL39.00
ERL39.00
ERL38.00
ERL38.00
ERL38.00
ERL37.00
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ERL34.00
ERL33.00
ERL32.00
ERL31.00
ERL30.00
ERL29.00
ERL28.00
ERL27.00
ERL26.00
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CLIENT
STRONACH PROPERTY
SUITE C502, LEE HARBOUR,
19 HONEYSUCKLE DRIVE, NEWCASTLE
PROJECT
11-17 MOSBRI CRESCENT
THE HILL NSW 2300
DRAWING TITLE
LEVEL 5 FLOOR PLAN
SCALE
1:200@A1
1:400@A3
DATE
DRAWN
LP
CHECKED
KI
JOB
17114
DRAWING
DA2.07
REVISION
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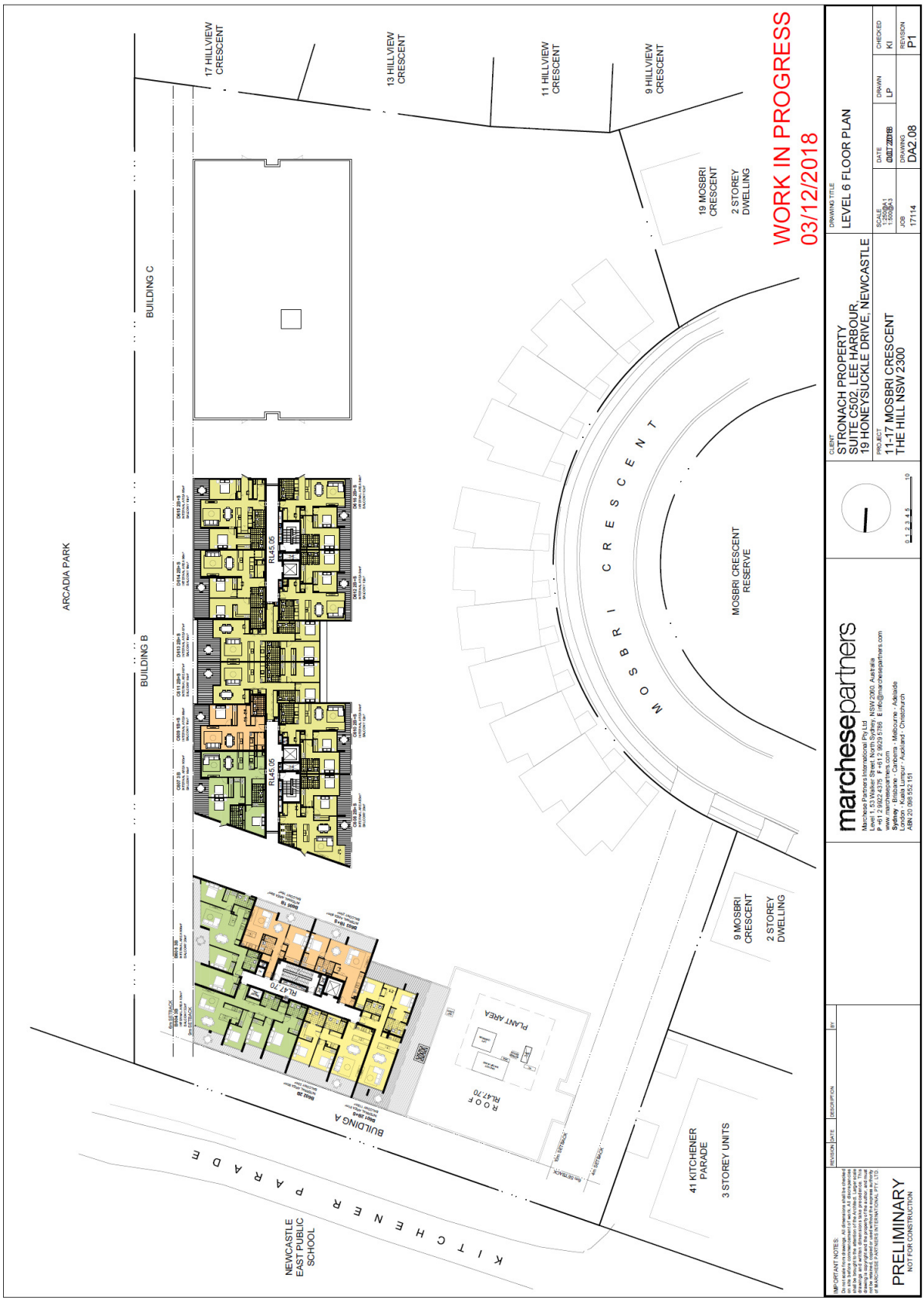
NOT FOR CONSTRUCTION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03/12/2018
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11 HILLVIEW CRESCENT
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2 STOREY DWELLING
ARCADIA PARK
BUILDING C
BUILDING B
BUILDING A
MOSBRI CRESCENT
MOSBRI CRESCENT RESERVE
PLANT AREA
ROOF RL47.70
RL45.05
RL45.05
RL47.70
9 MOSBRI CRESCENT
2 STOREY DWELLING
41 KITCHENER PARADE
3 STOREY UNITS
KITCHENER PARADE
NEWCASTLE EAST PUBLIC SCHOOL
CLIENT
STRONACH PROPERTY
SUITE C502, LEE HARBOUR,
19 HONEYSUCKLE DRIVE, NEWCASTLE
PROJECT
11-17 MOSBRI CRESCENT
THE HILL NSW 2300
DRAWING TITLE
LEVEL 6 FLOOR PLAN
SCALE
DATE
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CHECKED
JOB
17114
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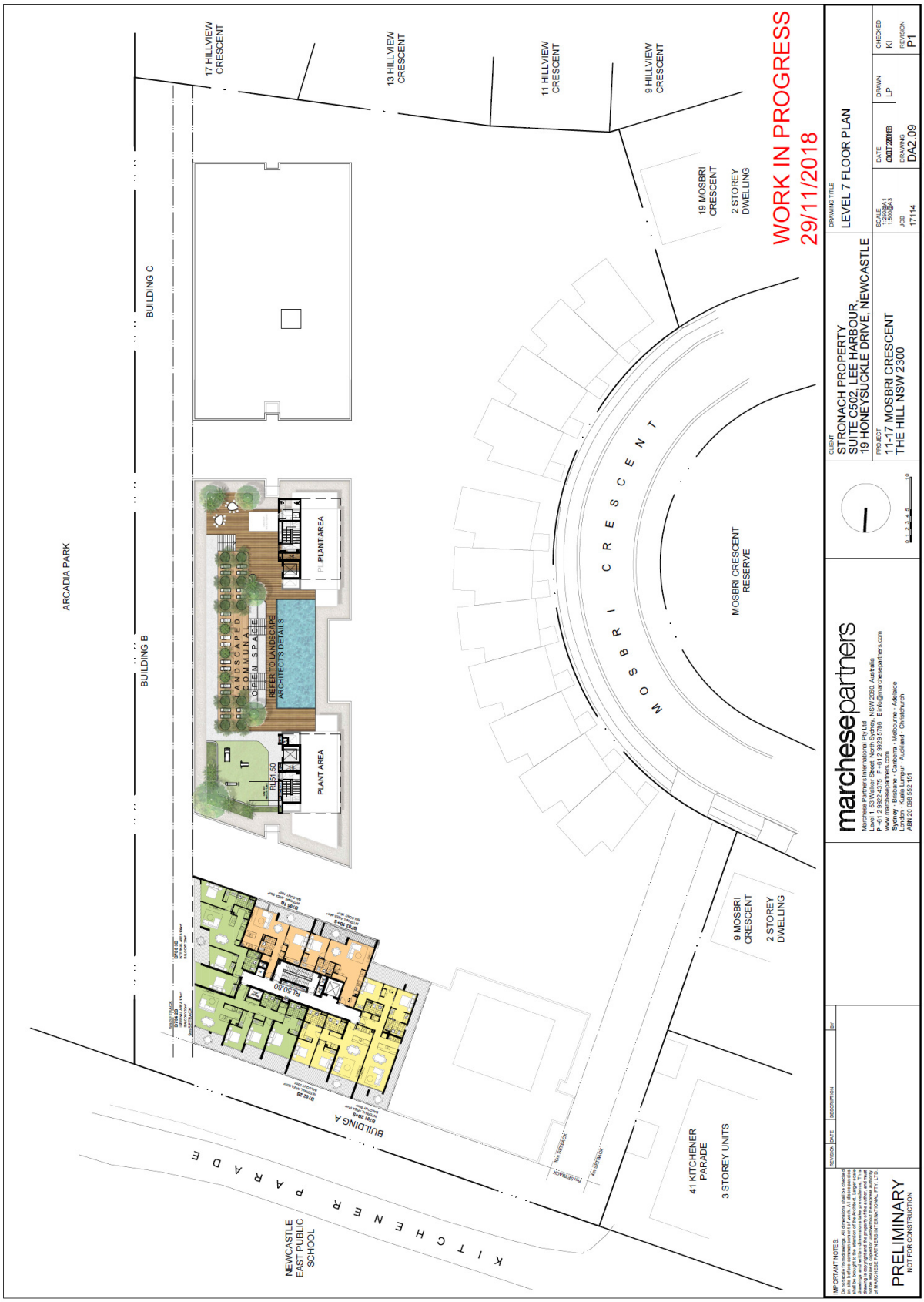
DA2.08
REVISION
P1
marchesepartners
PRELIMINARY
NOT FOR CONSTRUCTION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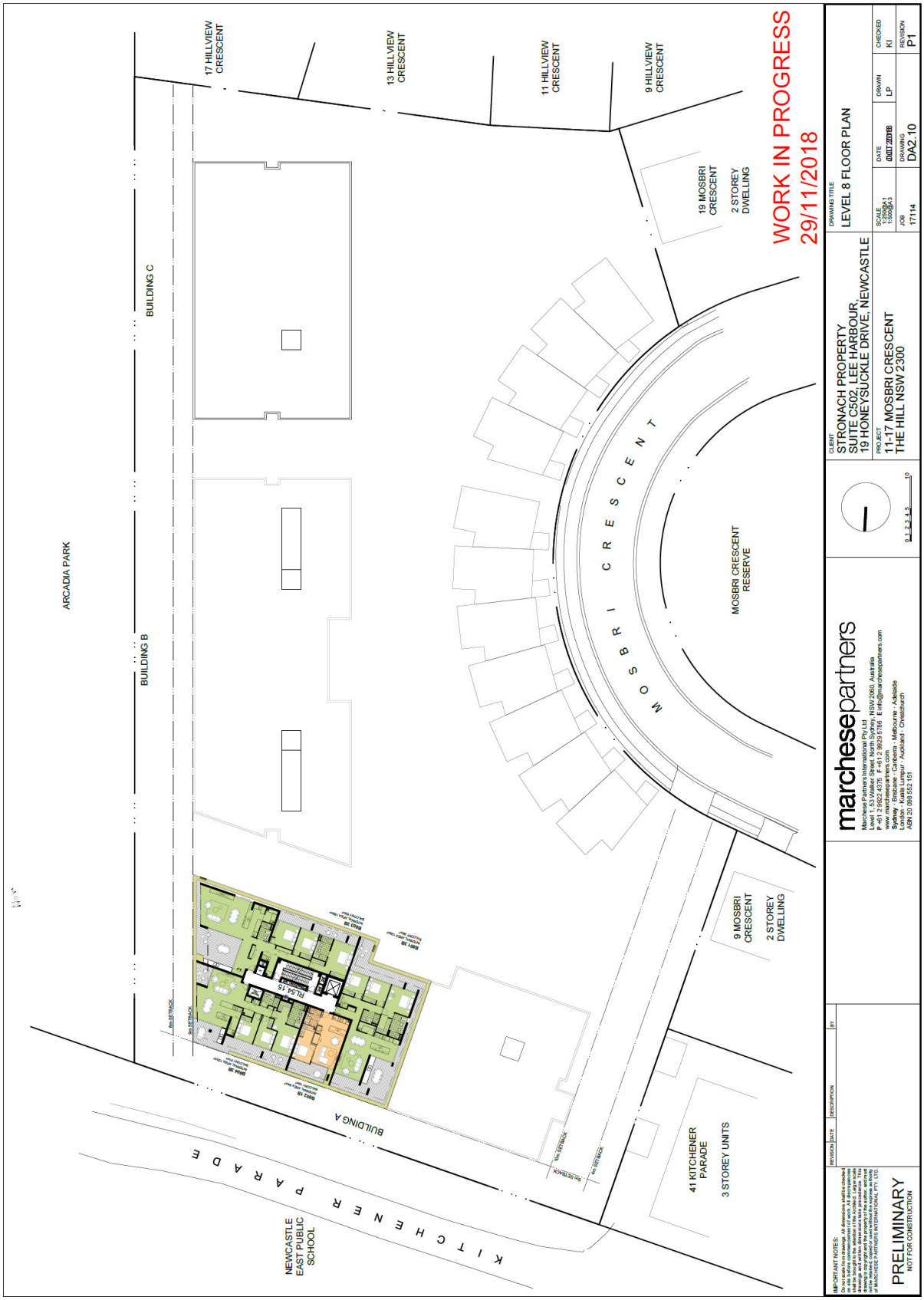
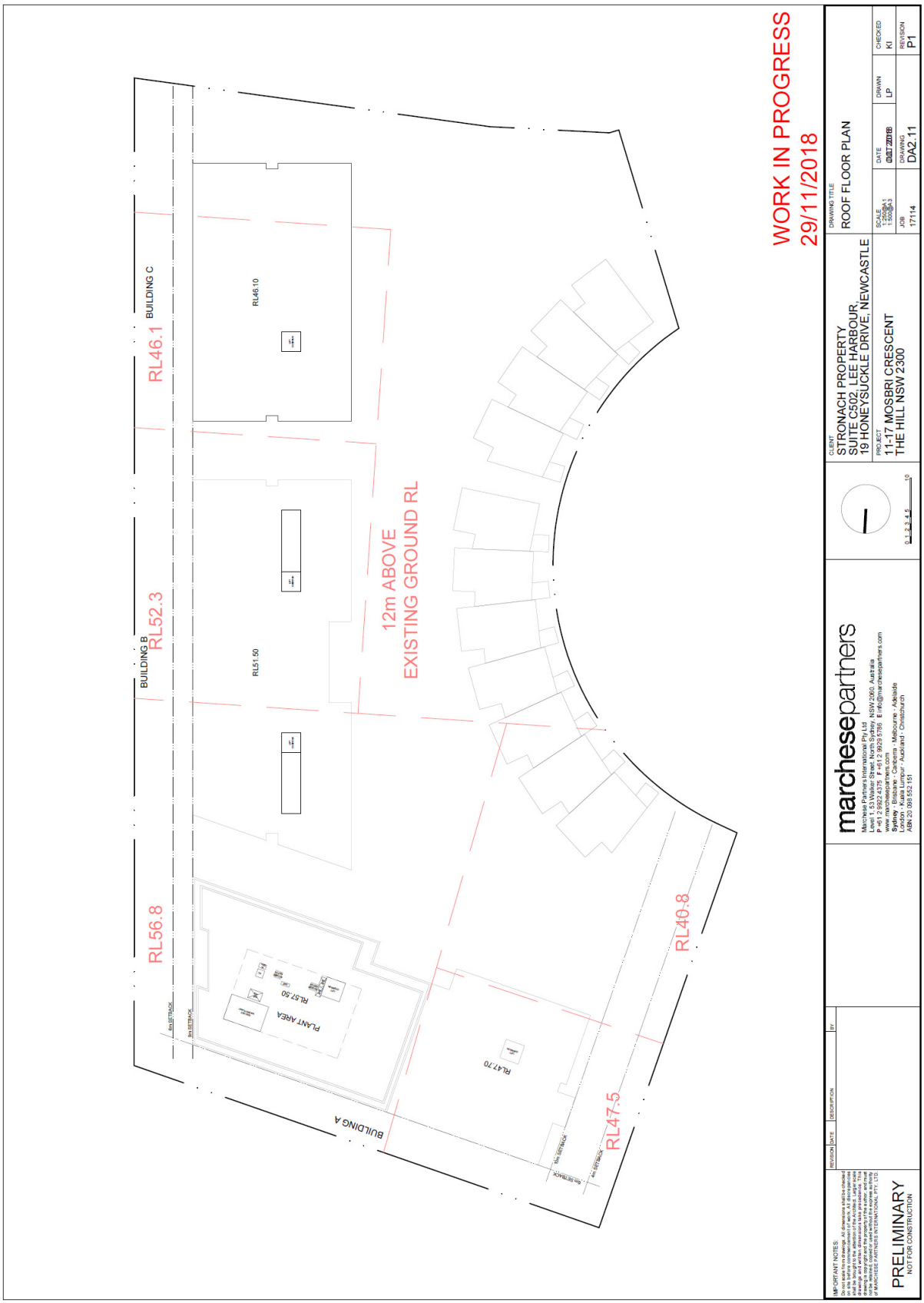
29/11/2018
17 HILLVIEW CRESCENT
13 HILLVIEW CRESCENT
11 HILLVIEW CRESCENT
9 HILLVIEW CRESCENT
19 MOSBRI CRESCENT
2 STOREY DWELLING
BUILDING C
BUILDING B
BUILDING A
ARCADIA PARK
LANDSCAPED COMMUNAL OPEN S.P.A.C.E.
REFER TO LANDSCAPE ARCHITECT'S DETAILS.
PLANT AREA
PLANT AREA
RL51.50
RL50.80
MOSBRI CRESCENT
MOSBRI CRESCENT RESERVE
9 MOSBRI CRESCENT
2 STOREY DWELLING
41 KITCHENER PARADE
3 STOREY UNITS
KITCHENER PARADE
NEWCASTLE EAST PUBLIC SCHOOL
marchesepartners
CLIENT
STRONACH PROPERTY
SUITE C502, LEE HARBOUR,
19 HONEYSUCKLE DRIVE, NEWCASTLE
PROJECT
11-17 MOSBRI CRESCENT
THE HILL NSW 2300
DRAWING TITLE
LEVEL 7 FLOOR PLAN
SCALE
1:500@A1
1:1000@A3
DATE
DRAWN
LP
CHECKED
KI
JOB
17114
DRAWING
DA2.09
REVISION
P1
PRELIMINARY
NOT FOR CONSTRUCTION


WORK IN PROGRESS
29/11/2018
17 HILLVIEW CRESCENT
13 HILLVIEW CRESCENT
11 HILLVIEW CRESCENT
9 HILLVIEW CRESCENT
19 MOSBRI CRESCENT
2 STOREY DWELLING
ARCADIA PARK
BUILDING C
BUILDING B
MOSBRI CRESCENT
MOSBRI CRESCENT RESERVE
9 MOSBRI CRESCENT
2 STOREY DWELLING
41 KITCHENER PARADE
3 STOREY UNITS
BUILDING A
KITCHENER PARADE
NEWCASTLE EAST PUBLIC SCHOOL
PRELIMINARY
NOT FOR CONSTRUCTION
marchesepartners
CLIENT
STRONACH PROPERTY
SUITE C502, LEE HARBOUR,
19 HONEYSUCKLE DRIVE, NEWCASTLE
PROJECT
11-17 MOSBRI CRESCENT
THE HILL NSW 2300
DRAWING TITLE
LEVEL 8 FLOOR PLAN
SCALE
1:200@A1
1:400@A3
DATE
DRAWN
LP
CHECKED
KI
JOB
17114
DRAWING
DA2.10
REVISION
P1


WORK IN PROGRESS
29/11/2018
BUILDING C
RL46.1
RL46.10
BUILDING B
RL52.3
RL51.50
RL56.8
12m ABOVE
EXISTING GROUND RL
PLANT AREA
RL57.50
RL47.70
RL40.8
RL47.5
BUILDING A
marchesepartners
CLIENT
STRONACH PROPERTY
SUITE C502, LEE HARBOUR,
19 HONEYSUCKLE DRIVE, NEWCASTLE
PROJECT
11-17 MOSBRI CRESCENT
THE HILL NSW 2300
DRAWING TITLE
ROOF FLOOR PLAN
SCALE
1:250@A1
1:500@A3
DATE
DRAWN
LP
CHECKED
KI
JOB
17114
DRAWING
DA2.11
REVISION
P1
PRELIMINARY
NOT FOR CONSTRUCTION

ATTACHMENT B
TRAFFIC COUNT DATA

Intersect Traffic
PO Box 268
East Maitland, Nsw, 2323
0423324188

Turn Count Summary

Location: Darby Street at Queen Street , Cooks Hill
GPS Coordinates: Lat=-32.930029, Lon=151.773449
Date: 2018-07-26
Day of week: Thursday
Weather: Sunny
Analyst: Peter

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
08:00	15	59	2	7	0	27	12	93	12	3	1	3	234
08:15	22	65	2	4	1	23	1	138	14	1	1	1	273
08:30	21	59	4	1	0	27	7	93	9	4	0	2	227
08:45	14	51	2	8	0	25	7	89	17	4	0	1	218
09:00	0	0	0	0	0	0	0	2	0	0	0	0	2

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
08:00	15	59	2	7	0	27	12	93	12	3	1	3	234
08:15	22	65	2	4	1	23	1	136	14	1	1	1	271
08:30	21	56	4	1	0	27	7	92	9	4	0	2	223
08:45	14	48	2	8	0	25	7	89	15	4	0	1	213
09:00	0	0	0	0	0	0	0	2	0	0	0	0	2

Heavy traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	2	0	0	0	0	2
08:30	0	3	0	0	0	0	0	1	0	0	0	0	4
08:45	0	3	0	0	0	0	0	0	2	0	0	0	5
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

08:00 - 09:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	72	234	10	20	1	102	27	413	52	12	2	7	952
Factor	0.82	0.90	0.62	0.62	0.25	0.94	0.56	0.75	0.76	0.75	0.50	0.58	0.87
Approach Factor	0.89			0.90			0.80			0.75			

Peak Hour Vehicle Summary

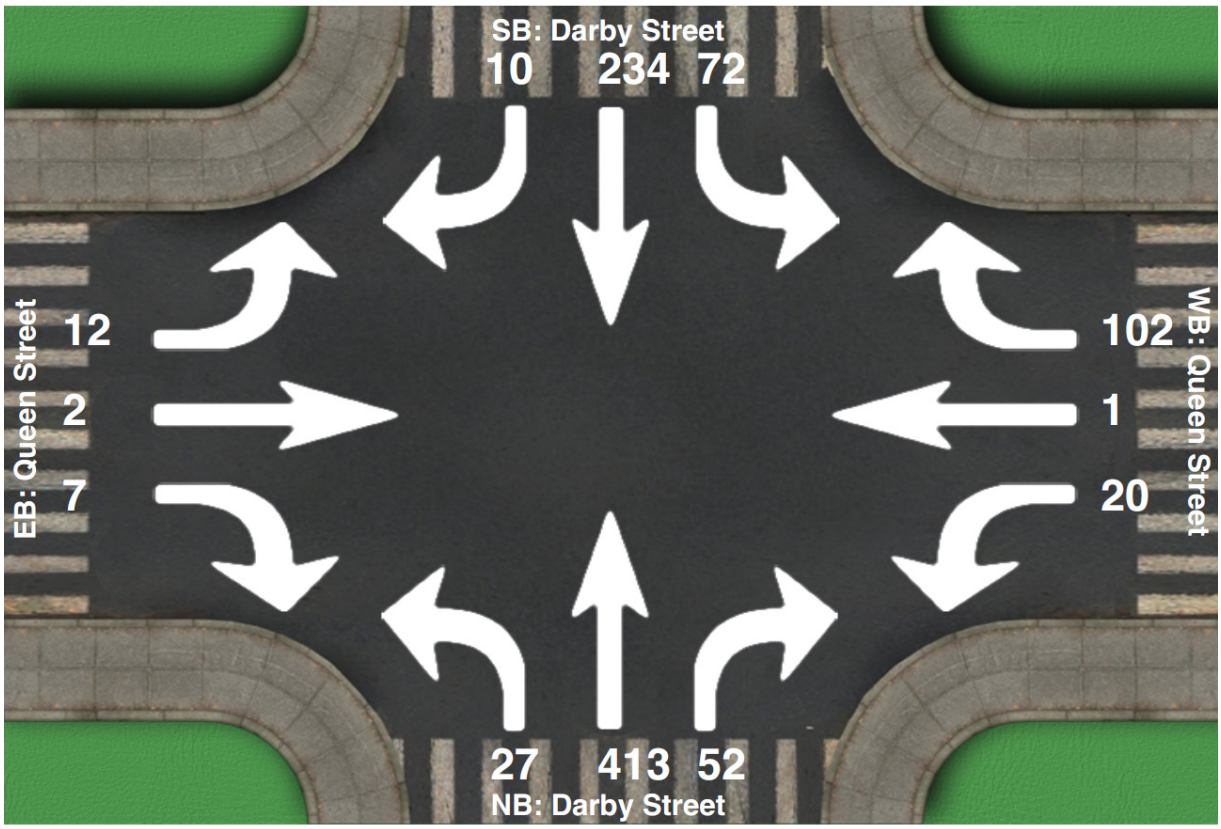
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	72	228	10	20	1	102	27	410	50	12	2	7	941
Heavy	0	6	0	0	0	0	0	3	2	0	0	0	11

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Darby Street at Queen Street , Cooks Hill
GPS Coordinates: Lat=-32.930029, Lon=151.773449
Date: 2018-07-26
Day of week: Thursday
Weather: Sunny
Analyst: Peter



Intersection Peak Hour

08:00 - 09:00

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	72	234	10	20	1	102	27	413	52	12	2	7	952
Factor	0.82	0.90	0.62	0.62	0.25	0.94	0.56	0.75	0.76	0.75	0.50	0.58	0.87
Approach Factor	0.89			0.90			0.80			0.75			

Intersect Traffic
PO Box 268
East Maitland, Nsw, 2323
0423324188

Turn Count Summary

Location: Darby Street at Queen Street, Cooks Hill
GPS Coordinates: Lat=-32.925224, Lon=151.759455
Date: 2018-07-26
Day of week: Thursday
Weather: Sunny
Analyst: Peter

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:15	10	75	0	5	1	24	2	77	10	7	0	5	216
16:30	19	82	1	3	1	26	4	76	5	9	0	8	234
16:45	26	90	1	4	2	28	4	74	16	2	1	2	250
17:00	19	108	1	6	0	28	4	63	8	8	1	8	254
17:15	24	92	4	16	0	38	8	56	7	4	0	7	256
17:30	0	0	0	0	0	0	0	0	1	0	0	0	1

Car traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:15	10	73	0	5	1	24	2	75	10	7	0	5	212
16:30	19	81	1	3	1	26	4	75	5	9	0	8	232
16:45	26	89	1	4	2	27	4	74	16	2	1	2	248
17:00	19	107	1	6	0	28	4	61	8	8	1	8	251
17:15	24	92	4	16	0	38	8	55	7	4	0	7	255
17:30	0	0	0	0	0	0	0	0	1	0	0	0	1

Heavy traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:15	0	2	0	0	0	0	0	2	0	0	0	0	4
16:30	0	1	0	0	0	0	0	1	0	0	0	0	2
16:45	0	1	0	0	0	1	0	0	0	0	0	0	2
17:00	0	1	0	0	0	0	0	2	0	0	0	0	3
17:15	0	0	0	0	0	0	0	1	0	0	0	0	1
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

16:30 - 17:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	88	372	7	29	3	120	20	269	36	23	2	25	994
Factor	0.85	0.86	0.44	0.45	0.38	0.79	0.62	0.88	0.56	0.64	0.50	0.78	0.97
Approach Factor	0.91			0.70			0.86			0.74			

Peak Hour Vehicle Summary

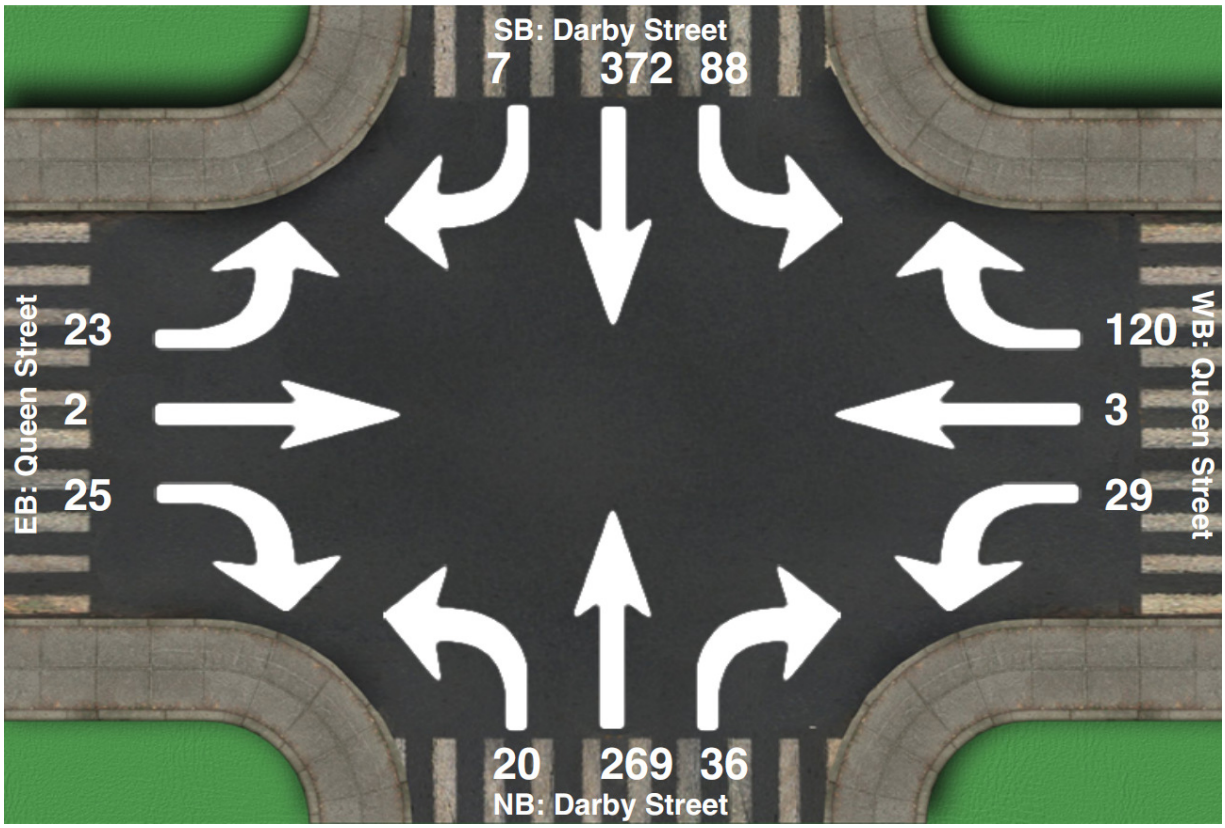
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	88	369	7	29	3	119	20	265	36	23	2	25	986
Heavy	0	3	0	0	0	1	0	4	0	0	0	0	8

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Darby Street at Queen Street, Cooks Hill
GPS Coordinates: Lat=-32.925224, Lon=151.759455
Date: 2018-07-26
Day of week: Thursday
Weather: Sunny
Analyst: Peter



Intersect Traffic
PO Box 268
East Maitland, Nsw, 2323
0423324188

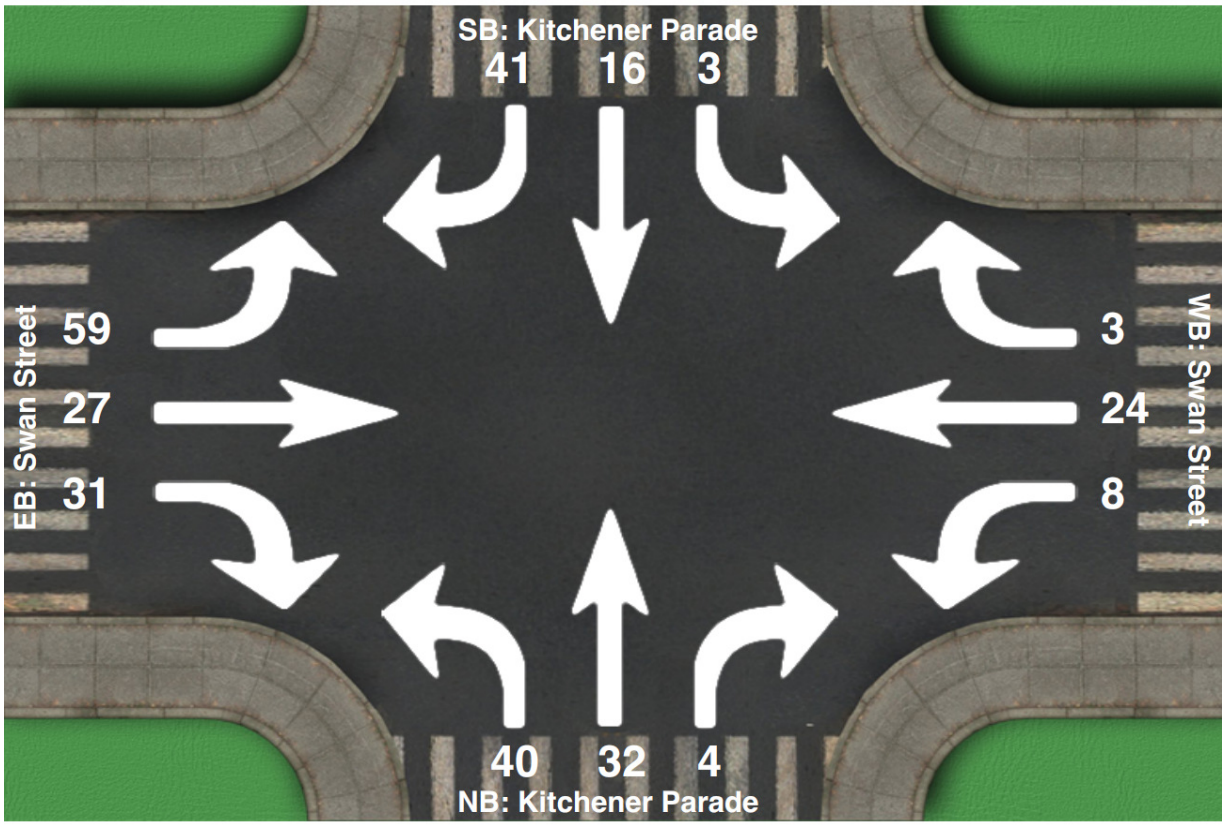
Location: Kitchener Parade at Swan Street , The Hill
GPS Coordinates: Lat=-32.930785, Lon=151.775562
Date: 2018-09-24
Day of week: Monday
Weather: Cloudy
Analyst: Peter

Intersection Peak Hour

08:00 - 09:00

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
08:00	1	5	10	1	8	1	7	6	0	12	6	12	69
08:15	1	2	7	2	7	1	9	7	0	18	3	7	64
08:30	1	7	10	3	4	0	11	13	1	17	8	7	82
08:45	0	2	14	2	5	1	13	6	3	12	10	5	73

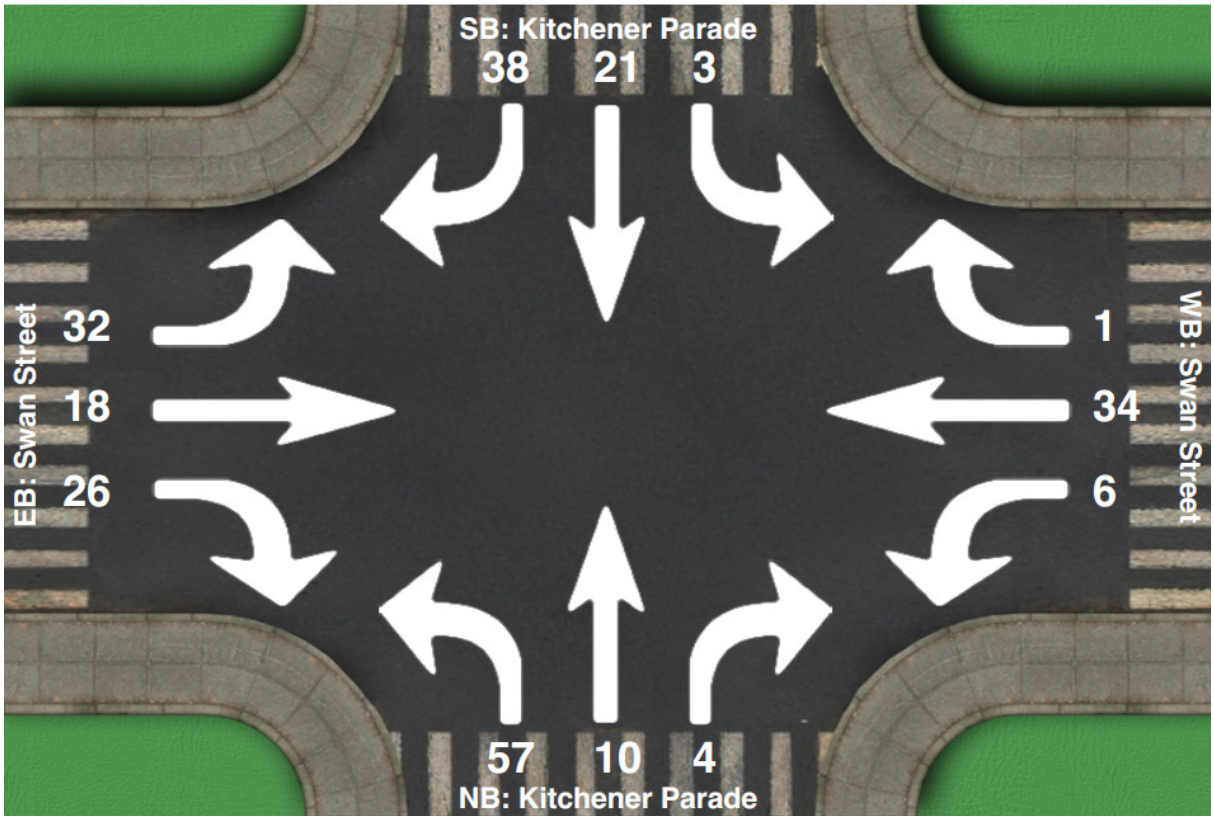


Intersection Peak Hour

16:30 - 17:30

Total vehicle traffic

Interval starts	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:30	0	5	6	1	12	0	12	5	2	7	4	6	60
16:45	1	3	5	2	4	0	10	1	0	10	7	1	44
17:00	0	10	13	1	13	1	10	3	1	8	4	9	73
17:15	2	3	14	2	5	0	25	1	1	7	3	10	73



ATTACHMENT C
SIDRA SUMMARY TABLES

MOVEMENT SUMMARY

Site: 101 [2018AM + dev]

Darby Street / Queen Street Signalised intersection
Mosbri Street Development

Signals - Fixed Time Isolated Cycle Time = 27 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Darby Street											
1	L2	28	0.0	0.165	10.6	LOS A	1.0	7.3	0.74	0.61	31.9
2	T1	442	0.7	0.827	13.1	LOS A	6.9	48.7	0.91	1.02	30.3
3	R2	64	3.3	0.827	17.8	LOS B	6.9	48.7	0.95	1.11	32.9
Approach		535	1.0	0.827	13.5	LOS A	6.9	48.7	0.91	1.01	30.8
East: Queen Street											
4	L2	40	0.0	0.097	13.0	LOS A	0.4	3.1	0.82	0.68	33.8
5	T1	1	0.0	0.371	10.4	LOS A	2.0	13.8	0.89	0.76	31.7
6	R2	161	0.0	0.371	13.9	LOS A	2.0	13.8	0.89	0.76	33.0
Approach		202	0.0	0.371	13.7	LOS A	2.0	13.8	0.88	0.74	33.1
North: Darby Street											
7	L2	93	0.0	0.150	10.6	LOS A	0.9	6.3	0.73	0.69	34.6
8	T1	254	2.5	0.433	8.1	LOS A	2.9	20.8	0.82	0.68	33.5
9	R2	11	0.0	0.433	11.6	LOS A	2.9	20.8	0.82	0.68	30.6
Approach		357	1.8	0.433	8.8	LOS A	2.9	20.8	0.80	0.68	33.8
West: Queen Street											
10	L2	13	0.0	0.031	12.8	LOS A	0.1	1.0	0.81	0.64	27.4
11	T1	2	0.0	0.024	9.3	LOS A	0.1	0.7	0.80	0.61	32.6
12	R2	7	0.0	0.024	12.8	LOS A	0.1	0.7	0.80	0.61	28.6
Approach		22	0.0	0.031	12.5	LOS A	0.1	1.0	0.80	0.63	28.6
All Vehicles		1116	1.0	0.827	12.0	LOS A	6.9	48.7	0.86	0.85	32.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	8.2	LOS A	0.0	0.0	0.78	0.78
P2	East Full Crossing	53	8.2	LOS A	0.0	0.0	0.78	0.78
P3	North Full Crossing	53	8.2	LOS A	0.0	0.0	0.78	0.78
P4	West Full Crossing	53	8.2	LOS A	0.0	0.0	0.78	0.78
All Pedestrians		211	8.2	LOS A			0.78	0.78

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

MOVEMENT SUMMARY

Site: 101 [2018PM + dev]

Darby Street / Queen Street Signalised intersection
Mosbri Street Development

Signals - Fixed Time Isolated Cycle Time = 25 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Darby Street											
1	L2	23	0.0	0.132	11.1	LOS A	0.7	4.9	0.78	0.62	31.3
2	T1	283	1.5	0.661	10.4	LOS A	3.7	26.0	0.92	0.84	31.7
3	R2	52	0.0	0.661	14.4	LOS A	3.7	26.0	0.95	0.88	34.2
Approach		358	1.2	0.661	11.1	LOS A	3.7	26.0	0.92	0.83	32.2
East: Queen Street											
4	L2	36	0.0	0.080	11.9	LOS A	0.4	2.5	0.80	0.67	34.3
5	T1	3	0.0	0.318	9.2	LOS A	1.6	11.3	0.86	0.74	32.3
6	R2	143	0.7	0.318	12.6	LOS A	1.6	11.3	0.86	0.74	33.5
Approach		182	0.6	0.318	12.4	LOS A	1.6	11.3	0.85	0.73	33.7
North: Darby Street											
7	L2	137	0.0	0.263	11.5	LOS A	1.4	9.8	0.81	0.73	34.1
8	T1	392	0.8	0.749	11.6	LOS A	5.4	38.1	0.96	0.98	31.4
9	R2	7	0.0	0.749	15.0	LOS B	5.4	38.1	0.96	0.98	27.9
Approach		536	0.6	0.749	11.6	LOS A	5.4	38.1	0.93	0.92	32.3
West: Queen Street											
10	L2	24	0.0	0.054	11.8	LOS A	0.2	1.7	0.80	0.66	28.1
11	T1	2	0.0	0.064	8.4	LOS A	0.3	2.0	0.80	0.66	32.8
12	R2	26	0.0	0.064	11.9	LOS A	0.3	2.0	0.80	0.66	28.9
Approach		53	0.0	0.064	11.7	LOS A	0.3	2.0	0.80	0.66	28.8
All Vehicles		1128	0.7	0.749	11.6	LOS A	5.4	38.1	0.90	0.85	32.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	7.2	LOS A	0.0	0.0	0.76	0.76
P2	East Full Crossing	53	7.2	LOS A	0.0	0.0	0.76	0.76
P3	North Full Crossing	53	7.2	LOS A	0.0	0.0	0.76	0.76
P4	West Full Crossing	53	7.2	LOS A	0.0	0.0	0.76	0.76
All Pedestrians		211	7.2	LOS A			0.76	0.76

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

MOVEMENT SUMMARY

Site: 101 [2028AM + dev]

Darby Street / Queen Street Signalised intersection
Mosbri Street Development

Signals - Fixed Time Isolated Cycle Time = 30 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Darby Street											
1	L2	34	0.0	0.170	9.9	LOS A	1.3	9.0	0.68	0.58	32.5
2	T1	529	0.6	0.850	14.3	LOS A	9.2	65.2	0.87	1.04	29.7
3	R2	75	2.8	0.850	19.5	LOS B	9.2	65.2	0.92	1.14	32.2
Approach		638	0.8	0.850	14.6	LOS B	9.2	65.2	0.87	1.02	30.2
East: Queen Street											
4	L2	44	0.0	0.119	14.8	LOS B	0.6	4.0	0.85	0.69	33.1
5	T1	1	0.0	0.469	12.4	LOS A	2.6	18.1	0.93	0.78	30.8
6	R2	182	0.0	0.469	15.9	LOS B	2.6	18.1	0.93	0.78	32.1
Approach		227	0.0	0.469	15.7	LOS B	2.6	18.1	0.91	0.76	32.3
North: Darby Street											
7	L2	107	0.0	0.145	9.8	LOS A	1.0	7.3	0.67	0.68	34.9
8	T1	303	2.1	0.435	7.4	LOS A	3.5	25.2	0.77	0.65	34.0
9	R2	13	0.0	0.435	10.9	LOS A	3.5	25.2	0.77	0.65	31.2
Approach		423	1.5	0.435	8.1	LOS A	3.5	25.2	0.74	0.66	34.2
West: Queen Street											
10	L2	15	0.0	0.040	14.4	LOS A	0.2	1.3	0.83	0.65	26.3
11	T1	2	0.0	0.030	11.0	LOS A	0.1	0.9	0.83	0.63	31.7
12	R2	8	0.0	0.030	14.5	LOS A	0.1	0.9	0.83	0.63	27.5
Approach		25	0.0	0.040	14.2	LOS A	0.2	1.3	0.83	0.64	27.4
All Vehicles		1314	0.9	0.850	12.7	LOS A	9.2	65.2	0.83	0.85	31.8

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80
P2	East Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80
P3	North Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80
P4	West Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80
All Pedestrians		211	9.6	LOS A			0.80	0.80

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

MOVEMENT SUMMARY

Site: 101 [2028PM + dev]

Darby Street / Queen Street Signalised intersection
Mosbri Street Development

Signals - Fixed Time Isolated Cycle Time = 27 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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: Darby Street											
1	L2	25	0.0	0.139	10.5	LOS A	0.9	6.1	0.73	0.60	31.9
2	T1	342	1.2	0.695	10.3	LOS A	4.6	32.2	0.89	0.84	31.8
3	R2	57	0.0	0.695	14.5	LOS A	4.6	32.2	0.92	0.90	34.2
Approach		424	1.0	0.695	10.9	LOS A	4.6	32.2	0.88	0.84	32.3
East: Queen Street											
4	L2	42	0.0	0.102	13.1	LOS A	0.5	3.3	0.83	0.68	33.8
5	T1	4	0.0	0.412	10.6	LOS A	2.1	15.1	0.90	0.76	31.6
6	R2	169	0.6	0.412	14.1	LOS A	2.1	15.1	0.90	0.76	32.9
Approach		216	0.5	0.412	13.8	LOS A	2.1	15.1	0.88	0.75	33.1
North: Darby Street											
7	L2	145	0.0	0.235	10.9	LOS A	1.5	10.3	0.76	0.71	34.5
8	T1	473	0.7	0.759	11.5	LOS A	6.9	48.6	0.95	0.98	31.4
9	R2	8	0.0	0.759	15.0	LOS B	6.9	48.6	0.95	0.98	27.9
Approach		626	0.5	0.759	11.4	LOS A	6.9	48.6	0.90	0.92	32.3
West: Queen Street											
10	L2	29	0.0	0.071	13.0	LOS A	0.3	2.3	0.82	0.67	27.3
11	T1	2	0.0	0.082	9.6	LOS A	0.4	2.6	0.82	0.67	32.2
12	R2	32	0.0	0.082	13.1	LOS A	0.4	2.6	0.82	0.67	28.1
Approach		63	0.0	0.082	12.9	LOS A	0.4	2.6	0.82	0.67	28.0
All Vehicles		1329	0.6	0.759	11.7	LOS A	6.9	48.6	0.89	0.85	32.3

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	8.2	LOS A	0.0	0.0	0.78	0.78
P2	East Full Crossing	53	8.2	LOS A	0.0	0.0	0.78	0.78
P3	North Full Crossing	53	8.2	LOS A	0.0	0.0	0.78	0.78
P4	West Full Crossing	53	8.2	LOS A	0.0	0.0	0.78	0.78
All Pedestrians		211	8.2	LOS A			0.78	0.78

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

MOVEMENT SUMMARY

Site: 101 [2018AM + DEV]

Mosbri Crescent Residential Development
Swan Street / Kitchener Parade Stop sign 4 way cross intersection

Stop (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kitchener Parade											
1	L2	42	2.0	0.072	8.2	LOS A	0.3	2.0	0.13	0.96	51.6
2	T1	34	2.0	0.072	8.7	LOS A	0.3	2.0	0.13	0.96	51.4
3	R2	6	2.0	0.072	8.4	LOS A	0.3	2.0	0.13	0.96	51.1
Approach		82	2.0	0.072	8.4	LOS A	0.3	2.0	0.13	0.96	51.5
East: Swan Street											
4	L2	15	2.0	0.030	5.6	LOS A	0.0	0.2	0.04	0.19	56.5
5	T1	38	2.0	0.030	0.0	LOS A	0.0	0.2	0.04	0.19	58.2
6	R2	3	2.0	0.030	5.8	LOS A	0.0	0.2	0.04	0.19	55.9
Approach		56	2.0	0.030	1.8	NA	0.0	0.2	0.04	0.19	57.6
North: Kitchener Parade											
7	L2	3	2.0	0.081	8.2	LOS A	0.3	2.0	0.27	0.92	51.5
8	T1	17	2.0	0.081	8.6	LOS A	0.3	2.0	0.27	0.92	51.3
9	R2	49	2.0	0.081	8.9	LOS A	0.3	2.0	0.27	0.92	51.0
Approach		69	2.0	0.081	8.8	LOS A	0.3	2.0	0.27	0.92	51.1
West: Swan Street											
10	L2	64	2.0	0.074	5.6	LOS A	0.2	1.6	0.09	0.40	54.5
11	T1	37	2.0	0.074	0.1	LOS A	0.2	1.6	0.09	0.40	56.0
12	R2	33	2.0	0.074	5.6	LOS A	0.2	1.6	0.09	0.40	53.9
Approach		134	2.0	0.074	4.1	NA	0.2	1.6	0.09	0.40	54.8
All Vehicles		341	2.0	0.081	5.7	NA	0.3	2.0	0.13	0.61	53.6

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.

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Project: C:\Work Documents\Project Files\2018\18.125 - Mosbri Crescent The Hill\Swan St Kitchener Pde Intn.sip7

MOVEMENT SUMMARY

Site: 101 [2018PM + DEV]

Mosbri Crescent Residential Development
Swan Street / Kitchener Parade Stop sign 4 way cross intersection

Stop (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Kitchener Parade											
1	L2	60	2.0	0.063	8.3	LOS A	0.2	1.7	0.13	0.93	51.7
2	T1	11	2.0	0.063	8.6	LOS A	0.2	1.7	0.13	0.93	51.4
3	R2	7	2.0	0.063	8.4	LOS A	0.2	1.7	0.13	0.93	51.2
Approach		78	2.0	0.063	8.3	LOS A	0.2	1.7	0.13	0.93	51.6
East: Swan Street											
4	L2	8	2.0	0.029	5.6	LOS A	0.0	0.1	0.01	0.10	57.3
5	T1	45	2.0	0.029	0.0	LOS A	0.0	0.1	0.01	0.10	59.0
6	R2	1	2.0	0.029	5.6	LOS A	0.0	0.1	0.01	0.10	56.7
Approach		55	2.0	0.029	1.0	NA	0.0	0.1	0.01	0.10	58.7
North: Kitchener Parade											
7	L2	3	2.0	0.076	8.2	LOS A	0.3	1.9	0.22	0.94	51.5
8	T1	22	2.0	0.076	8.5	LOS A	0.3	1.9	0.22	0.94	51.3
9	R2	42	2.0	0.076	8.8	LOS A	0.3	1.9	0.22	0.94	51.0
Approach		67	2.0	0.076	8.7	LOS A	0.3	1.9	0.22	0.94	51.1
West: Swan Street											
10	L2	37	2.0	0.061	5.7	LOS A	0.3	1.9	0.13	0.45	53.9
11	T1	19	2.0	0.061	0.1	LOS A	0.3	1.9	0.13	0.45	55.4
12	R2	53	2.0	0.061	5.6	LOS A	0.3	1.9	0.13	0.45	53.4
Approach		108	2.0	0.061	4.7	NA	0.3	1.9	0.13	0.45	53.9
All Vehicles		308	2.0	0.076	5.8	NA	0.3	1.9	0.13	0.62	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.
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.

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Project: C:\Work Documents\Project Files\2018\18.125 - Mosbri Crescent The Hill\Swan St Kitchener Pde Intn.sip7

MOVEMENT SUMMARY

Site: 101 [2028AM + DEV]

Mosbri Crescent Residential Development
Swan Street / Kitchener Parade Stop sign 4 way cross intersection

Stop (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: Kitchener Parade											
1	L2	51	2.0	0.088	8.4	LOS A	0.3	2.4	0.19	0.94	51.5
2	T1	40	2.0	0.088	9.1	LOS A	0.3	2.4	0.19	0.94	51.3
3	R2	5	2.0	0.088	8.7	LOS A	0.3	2.4	0.19	0.94	51.1
Approach		96	2.0	0.088	8.7	LOS A	0.3	2.4	0.19	0.94	51.4
East: Swan Street											
4	L2	17	2.0	0.047	5.6	LOS A	0.0	0.3	0.03	0.14	56.9
5	T1	68	2.0	0.047	0.0	LOS A	0.0	0.3	0.03	0.14	58.6
6	R2	4	2.0	0.047	5.8	LOS A	0.0	0.3	0.03	0.14	56.3
Approach		89	2.0	0.047	1.4	NA	0.0	0.3	0.03	0.14	58.2
North: Kitchener Parade											
7	L2	4	2.0	0.102	8.3	LOS A	0.4	2.6	0.31	0.93	51.3
8	T1	20	2.0	0.102	8.9	LOS A	0.4	2.6	0.31	0.93	51.0
9	R2	58	2.0	0.102	9.4	LOS A	0.4	2.6	0.31	0.93	50.8
Approach		82	2.0	0.102	9.2	LOS A	0.4	2.6	0.31	0.93	50.8
West: Swan Street											
10	L2	77	2.0	0.088	5.7	LOS A	0.3	2.0	0.12	0.39	54.3
11	T1	42	2.0	0.088	0.2	LOS A	0.3	2.0	0.12	0.39	55.8
12	R2	39	2.0	0.088	5.7	LOS A	0.3	2.0	0.12	0.39	53.8
Approach		158	2.0	0.088	4.2	NA	0.3	2.0	0.12	0.39	54.6
All Vehicles		425	2.0	0.102	5.6	NA	0.4	2.6	0.16	0.57	53.8

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.

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Project: C:\Work Documents\Project Files\2018\18.125 - Mosbri Crescent The Hill\Swan St Kitchener Pde Intn.sip7

MOVEMENT SUMMARY

Site: 101 [2028PM + DEV]

Mosbri Crescent Residential Development
Swan Street / Kitchener Parade Stop sign 4 way cross intersection

Stop (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: Kitchener Parade											
1	L2	72	2.0	0.076	8.3	LOS A	0.3	2.1	0.14	0.93	51.7
2	T1	13	2.0	0.076	8.7	LOS A	0.3	2.1	0.14	0.93	51.4
3	R2	8	2.0	0.076	8.6	LOS A	0.3	2.1	0.14	0.93	51.2
Approach		93	2.0	0.076	8.4	LOS A	0.3	2.1	0.14	0.93	51.6
East: Swan Street											
4	L2	9	2.0	0.033	5.6	LOS A	0.0	0.1	0.01	0.10	57.4
5	T1	53	2.0	0.033	0.0	LOS A	0.0	0.1	0.01	0.10	59.1
6	R2	1	2.0	0.033	5.7	LOS A	0.0	0.1	0.01	0.10	56.8
Approach		63	2.0	0.033	0.9	NA	0.0	0.1	0.01	0.10	58.8
North: Kitchener Parade											
7	L2	4	2.0	0.094	8.2	LOS A	0.3	2.4	0.25	0.94	51.4
8	T1	26	2.0	0.094	8.6	LOS A	0.3	2.4	0.25	0.94	51.2
9	R2	51	2.0	0.094	9.1	LOS A	0.3	2.4	0.25	0.94	50.9
Approach		81	2.0	0.094	8.9	LOS A	0.3	2.4	0.25	0.94	51.0
West: Swan Street											
10	L2	43	2.0	0.070	5.7	LOS A	0.3	2.2	0.14	0.44	53.9
11	T1	23	2.0	0.070	0.2	LOS A	0.3	2.2	0.14	0.44	55.4
12	R2	58	2.0	0.070	5.7	LOS A	0.3	2.2	0.14	0.44	53.4
Approach		124	2.0	0.070	4.7	NA	0.3	2.2	0.14	0.44	54.0
All Vehicles		361	2.0	0.094	5.9	NA	0.3	2.4	0.14	0.62	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.
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.

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Project: C:\Work Documents\Project Files\2018\18.125 - Mosbri Crescent The Hill\Swan St Kitchener Pde Intn.sip7