Our Ref: 21335

9 November 2021

Iris Capital
GPO BOX 5479
SYDNEY NSW 2001

Attention: Mr Warren Duarte

Dear Warren,

RE: 167 HUME HIGHWAY, CHULLORA – PLANNING PROPOSAL ADDENDUM TRAFFIC REPORT

As requested, please find herein The Transport Planning Partnership (TTPP)'s traffic and parking assessment for the above proposed development.

Background

The Palms Hotel located at 167 Hume Highway, Chullora, is proposed to be redeveloped to a mixed use residential and commercial development.

Previously, McLaren Traffic Engineering (MTE) was commissioned to provide a Traffic and Parking Impact Assessment of the Planning Proposal. Since then, there have been changes to the proposed development yield and the driveway positions.

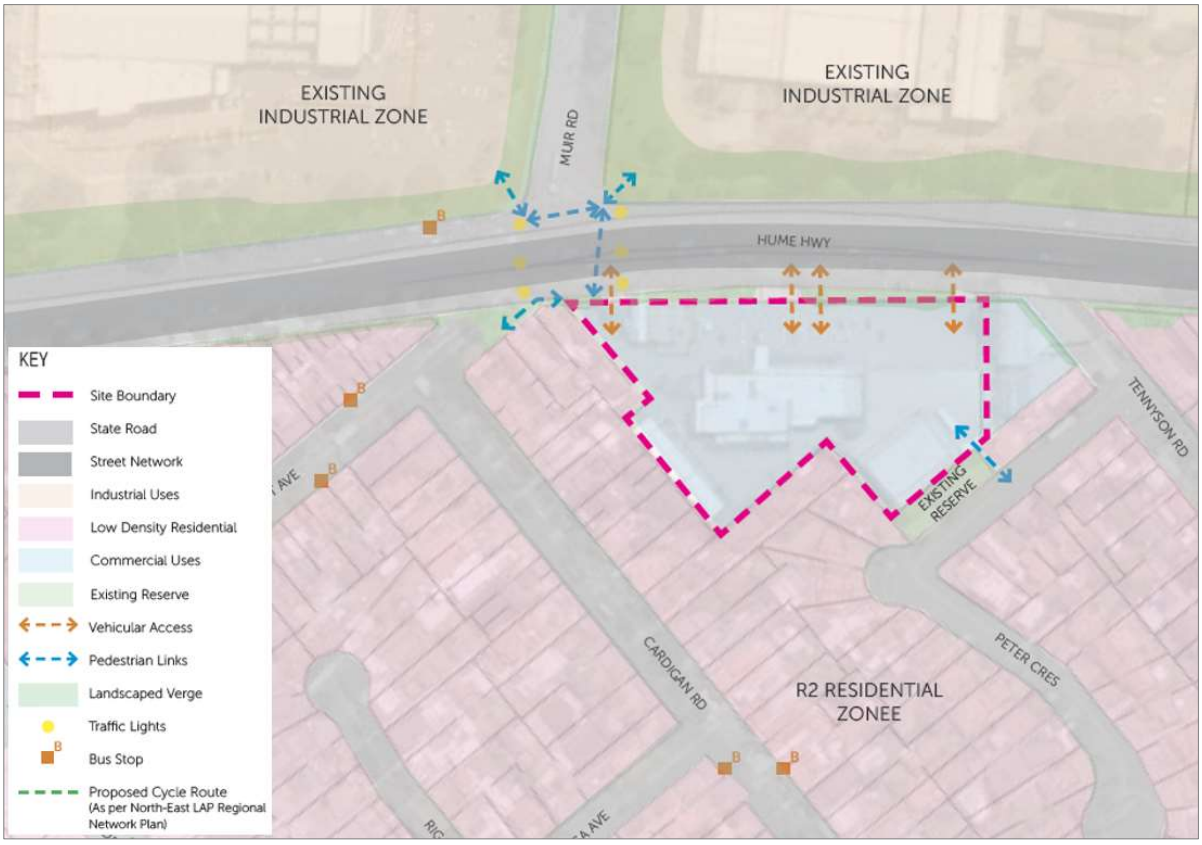
Therefore, TTPP has been commissioned to provide an addendum traffic report to assess the traffic and parking effects of these changes. Hence this addendum traffic report should be read in conjunction with the original traffic report. A copy of MTE traffic report (July 2018) is included in **Attachment One**.

The Transport Planning Partnership
Suite 402, 22 Atchison Street
ST LEONARDS NSW 2065

Current Site Access Arrangements

The current site has four site access arrangements which includes two entry driveways and two exit driveways off Hume Highway as shown in Figure 1.

Figure 1: Existing Site Access Arrangements

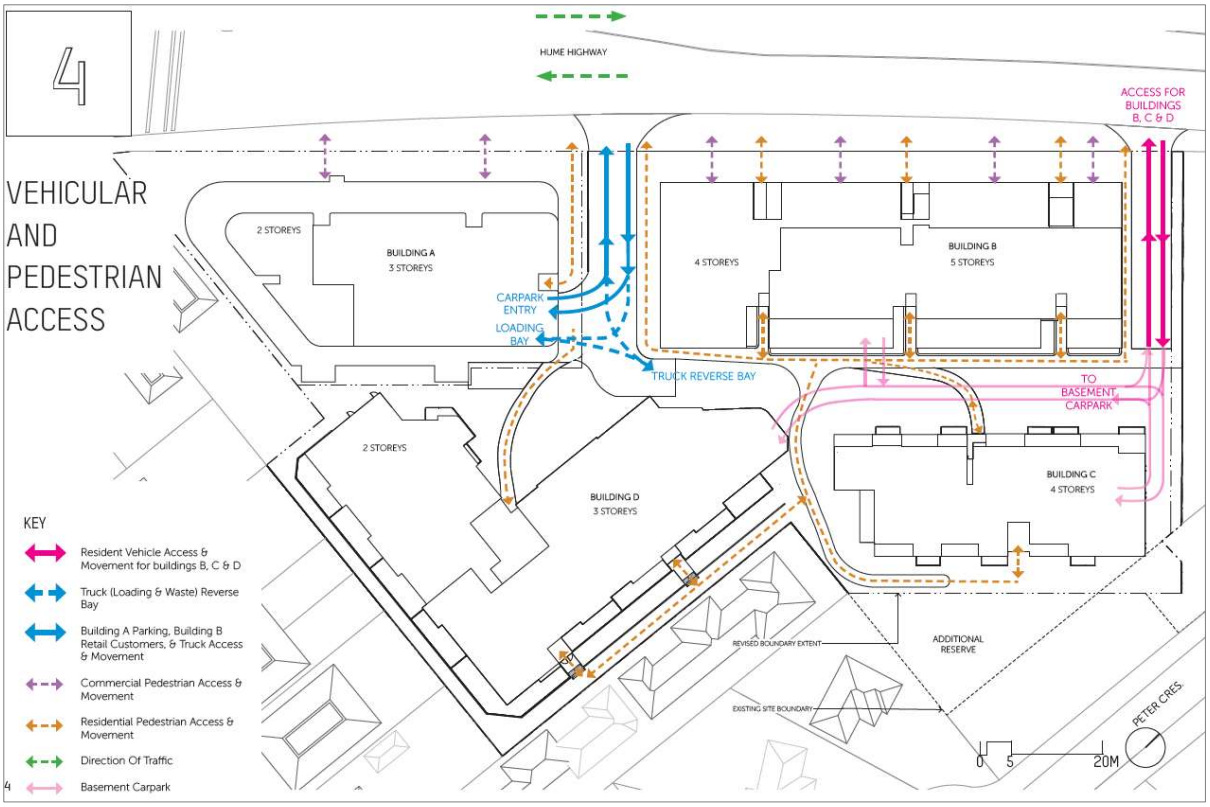


Planning Proposal Access Arrangements

A singular driveway to service the new development was initially proposed in the centre of the site for all movements. However, the location of the driveway would not be appropriate considering vehicles exiting the site would try to cross three lanes of traffic in order to turn right at the Hume Highway-Muir Road intersection.

The proposal in the gateway determination moved all commercial/tavern/loading/waste vehicle traffic to enter and exit the site via the middle driveway, and residential cars to enter and exit via the driveway furthest from the Hume Highway-Muir Road intersection (as shown in Figure 2). However, this arrangement may still result in vehicles attempting to cross lanes to undertake a right turn at Muir Road.

Figure 2: Planning Proposal Access Arrangement

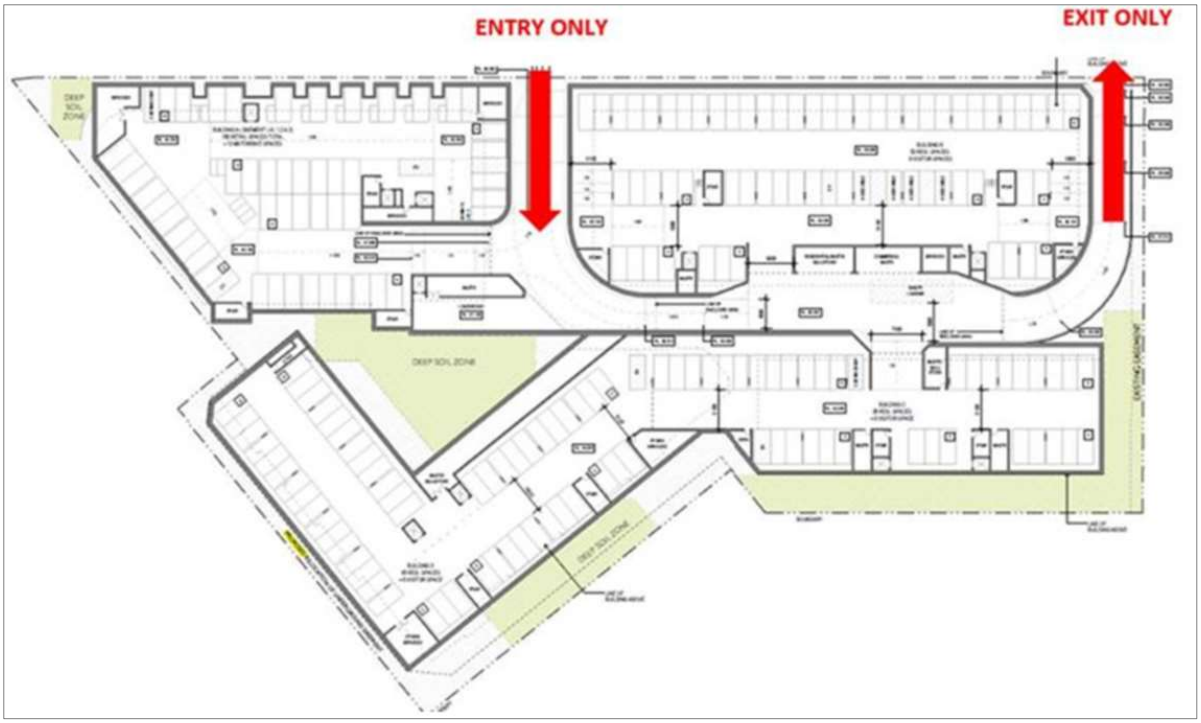


Proposed Amendment to Access Arrangements

The proposed amendment to the strategy is to have all traffic enter the site in the middle driveway but exit at the driveway furthest from the Hume Highway-Muir Road intersection as shown in Figure 3.

This would minimise the potential weaving issue associated with the right turn into Muir Road from the site.

Figure 3: Proposed Amendment to Access Arrangements



Development Proposal

The proposed yield is as follows:

- 127 residential units
- 1,450m^2 pub (accessible area)
- 1,750m^2 commercial/ retail area (GFA)
- 175 residential car parking spaces and 130 commercial/ retail car parking spaces.

Parking Assessment

The parking requirements for the proposed development have been assessed against the Bankstown Development Control Plan (DCP) 2015.

Car Parking Requirements

The car parking requirements are shown in Table 1.

Table 1: Car Parking Assessment

Land Use	Yield	DCP Parking Rate	Parking Requirement	Parking Provision
Residential				
1-bedroom dwelling	26 dwellings	1 car space per 1 bedroom dwelling	26	175
2-bedroom dwellings	93 dwellings	1.2 car spaces per 2-bedroom dwellings	112	
3- or more bedroom dwellings	8 dwellings	1.5 car spaces per 3 or more-bedroom dwellings	12	
Visitors	127 dwellings	1 visitor car space per 5 dwellings	25	
Sub-total			175	175
Commercial/Retail				
Pub/ Restaurants	1,450m^2	0.15 car space per m^2	218	130
Retail/ Show room (Bulky goods premises)	1,750m^2	1 car space per 60m^2 GFA	29	
Sub-total			247	130
Total			**422**	**305**

The parking provision of 175 residential car spaces satisfies the DCP parking requirement for the residential component.

The DCP requires 247 commercial car spaces to be provided with 218 of these for the pub. It is proposed to provide 130 spaces which using this calculation is a shortfall of 117 car spaces compared to the DCP requirement.

Alternatively, for the pub component, the rate of 8.7 spaces per 100m^2 specified in the 2010 approval of the site, can be adopted. This reduces the pub parking requirement to 126 spaces, bringing down the total commercial car parking requirement to 155 parking spaces. This results in a shortfall of 25 car spaces.

It is important to note that the peak demand for the pub and the retail/ showroom will not coincide. It is expected that most visitors to the retail/ show room areas will exit the site by 5:30pm, as visitors to the pub is likely to enter the site in the evening peak period, say after 6:30pm.

Parking Demand (Pub)

Since the introduction of random breath testing, there has been an increase in awareness of responsible drink-driving attitude with patrons carpooling with designated drivers or use of taxi/ride sharing services.

Based on a study undertaken by Deloitte on 'Economic effects of ridesharing in Australia' (2016), the following findings are noted:

- *Ridesharing has been argued to have a negative influence on drink driving due to its cost advantages and impact on increasing availability through the electronic platform. (page 45)*
- *Importantly, a survey undertaken as part of the MADD study revealed attitudes towards Uber and drink driving. It found that 88 per cent of respondents over the age of 21 agreed that Uber has made it easier to avoid driving home after having too much to drink, and 78 per cent said that since Uber launched in their city, their friends are less likely to drive after drinking. (page 46)*
- *The impact on parking can be significant. According to the Capital Metropolitan Transportation Authority in Texas, the implementation of carpooling incentives in Minneapolis and St. Paul reduced trips to work by between 27 per cent and 37 per cent. Associated with this was a reduction in parking demand by between 11 per cent and 21 per cent. (page 54).*

In summary, carpooling with designated drivers or use of taxi/ride sharing services have resulted in a considerable reduction in parking demands generated by developments with a hotel/pub component.

More specifically, it is expected that visitors of the proposed pub area would comprise primarily of residents as well as employees in the vicinity of the site, who will be able to walk to the pub at lunch time or after work.

Therefore, it is unlikely that the pub component would generate a parking requirement of 218 spaces as per Council's DCP parking rates. The proposed provision of 130 car spaces is considered acceptable to accommodate the proposed commercial parking demand on site.

Proposed Parking Demand Management

In addition, it is considered appropriate to manage parking demand by adopting the following measures:

- Promotion of responsible drink-driving attitude with carpooling with designated drivers and taxi services.
- Encourage the use of alternative transport modes as the site is located in close vicinity to bus stops on Muir Road, Hillcrest Avenue and Cardigan Road.
- Monitor the use of on-site parking by staff and assign parking to a small proportion of staff members only to ensure the availability of customer parking spaces.
- Produce a Transport Access Guide which can be given to staff and customers to indicate how they can travel to the site by means other than car.

Bicycle and Motorcycle Parking

The DCP does not provide a requirement for bicycle parking and motorcycle parking.

Servicing and Loading

In Section 5 of the DCP, the requirements for loading and unloading facilities are provided as follows:

Mixed use development must provide appropriate loading/unloading or furniture pick-up spaces. If no provision is made for the facilities, development applications must provide justification why they are not necessary.

Where rear lane access is not available and the commercial/retail gross floor area of a building is greater than 500m2, Council requires:

a) At least one off-street parking space for delivery/service vehicles; and

b) Additional off-street parking spaces or a loading dock depending on the size, number, and frequency of delivery/service vehicles likely to visit the premises

The design of loading docks must:

a) Be separate from parking circulation or exit lanes to ensure safe pedestrian movement and uninterrupted flow of other vehicles in the circulation roadways;

b) Allow vehicles to enter and leave an allotment in a safe manner; and

c) Have minimum dimensions of 4 metres by 7 metres per space

The loading bay will be provided according to DCP requirements. Details will be provided during the DA stage.

Accessible Parking

Section 2.7 of the DCP requires car parking spaces to be provided at a rate of one space per 100 car spaces for people with disabilities.

The accessible car parking spaces will be provided as per the DCP requirements.

Car Wash Bay

In Section 5.17 of the DCP, the requirements for car wash bays are provided as follows:

Where residential development is required to provide a car wash bay as a condition of development consent, the following requirements apply:

(a) the car wash bay pavement must be bunded and isolated from the stormwater drainage system so that car wash runoff does not discharge into the Sydney Water sewer system;

(b) the car wash bay must be covered or located in the basement and protected so that stormwater does not collect in the wash bay and discharge into the sewer system; and

(c) the car wash bay space may also be used as a visitor space.

The car wash bay(s) will be provided according to the DCP requirements.

Car Park Design and Compliance

Car parking areas shall be designed in accordance with the requirements of the Australian Standards AS2890.1:2004.

Preliminary swept paths have been undertaken using a 12.5m Heavy Rigid Vehicle (HRV) as shown in **Attachment Two**. These swept paths indicate that 12.5m HRVs can be accommodated on site and are able to enter and exit the site in a forward direction.

A detailed compliance review and swept path testing will be undertaken during the DA stage.

Traffic Assessment

Traffic Generation

Transport for New South Wales (TfNSW) provides trip generation rates for different land uses in their 'Guide to Traffic Generating Developments 2002' and updated 'Technical Direction (TDT2013/04a' (Guide). This section assesses the potential traffic generation and impacts associated with the development proposal.

It is noted that the TfNSW Guide does not include traffic generation for pubs. However, the trip rate for the PM peak of 0.68 trips per car space have been referenced from the MTE traffic report, July 2018. This rate was based on traffic and parking surveys undertaken for current site in 2016. This rate has been increased by 25% to consider future trip attractions. Therefore, 0.85 trips per car space was adopted for the pub component.

The following traffic generation rates are adopted for various uses:

- Residential: 0.29 vehicle trips/ unit (TfNSW, 2002 rates)
- Pub: 0.85 trips per car space (based on site survey)
- Retail/show room: 2.7 vehicle trips per 100m^2 GFA (TfNSW, 2013 rates for bulky goods retail stores).

The total estimated trip generation of the proposed development is summarised in Table 2.

Table 2: Trip Generation Summary

Land Use	Yield	Trip Generation Rate		Trip Generation Estimate	
		AM Peak	PM Peak	AM Peak	PM Peak
Residential	127 Units	0.29 trips per unit	0.29 trips per unit	37	37
Pub	126 spaces	-	0.85 trips per space	-	107
Retail	1,750m²	-	2.7 trips per 100m²	-	47
Total				**37 trips**	**191 trips**

Based on the above, the site is expected to generate 37 trips/hour in the AM peak and 191 trips/hour in the PM peak.

Based on 2016 site survey, the existing generates 12 trips in the AM peak and 47 trips in the PM peak.

Therefore, the net increase in trip generation would be 25 additional trips in the AM peak and 144 additional trips in the PM peak. This is less than one additional trip per minute in the AM peak and two to three additional trips per minute in the PM peak.

Traffic Assignment

The site is restricted to left-in and left -out movements via Hume Highway. Therefore, all outbound vehicles will travel through the Hume Highway-Muir Road intersection.

As discussed above, the net increase in trip generation would be 25 additional trips in the AM peak and 144 additional trips in the PM peak.

The net additional traffic movements have been shown in Figure 4 for the AM peak and Figure 5 for the PM peak.

Figure 4: Net Additional Traffic Movements (AM Peak)

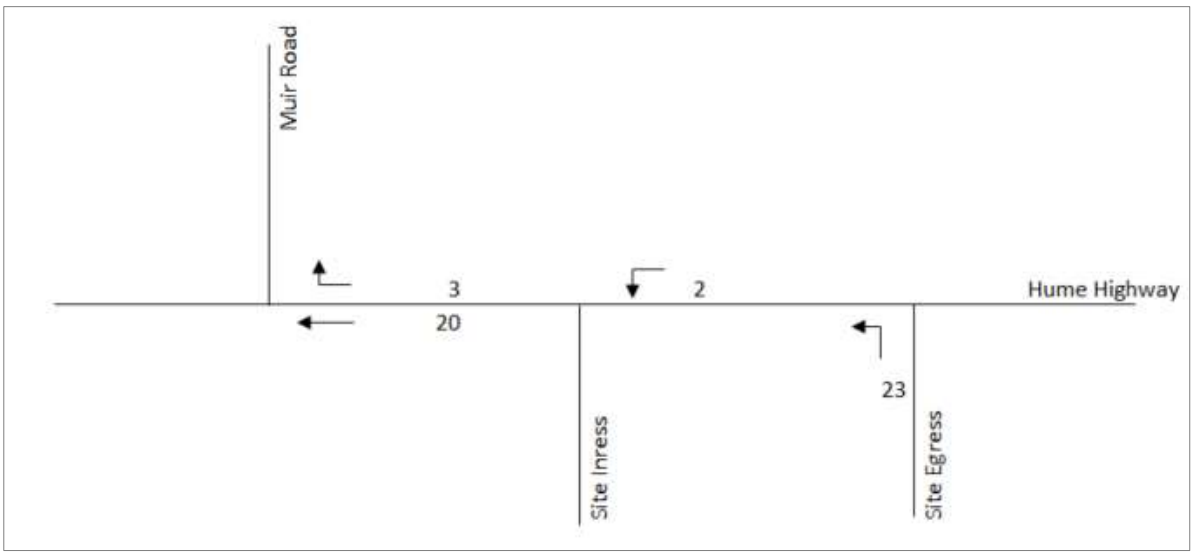
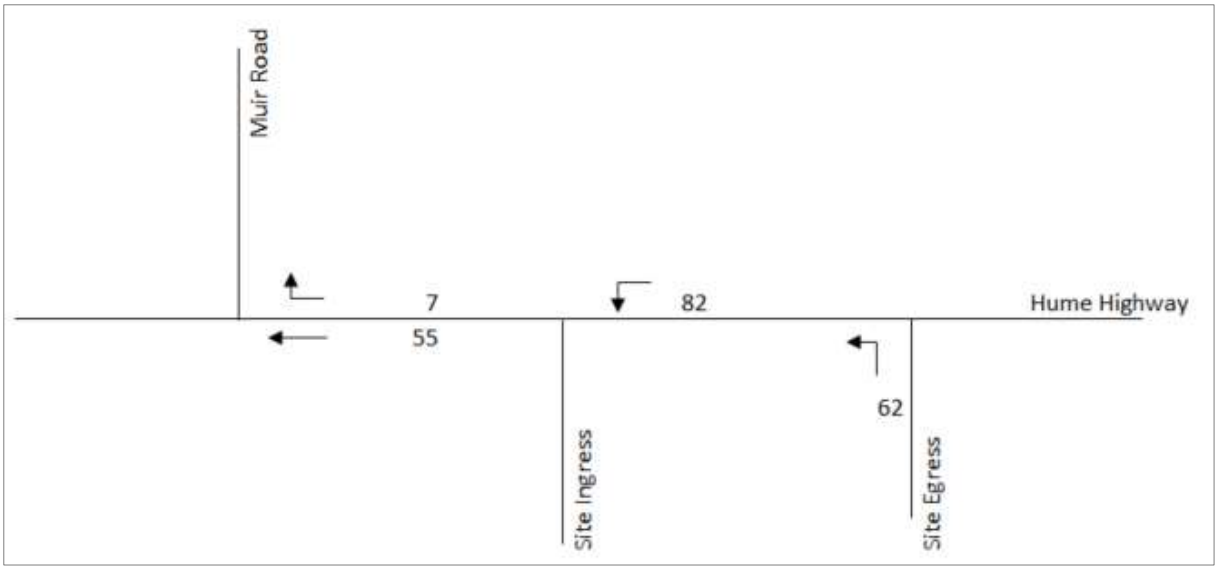


Figure 5: Net Additional Traffic Movements (PM Peak)



Intersection Capacity Assessment

Intersection capacity analysis has been conducted using SIDRA Intersection 7 modelling software, that is, consistent with MTE 2018 traffic report, to ascertain the intersection performance at the key nominated intersection in vicinity of the site.

TfNSW uses the performance measure level of service (LoS) to define how efficient an intersection is operating under given prevailing traffic conditions. Level of service is directly related to the delays experienced by traffic travelling the intersection. Level of service ranges from LoS A to LoS F. LoS A indicates the intersection is operating with spare capacity, while LoS F indicates the intersection is operating above capacity. LoS D is the long-term desirable level of service.

Level of service is directly related to the average delay experienced by vehicles travelling through the intersection. At signalised intersections, the average delay is the volume weighted average of all movements. For roundabouts and priority-controlled intersections (give way and stop sign), the average delay relates to the worst movement.

Table 3 shows the criteria that SIDRA Intersection adopts in assessing the level of service.

Table 3: Level of Service Criteria for Intersection Operation

Level of Service	Average Delay (seconds per vehicle)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays	Near capacity and accident study required
F	Greater than 71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control mode

Source: TfNSW Guide to Traffic Generating Developments, 2002

The base model for the intersection of Hume Highway and Muir Road is consistent with the SIDRA model produced by MTE in 2018 (traffic surveys used for these models were undertaken in 2016).

The volumes in the base model, that is, 2016 models were increased using the Strategic Traffic Forecasting Model (STFM) growth rates of 2.2% p.a. in the AM peak and 2.4% p.a. in the PM peak, to estimate traffic volumes in 2021.

The modelling scenarios are as follows:

- Surveyed Conditions (2016)
- Estimated Existing Conditions (2021)
- Post Development (2021 + Development).

The summary of the SIDRA results for the existing conditions and the post development scenarios are presented in Table 4 with full results contained in **Attachment Three**.

Table 4: SIDRA Results Summary

Intersection	AM Peak		PM Peak	
	Average Delay	LoS	Average Delay	LoS
Surveyed (2016)				
Hume Highway-Muir Road	18	B	19	B
Estimated Existing (2021)				
Hume Highway-Muir Road	19	B	19	B
Post Development (2021) + Development				
Hume Highway-Muir Road	19	B	19	B
Hume Highway-Future Site Egress	10	A	11	A

Table 4 indicates that under the post development scenarios, the Hume Highway-Muir Road intersection would continue to operate at the same level of service, that is level of service B. The intersection of Hume Highway with the future site egress would operate at a level of service A with development traffic.

Summary and Conclusion

This traffic and parking assessment relates to the Planning Proposal at the existing The Palms Hotel located at 167 Hume Highway, Chullora.

The proposed development involves the construction of residential units, a bar and additional commercial/retail space.

It is unlikely that the pub component would generate a parking requirement of 218 spaces as per Council's DCP parking rates. The proposed provision of 130 car spaces is considered acceptable to accommodate the proposed commercial parking demand on site.

The Hume Highway-Muir Road intersection would continue to operate at an LoS B in the post development scenario as it does in the existing scenario. As such, any net difference in traffic generation and parking demand of the proposed development would not have any noticeable impact on the surrounding road network.

We trust the above is to your satisfaction. Should you have any queries regarding the above or require further information, please do not hesitate to contact the undersigned on 8437 7800.

Yours sincerely,

Ken Hollyoak
Director

Attachment One

MTE Traffic Report (July 2018)

PLANNING PROPOSAL TRAFFIC AND PARKING IMPACT ASSESSMENT OF MIXED USE RESIDENTIAL & COMMERCIAL AT 167 HUME HIGHWAY, CHULLORA

Address: Shop 7, 720 Old Princes Highway Sutherland NSW 2232
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Telephone: +61 2 8355 2440
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Division of RAMTRANS Australia ABN: 45067491678

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

16408.04FA - 9th July 2018

Development Type: **Mixed Use Residential & Commercial**

Site Address: **167 Hume Highway, Chullora**

Prepared for: **Iris Capital**

Document reference: **16408.04FA**

Status	Issue	Prepared By	Checked By	Date
Draft	A	MM	CM	6th July 2018
Final	A	MM	CM	9th July 2018

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1 INTRODUCTION

M^{C}Laren Traffic Engineering (MTE) was commissioned by *Iris Capital* to provide a Planning Proposal Traffic and Parking Impact Assessment of the proposed redevelopment of The Palms, Chullora to a Mixed Use Residential & Commercial development. The site is located at 167 Hume Highway, Chullora. The proposed plans are reproduced in **Annexure A** for reference.

1.1 Description and Scale of Development

The proposed planning proposal consists of the following scale relevant to this report:

- Hotel floor area of 970m^2 in Building A
- 18 serviced apartments in Building A
    - 3 x 1 bedroom apartments
    - 6 x 2 bedroom apartments
- 63 units within Building B
    - 12 x 1 bedroom apartments;
    - 47 x 2 bedroom apartments;
    - 4 x 3 bedroom apartments.
- 32 units within Building C
    - 24 x 2 bedroom apartments;
    - 8 x 3 bedroom apartments.
- 54 units within Building D
    - 1 x 1-bedroom apartment
    - 47 x 2-bedroom apartment
    - 6 x 3-bedroom apartment
- On-site car parking within basement parking levels for both the commercial and residential portion of the development. Basement parking will be separated for the commercial parking and residential parking.
- On-site loading bay to be utilised for both delivery and waste collection located adjacent to the proposed hotel, facilitating up to a 12.5m length Heavy Rigid Vehicle via a forward entry / forward exit from the site.
- Vehicular access from the Hume Highway only, via two newly created two-way driveways along the Hume Highway. The most northern proposed two-way driveway will residents only, with the southern driveway for services and hotel patrons.

1.2 State Environmental Planning Policy (Infrastructure) 2007

The proposed development does qualify as a development with relevant size and/or capacity under Clause 104 of the SEPP (Infrastructure) 2007. Accordingly, formal referral to the Roads and Maritime Services (RMS) is necessary and Canterbury-Bankstown Council officers can refer this proposal accordingly.

1.3 Site Description

The subject site, officially identified as Lot 402 DP 631754, is irregular in shape with frontage to Hume Highway only. The boundary length along the Hume Highway is 171.3m in length

and currently has four (4) vehicular driveways onto the Hume Highway. The site is currently zoned B6 – Enterprise Corridor as per Bankstown Council Local Environmental Plan (LEP).

Internally, the existing site has three (3) structures consisting of a restaurant, The Palms Hotel premises and associated units and a storage brick building. There are currently 166 line-marked car parking spaces throughout the site, shared between the Palms Hotel and the restaurant. The existing GFA of these buildings are 1,300m^2 GFA.

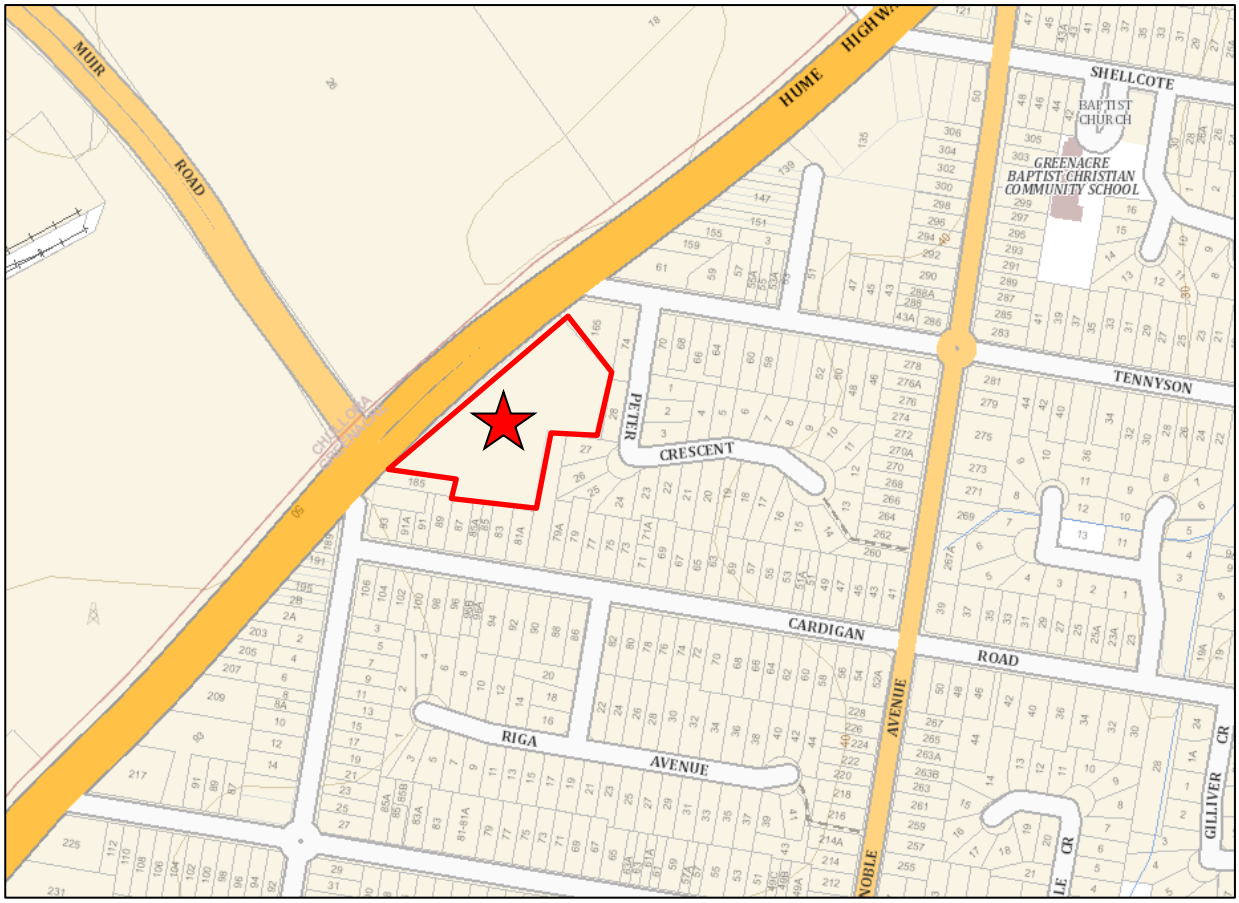
The site is bounded by low density residential to the eastern side of the Hume Highway, whilst the western side of the Hume Highway consists of large bulky goods (Masters retail hardware) and warehouse / industrial complexes.

1.4 Site Context

The site location is shown on aerial imagery and a map in **Figure 1** & **Figure 2** respectively.

★ Site Location

FIGURE 1: SITE CONTEXT – AERIAL PHOTO



Site Location

FIGURE 2: SITE CONTEXT – STREET MAP

2 EXISTING TRAFFIC AND PARKING CONDITIONS

2.1 Road Hierarchy

Hume Highway has the following characteristics within close proximity to the site:

- RMS Classified MAIN Road (No. 638);
- Approximately 25m in width (including a medium strip) facilitating three lanes in both directions;
- Signposted 70km/h carriageway;
- No Parking signage along both sides of the road;
- Approved 25/26m B-Double truck route.

Muir Road has the following characteristics within close proximity to the site:

- Unclassified Collector Road;
- Approximately 19m in width (including a medium strip) facilitating two lanes in both directions;
- Signposted 60km/h carriageway;
- Unrestricted kerb side parking where available along both sides of the road;
- Approved 25/26m B-Double truck route.

Tennyson Road has the following characteristics within close proximity to the site:

- Unclassified LOCAL road;
- Approximately 10m in width facilitating two-way passing and kerbside parking;
- No speed limit signposted - 50km/h applies;
- Unrestricted kerbside parking permitted along both sides of the road with sections of 3-hour restricted kerbside parking on both sides of the road.

Peter Crescent has the following characteristics within close proximity to the site:

- Unclassified LOCAL road;
- Approximately 7m in width facilitating two-way passing and kerbside parking;
- No speed limit signposted - 50km/h applies;

- Unrestricted kerbside parking along the east side of the road with “No Parking” signage along the west side of the road.

2.2 Existing Traffic Management

- Signalised intersection of Hume Highway & Muir Road
- Left in/ Left out “Give Way” junction of Hume Highway & Tennyson Road
- Priority controlled intersection of Tennyson Road & Peter Crescent
- No vehicular access from Hume Highway into Hillcrest Avenue / Cardigan Road

2.3 Existing Traffic and Parking Environment

Hume Highway currently carries in the range of 58,000 two-way daily vehicles north of Waterloo Road and some 57,000 two-way daily vehicles south of Brunker Road. Historically, traffic volumes north of Waterloo Road appear to have remained constant, with a slight increase in the average daily vehicles during 2017 and 2018. Whilst traffic volumes south of Brunker Road appear to have gradually decreased, between 2015 and 2016, compared to the previous years and increased in 2017 and 2018 (back to the average two-way traffic flow in years 2013 and 2014).

An intersection survey was undertaken at the signal controlled intersection of Hume Highway & Muir Road on Friday 19th August 2016. The survey sheets are provided in **Annexure B** for reference.

Existing intersection performances have been assessed using SIDRA INTERSECTION 7.0. The analysis is summarised in **Table 1** below with detailed outputs reproduced in **Annexure C** for reference.

TABLE 1: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 7.0)

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
EXISTING PERFORMANCE						
Hume Highway / Muir Road	AM	0.58	17.1	B	Signal	N.A
	PM	0.57	18.6	B		N.A

NOTES:

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

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

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

As shown above, the intersection of Hume Highway & Muir Road is operating at Level of Service (LoS) “B” which reflects satisfactory operation with spare capacity and minimal delays.

In addition to the intersection survey being undertaken, driveway movements were also recorded along the site’s Hume Highway frontage, the survey sheets are provided in **Annexure B** for reference. During the morning peak hour of 8:45 to 9:45 there were 12 two-way traffic movements. During this time period there were 25 vehicles parked on-site which represents a peak hour generation rate of 0.5 trips per car space in use. The evening peak hour of 6:00-7:00pm found 47 two-way traffic movements. During this time period there were 69 vehicles parked on-site, which represents 0.68 peak hour movements per car space in use. The two-way traffic movement during the morning peak hour was 26% of the evening peak hour.

2.4 Gap Summary

A gap assessment was conducted on 30th February 2017 during the peak AM and PM time period. The gaps surveyed the number of gaps over the 5 traffic lanes, including the right hand turn lanes as shown in **Figure 3** below. The survey results have been reproduced in **Annexure B** for reference.

FIGURE 3: LOCATION OF GAP SURVEY

The results of the gap survey are summarised in **Table 5** below.

TABLE 2: GAP ASSESSMENT

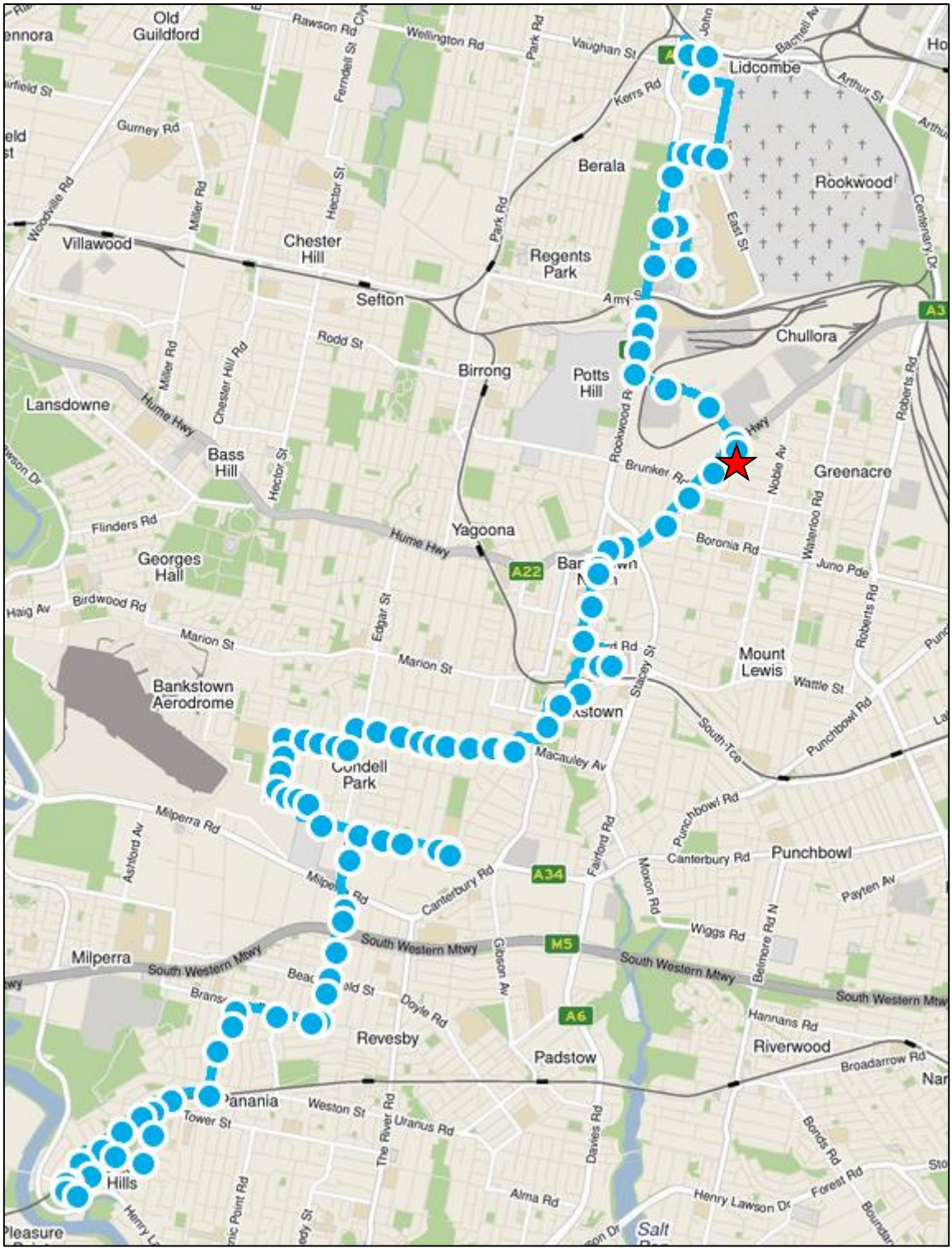
Peak Time	Peak hour	Minimum Gaps from 5 to 8 seconds	Minimum Gaps greater than 8 seconds	Minimum gaps within a one hour period
AM	8:15am – 9:15am	98	49	147
PM	4:00pm – 5:00pm	73	70	143

As shown in **Table 2** above there is a minimum of **147** and **143** gaps in the AM and PM period respectively. This shows that there are adequate gaps in traffic to allow vehicles to exit the site. Furthermore, there are additional routes for vehicles to travel to head north. If vehicles cannot find an acceptable gap to turn right at Muir Street, they can easily travel south to the intersection of Brunker Road / Hume Highway / Rawson Road where they can turn right.

It is relevant to note that the proposed driveway located at the end of the right turning lanes into Muir Road will be solely used by visitors to the hotel, which typically have their peak traffic movements outside the peak commuter AM and PM periods.

2.5 Public Transport

The subject site has access to existing bus route 925 provided by Transdev NSW which runs through East Hills to Lidcombe via Bankstown. The nearest bus stop is located along the Hume Highway within a 90m walking distance of the site. The 925 bus route provides access to Lidcombe Train station and East Hills Train Station. Bus Route 925 operates every 30 minutes during peak AM and PM weekday commuter periods and every 1-hour outside peak commuter periods. Hourly services are provided on Saturdays and Sundays from 6am to 11pm. **Figure 3** shows the bus route for 925 relative to the location of the development



SITE LOCATION

FIGURE 4: BUS ROUTE MAP

2.6 Future Road and Infrastructure Upgrades

From The New City of Canterbury-Bankstown Council's Development Application tracker and website, it appears that there is no future planned road or public transport changes that will affect traffic conditions within the immediate vicinity of the subject site.

3 PREVIOUS APPROVALS

The site has previously been approved to construct a drive-through liquor shop under Development Application (DA) 11153/2010. The development consisted of the following:

- 122m^2 of display area
- 58m^2 cool room area
- Drive through bay for 5 vehicles
- Drive through express lane for 5 vehicles
- 2 parking bays for customers
- 3 parking bays for staff
- 1 disabled parking space

The application identified removal of 23 car parking spaces from the overall provision of 126 car parking spaces. Conclusions of the *Traffix* assessment (dated November 2010) is that:

- Existing site parking demand was 61 car spaces out of 126 car parking spaces
- Under the proposal, 103 car spaces (60 hotel, 24 restaurant and 22 motel) were retained.
- Deliveries to the proposal to be made by a 10.4m rigid truck
- Proposed traffic generation of 130 vehicles in the peak hour (65 in; 65 out)
- Adopted a passing trade of 90%, such that only 10% of the generation is classed as 'new' trips to and from the development.

4 PARKING ASSESSMENT

4.1 Council Parking Requirement

The site is within the newly formed Canterbury-Bankstown Local Government Area, however the planning controls of the Bankstown Council remain in place.

As such, the Bankstown Council Development Control Plan 2015 (BCDCP 2015) is the relevant control document stipulating, amongst other things, Council's car parking requirement. The BCDCP 2015 states the following car parking rates applicable to the proposed development:

> *Part B5 – Parking*
>
> *Residential Flat Building, In Zone R4, B1, B2 & B6*
> *1 car space per 1 bedroom dwelling; or*
> *1.2 car spaces per 2 bedroom dwelling; or*
> *1.5 car spaces per 3 or more bedroom dwelling; and*
> *1 visitor car space per 5 dwellings*
>
> *Hotel or Motel Accommodation*
> *1 car space per unit; and*
> *1 car space per 2 employees*
>
> *Restaurants – Outside of Centres*
> *0.15 car space per square metre of total dining or bar area.*
> *Total dining bar area means all of those parts of a restaurant, catering or reception centre where customers order or are served food or drink, and includes waiting areas.*
>
> *Drive-in Liquor Store*
> *Off-street car spaces for "browse-room" customers' and*
> *1 car space for each employee*
> *Where customers park and leave their vehicles to purchase liquor, a drive-in liquor store may be considered as a shop. Under these circumstances, 1 car space per 40m^2 of gross floor area will be required.*

BCDCP 2015 states that the total number of car parking spaces required for a development is to be rounded down if the calculation results in less than half a space, or rounded up if the calculation results in equal or more than half a space.

Based on BDCP 2015 car parking rates, the car parking requirement is summarised in **Table 2**.

TABLE 3: BDCP CAR PARKING REQUIREMENT

Use	Scale	Rate	Requirement	Provision
Residential Flat Building- Building A	6 x 1 bed	1.0 per unit	6	6
	12 x 2 bed	1.2 per unit	14.4	24
	Sub-Total		**20.4**	**30**
Residential Flat Building- Building B	12 x 1 bed	1.0 per unit	12	12
	47 x 2 bed	1.2 per unit	56.4	76
	4 x 3 bed	1.5 per unit	6	6
	Sub-Total		**74.4**	**94**
Residential Flat Building- Building C	24 x 2 bed	1.2 per unit	28.8	46
	8 x 3 bed	1.5 per unit	12	12
	Sub-Total		**40.8**	**58**
Residential Flat Building- Building D	1 x 1 bed	1.0 per unit	1	1
	47 x 2 bed	1.2 per unit	56.4	67
	6 x 3 bed	1.5 per unit	9	9
	Sub-Total		**66.4**	**77**
Residential Flat Building	167 units	1 per 5 units (visitor)	33.4	35
Sub-Total	**-**	**-**	**235.4 (235)**	**294**
Hotel	970m^2 Dining/Bar	0.15 per 1m^2	145.5 (146)	TBD
Total	**-**	**-**	**381 (235 +146)**	**294 + Hotel**

As shown above, the site requires **235** residential spaces including **33** visitor spaces. The site provides **294** residential spaces including **35** visitor spaces, exceeding Council DCP car parking requirement for the residential component of the site.

The proposed hotel requires a **146** car parking spaces based on Council's DCP car parking requirement. It is relevant to note the following with respect to parking for the existing hotel on-site to determine the appropriate parking controls for the hotel portion of th development.

4.1.1 Hotel Parking

The parking surveys undertaken show current underutilisation, with a peak of some 69 vehicles on-site with an existing hotel restaurant GFA of 1,300 m^2. This equates to approximately 5.3 spaces per 100m^2 GFA. Therefore, based upon the 970m^2 GFA, this results in **52** car parking spaces (this most likely over estimates the rate as it includes the restaurant uses as well).

Adopting the 2010 consent required 113 spaces. This equates to a rate of 8.7 spaces per 100m^2. Based upon the proposed 970m^2 results in **84** spaces rounded down (this most likely over estimates the rate as it includes the restaurant uses as well). Hence based upon the above and Council's DCP car parking requirements adopting a conservative approach, some **84** car parking spaces would be sufficient for the parking demand of the hotel development. The provision parking for the hotel will be detailed during DA stage.

4.2 Bicycle & Motorcycle parking Requirements

BDCP 2015 Part 5- Section 5.18 states that "*Council may require development to provide appropriate bicycle parking facilities either on-site or close to the development."* Council's DCP does not specify a rate of provision for any land use.

Reference is made to Austroads Guide to Traffic Engineering Practice Part 14 – Bicycles (1993) which outlines the following bicycle provisions:

Residential Units
1 bicycle space per 4 units for residents
1 bicycle space per 16 units for visitors

Hotel
1 bicycle space per 25m^2 bar floor area for employees
1 bicycle space per 100m^2 beer garden area for employees
1 bicycle space per 25m^2 bar floor area for customers
1 bicycle space per 100m^2 beer garden area for customers

Restaurant
1 bicycle space per 100m^2 of public area for employees
2 bicycle spaces for customers

It should be noted that the above bicycle rates provide a guide to the number of bicycle parking spaces which could be provided for various land uses.

Based on the above rates, the number of bicycle spaces required as a guide for the development is summarised in **Table 4** below.

TABLE 4: BICYCLE PARKING GUIDELINE

Use	Scale	Requirement	
		Resident / Employee	Visitor / Customer
Residential	167 units	41.75 (42)	10.4 (10)
Pub/ Resturant	970m^2	10$^{(1)}$	2$^{(1)}$

Note 1) Adopt restaurant rate as no beer garden for hotel and due to large on-site residential component

As shown above, based on the Austroads guideline for bicycle parking, the site could ideally provide **42** residential spaces, **10** residential visitor spaces, **10** employee spaces and **2** visitor spaces for the proposed hotel. This parking requirement is a guide for Council and is not strictly required for the subject development.

Council's DCP does not outline any parking rates for motorcycle parking and as such the site does not require the provision of this facility. It is envisaged that some motorcycle parking will be provided during detailed DA stage.

4.3 Servicing & Loading

BCDCP 2015 Section 5 requires the following with respect to loading and unloading facilities:

Mixed use development must provide appropriate loading/unloading or furniture pick-up spaces. If no provision is made for the facilities, development applications must provide justification why they are not necessary.

Where rear lane access is not available and the commercial/retail gross floor area of a building is greater than 500m^2, Council requires:

a) *At least on off-street parking space for delivery/service vehicles; and*
b) *Additional off-street parking spaces or a loading dock depending on the size, number, and frequency of delivery/service vehicles likely to visit the premises*

The design of loading docks must:

a) *Be separate from parking circulation or exit lanes to ensure safe pedestrian movement and uninterrupted flow of other vehicles in the circulation roadways;*
b) *Allow vehicles to enter and leave an allotment in a safe manner; and*
c) *Have minimum dimensions of 4 metres by 7 metres per space*

Bankstown Council's Waste Education Officer has advised that Bankstown Council's waste collection vehicles is as per the following specifications:

- Rear loader
- Total length of 12.5m
- Turning radius of 12.5m
- Sweep circle of 27.8m
- Headroom clearance of 4.5m

Council's waste vehicle specifications are similar to the Australian Standard 2890.2:2002 specification for a 12.5m Heavy Rigid Vehicle (HRV) which is as follows:

- Total length of 12.5m
- Turning radius of 12.5m
- Outer body swept path of 27.8m
- Headroom requirement of 4.5m

A central delivery and waste collection area is provided on-site adjacent to the hotel. The area is designed to accommodate an HRV via a forward entry / forward exit onto The Hume Highway.

4.4 Disabled Parking

BCDCP 2015 Part B5 requires car parking spaces for people with disabilities to be provided at a rate of 1 space per 100 car spaces. The provision of disabled car parking will be determined during detailed DA stage for the hotel development.

With respect to residential units, BCDCP 2015 Part B1, Section 9 requires the following for residential flat buildings, serviced apartments and shop top housing:

"*Residential flat buildings, serviced apartments and shop top housing with 10 or more dwellings must provide at least one adaptable dwelling plus and adaptable dwelling for every 50 dwellings in accordance with AS4299 – Adaptable Housing."*

Based on the provision of 167 units, the development is required to provide 5 adaptable units (1 + 167/50) compliant with AS4299. This therefore results in a required provision of 5 disabled car parking spaces for residents.

4.5 Car Park Design & Compliance

Car parking areas shall be designed in accordance with AS2890.1:2004, AS2890.6:2009 and AS4299:1995 where applicable. The notable design criteria of these standards are as follows:

- Residential car parking spaces shall measure a minimum of 2.4m in width by 5.4m in length;
- Residential visitor car parking spaces shall measure a minimum of 2.5m in width by 5.4m in length;
- Aisle widths for User Class 1/1A shall be a minimum of 5.8m;
- A 1.0m blind aisle extension is required for blind aisles;
- An additional 300mm clearance on top of the base parking dimensions is required to obstructions and walls greater than 150mm in height;
- Disabled parking spaces shall measure 2.4m wide by 5.4m in length, with an adjacent shared zone of the same dimensions;
- Residential disabled (adaptable) spaces shall measure 3.8m in width by 5.4m in length;
- Headroom for passenger cars shall be minimum 2.2m in all locations, increasing to 2.5m above disabled parking spaces and shared zones.

Loading areas and bays shall be designed in accordance with AS2890.2:2002. Notably, the following design criteria should be met:

- Minimum Loading Bay Widths
    - HRV – 12.5m x 3.5m
- Headroom of 4.5m above loading areas and all vehicular path of travel;
- Loading area grade is to be no greater than 4% in any direction;
- Access ramps to loading area
    - HRV – Maximum grade of 15.4% with a grade changes of 6.25% over 7m transitions.

A detailed compliance review and swept path testing will be undertaken during DA stage.

5 TRAFFIC ASSESSMENT

Traffic generation has been based upon those rates specified in the RMS *Guide to Traffic Generating Developments* (October 2002) with due consideration also given to the updated data from the RMS (RMS Technical Direction TDT 2013/04).

5.1 Traffic Generation

The traffic generation for the residential and commercial component is based upon the following:

0.29 Trips per Unit	RMS Guide to Traffic Generating Developments
0.5 to 0.68 Trips per Car Space	Survey of Existing Site

The estimated traffic generation level for the development is based upon the RMS *""'Guide to Traffic Generating Developments"*, which assumes a worst case of a high proportion of private vehicle trips. The traffic generation is summarised in **Table 5** below.

TABLE 5: TRAFFIC GENERATION OF SITE

Land Use	Scale	Traffic Generation Rate	Peak Hour Traffic Generation	
			AM	PM
Residential	167 units	0.29 / unit(1)	49 (10 in; 39 out)	49 (39 in; 10 out)
Commercial	84 car spaces(3)	0.5 / car space(2)	42 (21 in; 21 out)	-
		0.68 / car spaces(2)	-	57 (29 in; 28 out)
Sub Total			**91**	**106**
Less Existing			**-12(2)**	**-47(2)**
Net Total			**79 (25 in; 54 out)**	**59 (44 in; 15 out)**

Notes 1) assumes residential split of 80% outbound and 20% inbound during the AM peak period and vice versa during the PM peak

2) Assumes a 50/50 split of commercial trips as entry / egress

3) An estimate of parking requirements based upon the existing 2010 approval of the site and traffic surveys

As summarised by **Table 5** above, the forecast traffic generation is **91** two-way trips in the morning peak hour and **106** two-way trips in the evening peak hour.

When taking into consideration the existing site generation, the net increase on the surrounding road network is **79** vehicle trips in the morning and **59** vehicle trips in the evening.

5.2 Traffic Assignment

As the site is restricted to left in / left out access only, all outbound vehicles will travel through the signalised intersection of Muir Road / Hume Highway.

5.3 Traffic Impact

The traffic generation outlined in **Section 5.1 & 5.2** above has been added to the existing traffic volumes recorded. SIDRA INTERSECTION 7.0 was used to assess the intersections performance. The purpose of this assessment is to compare the existing intersection operations to the future scenario under the increased traffic load. The results of this assessment are shown in **Table 6** below:

TABLE 6: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 7.0)

Intersection	Peak Hour	Degree of Saturation[(1)]	Average Delay[(2)] (sec/vehicle)	Level of Service[(3)]	Control Type	Worst Movement
EXISTING PERFORMANCE						
Hume Highway / Muir Road	AM	0.58	17.1	B	Signals	N.A
	PM	0.57	18.6	B		N.A
FUTURE PERFORMANCE						
Hume Highway / Muir Road	AM	0.60	17.8	B	Signals	N.A
	PM	0.58	18.6	B		N.A

NOTES:

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

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

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

As shown in **Table 6** above, the performance of the key intersection of the Hume Highway / Muir Road remains unaltered under the future scenario. The existing LoS has been retained with minimal delays and additional capacity maintained.

5.4 Gap Assessment

The southern access driveway for the development is located such that vehicles can manoeuvre into the right turn lane on the Hume Highway. A gap assessment was conducted to support this movement; the results of the survey are summarised in **Section 2.4**. **Table 7** outlines the minimum number of gaps and the corresponding peak hour generation.

TABLE 7: GAP ASSESSMENT

Peak Time	Peak hour	Minimum Gaps from 5 to 8 seconds	Minimum Gaps greater than 8 seconds	Total Gaps > 5 Seconds	Peak Hour Traffic Generation and split
AM	8:15am – 9:15am	98	49	147	42 (21 in, 21 out)
PM	4:00pm – 5:00pm	73	70	143	57 (29 in, 28 out)

As shown above, the number of acceptable gaps for vehicles to enter/exit the Hume Highway in the AM peak time is **147** this corresponds to a peak hour traffic generation of **42** (21 in, 21 out). Based on the **21** vehicles exiting the site there are sufficient gaps within the AM period for vehicles to manoeuvre into the right turn lane on the Hume Highway. Similarly, during the PM peak period the minimum gaps surveyed during the PM period was **143**, corresponding to a peak traffic generation of **57** (29 in, 28 out). Based upon the **28** vehicles exiting the site there are sufficient gaps to manoeuvre into the right turn lane on the Hume Highway.

It is relevant to note that the proposed driveway located at the end of the right turning lanes into Muir Road will be solely used by visitors to the hotel, which typically have their peak traffic movements outside the peak commuter AM and PM periods, namely 7:00 – 9:00am and 4:00 – 6:00pm. This is further supported by the existing survey of the site which had its peak traffic generation occur at 8:45 to 9:45am and 6:00 – 7:00pm.

Furthermore, during the AM and PM period not all vehicles exiting the site will be undertaking this movement, as a result the driveway location is fully supportable in terms of the safety aspects and traffic flow.

5.5 Residential Amenity

The site fronts and has access only to the Hume Highway, a classified roadway. This state road is a major arterial carriageway that is not sensitive to residential amenity considerations.

6 CONCLUSION

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

- Council's DCP requires the provision of **235** car spaces for the residential component and **146** commercial spaces. The site provides **294** residential spaces satisfying Council's DCP car parking requirement for the residential component and it is expected that at least **84** car parking spaces will be provided for the commercial component of the site. The provision of **84** car parking spaces is supportable based upon the previous consent condition the shortfall of **62** spaces from Council's DCP will not have a detrimental impact on the surrounding land uses and it is not envisaged that any over flow will occur onto the surrounding streets. The exact provision of parking for the hotel development will be detailed further during DA stage.

- Council's DCP does not outline any parking rates for motorcycle parking and as such the site does not require the provision of this facility. It is envisaged that motorcycle parking will be provided within the basement car park, which will be detailed during DA stage.

- Based on Council's DCP requirements, the residential component requires five (5) disabled parking spaces. The commercial portion of the development requires one disabled car parking spaces for every 100 car spaces provided. The provision of the commercial disabled car parking spaces will be detailed during DA stage.

- A central delivery and waste collection area is provided on-site. The area will be designed to accommodate a 12.5m length HRV.

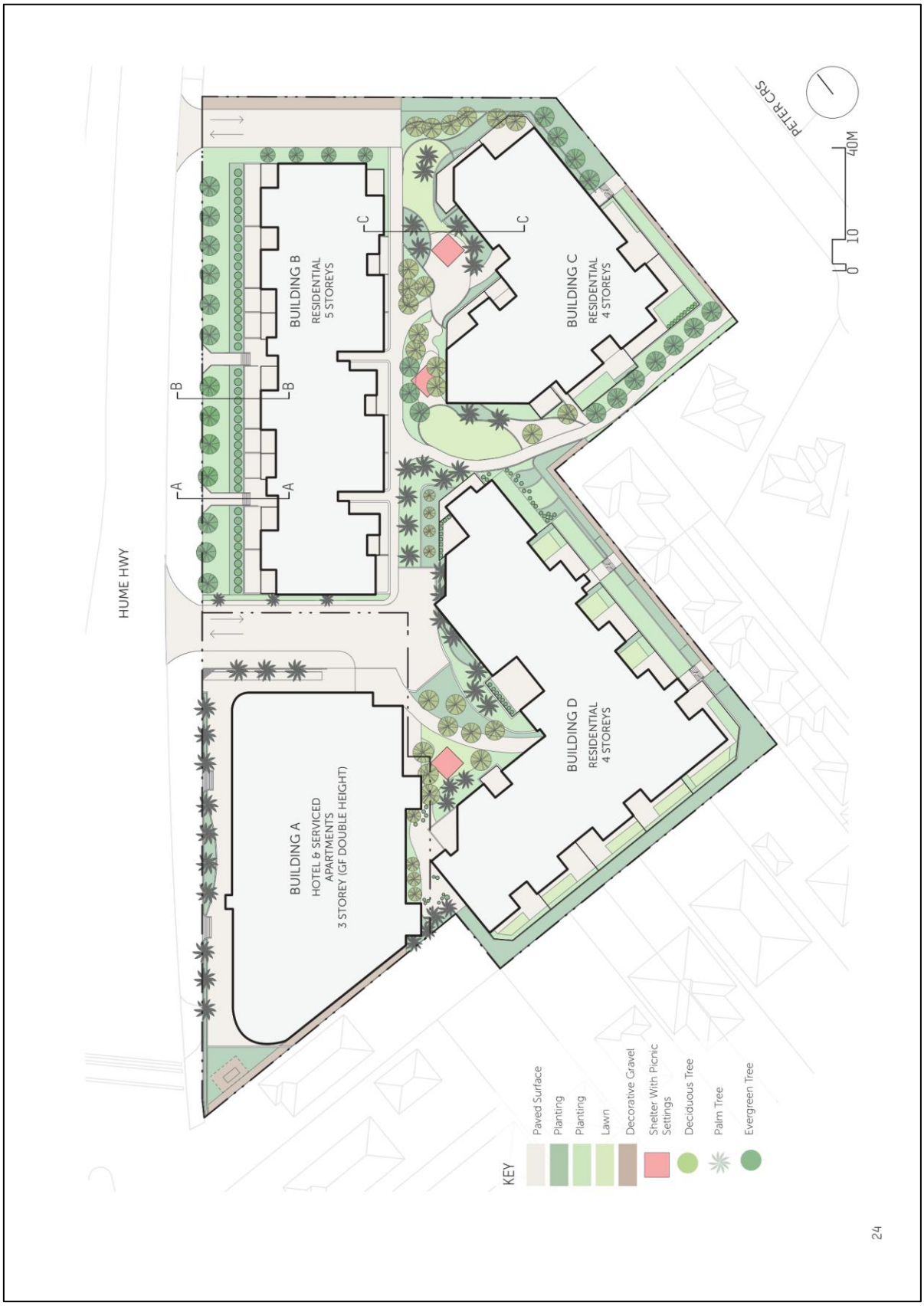
- Based on the Austroads guideline for bicycle parking, the site should provide **42** residential spaces, **10** residential visitor spaces, **10** employee spaces and **2** visitor spaces for the proposed hotel. This parking requirement is a guide for Council and is not strictly required by the development.

- Car parking areas shall be designed in accordance with AS2890.1:2004, AS2890.6:2009, AS2890.2:2002 and AS4299:1995 where applicable.

- The forecast traffic generation is **91** two-way trips in the morning peak hour and **106** two-way trips in the evening peak hour. When taking into consideration the existing site generation, the net increase on the surrounding road network is **79** vehicle trips in the morning and **59** vehicle trips in the evening. The impact of some **79** (25 in, 54 out) and **59** (44 in, 15 out) vehicle trips on the surrounding intersections remain unaltered under the future scenario. The existing LoS has been retained with minimal delays and additional capacity maintained.

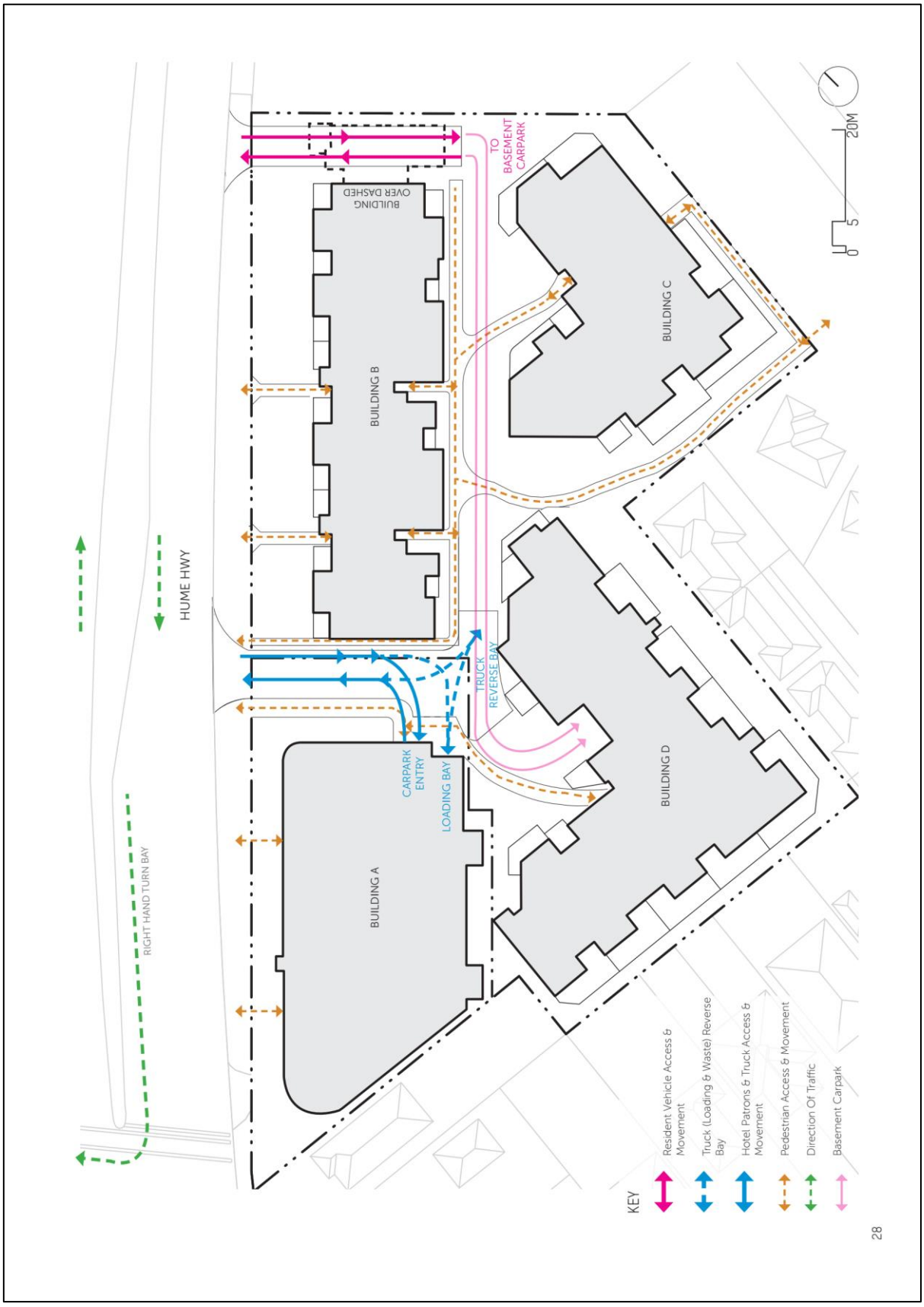
ANNEXURE A: PROPOSED PLAN

(Sheet 1 of 2)



ANNEXURE A: PROPOSED PLAN

(Sheet 2 of 2)



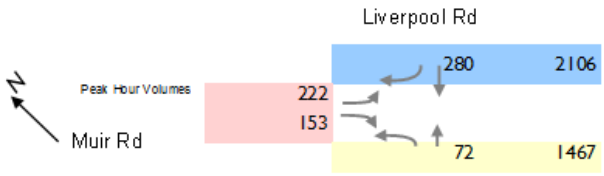
ANNEXURE B: TRAFFIC, PARKING AND SPEED SURVEYS

(SHEET 1 OF 6)

Curtis Traffic Surveys

Turning movement count

Job:	160805mcl (16_408)
Day, date	19/08/16
Location:	Hume Hy & Muir Rd
Weather:	Fine
Client:	McLaren Traffic Engineering



Time Period	From Hume H'y north through	From Hume H'y north right	From Muir Rd left	From Muir Rd right	From Hume H'y south left	From Hume H'y south through	Total vehicles	Peak
06:00 to 06:15	215	31	28	14	17	504	809	
06:15 to 06:30	317	68	32	22	17	460	916	
06:30 to 06:45	254	51	33	25	19	514	896	
06:45 to 07:00	263	42	30	26	24	528	913	
07:00 to 07:15	390	57	55	24	17	513	1056	
07:15 to 07:30	420	48	40	27	18	403	956	
07:30 to 07:45	420	65	38	15	19	512	1069	
07:45 to 08:00	553	81	47	51	14	357	1103	peak
08:00 to 08:15	561	75	59	47	19	321	1082	
08:15 to 08:30	572	59	78	40	20	277	1046	
08:30 to 08:45	478	46	46	34	22	252	878	
08:45 to 09:00	503	82	35	64	22	329	1035	
09:00 to 09:15	403	32	49	41	9	404	938	
09:15 to 09:30	238	25	32	22	13	315	645	
09:30 to 09:45	413	35	37	38	15	301	839	
09:45 to 10:00	405	58	34	57	19	325	898	
Total	6405	855	673	547	284	6315		

ANNEXURE B: TRAFFIC, PARKING AND SPEED SURVEYS

(SHEET 2 OF 6)

Curtis Traffic Surveys

Turning movement count

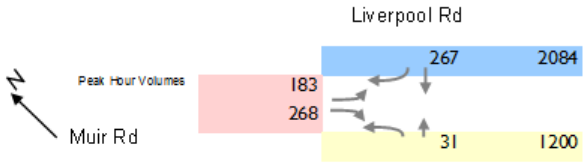
160805mcl (16_408)

Day, date 19/08/16

Location: Hume H'y & Muir Rd

Weather: Fine

Client: McLaren Traffic Engineering



Time Period	From Hume H'y north through	From Hume H'y north right	From Muir Rd left	From Muir Rd right	From Hume H'y south left	From Hume H'y south through	Total vehicles	Peak
15:00 to 15:15	345	67	37	45	19	287	800	
15:15 to 15:30	325	75	40	40	22	295	797	
15:30 to 15:45	434	82	35	50	26	300	927	
15:45 to 16:00	309	67	48	96	16	234	770	
16:00 to 16:15	452	62	41	86	16	267	924	
16:15 to 16:30	543	83	40	50	9	320	1045	peak
16:30 to 16:45	446	65	59	62	12	210	854	
16:45 to 17:00	403	46	101	45	13	186	794	
17:00 to 17:15	425	54	85	52	15	265	896	
17:15 to 17:30	383	72	70	60	12	234	831	
17:30 to 17:45	428	68	61	62	10	245	874	
17:45 to 18:00	452	72	45	66	13	359	1007	
18:00 to 18:15	523	75	52	70	8	301	1029	
18:15 to 18:30	568	66	45	80	4	272	1035	
18:30 to 18:45	541	54	41	52	6	268	962	
18:45 to 19:00	526	42	31	35	10	298	942	
Total	7103	1050	831	951	211	4341		

ANNEXURE B: TRAFFIC, PARKING AND SPEED SURVEYS

(SHEET 3 OF 6)

Curtis Traffic Surveys

Turning movement count

Job: 160805mcl (16_408)

Day, date: 19/08/16

Location: Hume H'y & Muir Rd

Weather: Fine

Client: McLaren Traffic Engineering

	From Hume H'y north		From Palms			
Time Period	North driveway	second driveway	third driveway	south driveway	Total vehicles	Peak
06:00 to 06:15	0	0	0	0	0	
06:15 to 06:30	0	0	0	0	0	
06:30 to 06:45	0	0	0	0	0	
06:45 to 07:00	0	0	1	2	3	
07:00 to 07:15	0	0	2	0	2	
07:15 to 07:30	0	0	0	0	0	
07:30 to 07:45	0	0	0	1	1	
07:45 to 08:00	1	1	1	0	3	
08:00 to 08:15	0	0	0	1	1	
08:15 to 08:30	1	0	1	2	4	
08:30 to 08:45	0	0	0	1	1	
08:45 to 09:00	1	0	2	2	5	peak
09:00 to 09:15	0	1	0	0	1	
09:15 to 09:30	2	0	0	1	3	
09:30 to 09:45	1	0	1	1	3	
09:45 to 10:00	1	0	1	0	2	
Total	7	2	9	11		

ANNEXURE B: TRAFFIC, PARKING AND SPEED SURVEYS

(SHEET 4 OF 6)

Curtis Traffic Surveys

Turning movement count

Job: 160805mcl (16_408)

Day, date: 19/08/16

Location: Hume H'y & Muir Rd

Weather: Fine

Client: McLaren Traffic Engineering

	From Hume H'y north		From Palms			
Time Period	North driveway	second driveway	third driveway	south driveway	Total vehicles	Peak
15:00 to 15:15	1	0	1	0	2	
15:15 to 15:30	2	1	0	0	3	
15:30 to 15:45	1	0	3	0	4	
15:45 to 16:00	2	2	1	0	5	
16:00 to 16:15	5	4	0	0	9	
16:15 to 16:30	7	4	2	0	13	
16:30 to 16:45	1	2	3	1	7	
16:45 to 17:00	6	2	5	0	13	
17:00 to 17:15	1	1	2	0	4	
17:15 to 17:30	2	1	3	1	7	
17:30 to 17:45	5	3	1	1	10	
17:45 to 18:00	4	3	5	0	12	
18:00 to 18:15	3	1	2	0	6	
18:15 to 18:30	5	2	7	1	15	
18:30 to 18:45	2	2	4	2	10	
18:45 to 19:00	4	6	5	1	16	peak
Total	51	34	44	7		

ANNEXURE B: TRAFFIC, PARKING AND SPEED SURVEYS

(SHEET 5 OF 6)

TRANS TRAFFIC SURVEY

ABN	18 434 565 435
Contact	Binh S Vo
Email	traffic@trafficsurvey.com.au
Date	30/02/2017
Weather: Fine, max 20 deg C	

From	To	Southbound	
		From 5 to 8 sec	> 8 sec
7:00	7:15	18	26
7:15	7:30	30	19
7:30	7:45	28	18
7:45	8:00	25	13
8:00	8:15	29	15
8:15	8:30	30	10
8:30	8:45	25	14
8:45	9:00	21	10
9:00	9:15	22	15
9:15	9:30	36	15
9:30	9:45	23	22
9:45	10:00	28	22
16:00	16:15	16	14
16:15	16:30	23	19
16:30	16:45	14	20
16:45	17:00	20	17
17:00	17:15	23	18
17:15	17:30	23	16
17:30	17:45	27	15
17:45	18:00	19	16
18:00	18:15	18	18
18:15	18:30	30	16
18:30	18:45	28	15
18:45	19:00	27	20

ANNEXURE B: TRAFFIC, PARKING AND SPEED SURVEYS

(SHEET 6 OF 6)

From	To	Queue Length Number of cars
07:00	07:05	6
07:05	07:10	3
07:10	07:15	4
07:15	07:20	3
07:20	07:25	5
07:25	07:30	4
07:30	07:35	5
07:35	07:40	5
07:40	07:45	4
07:45	07:50	6
07:50	07:55	5
07:55	08:00	8
08:00	08:05	4
08:05	08:10	3
08:10	08:15	7
08:15	08:20	6
08:20	08:25	5
08:25	08:30	5
08:30	08:35	4
08:35	08:40	5
08:40	08:45	3
08:45	08:50	6
08:50	08:55	3
08:55	09:00	5
09:00	09:05	3
09:05	09:10	3
09:10	09:15	3
09:15	09:20	4
09:20	09:25	2
09:25	09:30	4
09:30	09:35	4
09:35	09:40	3
09:40	09:45	3
09:45	09:50	4
09:50	09:55	2
09:55	10:00	1
16:00	16:05	2
16:05	16:10	4
16:10	16:15	3
16:15	16:20	7
16:20	16:25	3
16:25	16:30	6
16:30	16:35	4
16:35	16:40	5
16:40	16:45	4
16:45	16:50	3
16:50	16:55	2
16:55	17:00	4
17:00	17:05	5
17:05	17:10	5
17:10	17:15	7
17:15	17:20	6
17:20	17:25	4
17:25	17:30	6
17:30	17:35	5
17:35	17:40	6
17:40	17:45	6
17:45	17:50	5
17:50	17:55	3
17:55	18:00	3
18:00	18:05	5
18:05	18:10	3
18:10	18:15	4
18:15	18:20	3
18:20	18:25	2
18:25	18:30	2
18:30	18:35	1
18:35	18:40	2
18:40	18:45	1
18:45	18:50	2
18:50	18:55	3
18:55	19:00	1

ANNEXURE C: SIDRA OUTPUT RESULTS

(Sheet 1 of 2)

MOVEMENT SUMMARY

Site: 101 [Hume & Muir AM- Existing]

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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
NorthEast: Hume Highway (N)											
25	T1	2217	5.0	0.581	8.9	LOS A	22.1	161.4	0.52	0.48	52.4
26	R2	295	5.0	0.548	57.8	LOS E	8.2	59.8	0.98	0.80	30.5
Approach		2512	5.0	0.581	14.6	LOS B	22.1	161.4	0.58	0.52	48.3
NorthWest: Muir Road											
27	L2	234	5.0	0.300	10.8	LOS A	4.5	32.9	0.41	0.68	50.2
29	R2	161	5.0	0.234	50.3	LOS D	4.0	29.4	0.89	0.76	32.6
Approach		395	5.0	0.300	26.9	LOS B	4.5	32.9	0.60	0.71	41.2
SouthWest: Hume Highway (S)											
30	L2	76	5.0	0.055	6.9	LOS A	0.6	4.3	0.19	0.60	53.1
31	T1	1544	5.0	0.536	21.2	LOS B	20.1	146.7	0.73	0.65	44.6
Approach		1620	5.0	0.536	20.5	LOS B	20.1	146.7	0.70	0.65	44.9
All Vehicles		4526	5.0	0.581	17.8	LOS B	22.1	161.4	0.62	0.58	46.4

MOVEMENT SUMMARY

Site: 101 [Hume & Muir PM- Existing]

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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
NorthEast: Hume Highway (N)											
25	T1	2194	5.0	0.574	8.8	LOS A	21.6	158.0	0.52	0.48	52.4
26	R2	281	5.0	0.448	54.2	LOS D	7.5	54.7	0.94	0.80	31.5
Approach		2475	5.0	0.574	14.0	LOS A	21.6	158.0	0.57	0.51	48.7
NorthWest: Muir Road											
27	L2	193	5.0	0.224	8.9	LOS A	2.8	20.1	0.32	0.65	51.6
29	R2	282	5.0	0.410	52.1	LOS D	7.3	53.6	0.92	0.79	32.1
Approach		475	5.0	0.410	34.6	LOS C	7.3	53.6	0.68	0.73	37.9
SouthWest: Hume Highway (S)											
30	L2	33	5.0	0.024	6.7	LOS A	0.2	1.6	0.18	0.58	53.2
31	T1	1263	5.0	0.461	21.9	LOS B	16.2	118.1	0.71	0.63	44.2
Approach		1296	5.0	0.461	21.5	LOS B	16.2	118.1	0.70	0.63	44.4
All Vehicles		4245	5.0	0.574	18.6	LOS B	21.6	158.0	0.62	0.57	45.9

ANNEXURE C: SIDRA OUTPUT RESULTS

(Sheet 2 of 2)

MOVEMENT SUMMARY

Site: 101 [Hume & Muir AM- Future]

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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
NorthEast: Hume Highway (N)											
25	T1	2281	5.0	0.597	9.1	LOS A	23.2	169.2	0.53	0.49	52.3
26	R2	295	5.0	0.548	57.8	LOS E	8.2	59.8	0.98	0.80	30.5
Approach		2576	5.0	0.597	14.6	LOS B	23.2	169.2	0.58	0.53	48.3
NorthWest: Muir Road											
27	L2	234	5.0	0.300	10.8	LOS A	4.5	32.9	0.41	0.68	50.2
29	R2	161	5.0	0.234	50.3	LOS D	4.0	29.4	0.89	0.76	32.6
Approach		395	5.0	0.300	26.9	LOS B	4.5	32.9	0.60	0.71	41.2
SouthWest: Hume Highway (S)											
30	L2	76	5.0	0.055	6.9	LOS A	0.6	4.3	0.19	0.60	53.1
31	T1	1544	5.0	0.536	21.2	LOS B	20.1	146.7	0.73	0.65	44.6
Approach		1620	5.0	0.536	20.5	LOS B	20.1	146.7	0.70	0.65	44.9
All Vehicles		4591	5.0	0.597	17.8	LOS B	23.2	169.2	0.63	0.58	46.4

MOVEMENT SUMMARY

Site: 101 [Hume & Muir PM- Future]

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

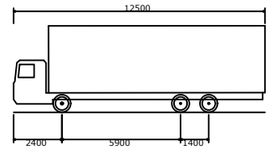
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
NorthEast: Hume Highway (N)											
25	T1	2220	5.0	0.581	8.9	LOS A	22.1	161.3	0.52	0.48	52.4
26	R2	281	5.0	0.448	54.2	LOS D	7.5	54.7	0.94	0.80	31.5
Approach		2501	5.0	0.581	14.0	LOS A	22.1	161.3	0.57	0.52	48.7
NorthWest: Muir Road											
27	L2	193	5.0	0.224	8.9	LOS A	2.8	20.1	0.32	0.65	51.6
29	R2	282	5.0	0.410	52.1	LOS D	7.3	53.6	0.92	0.79	32.1
Approach		475	5.0	0.410	34.6	LOS C	7.3	53.6	0.68	0.73	37.9
SouthWest: Hume Highway (S)											
30	L2	33	5.0	0.024	6.7	LOS A	0.2	1.6	0.18	0.58	53.2
31	T1	1263	5.0	0.461	21.9	LOS B	16.2	118.1	0.71	0.63	44.2
Approach		1296	5.0	0.461	21.5	LOS B	16.2	118.1	0.70	0.63	44.4
All Vehicles		4272	5.0	0.581	18.6	LOS B	22.1	161.3	0.62	0.57	45.9

Attachment Two

Swept Path Assessment

KEY:

	Forward	Reverse
Wheel path		
Body envelope		
300mm clearance		



HRV - Heavy Rigid Vehicle

Overall Length	12500mm
Overall Width	2500mm
Overall Body Height	4300mm
Min Body Ground Clearance	417mm
Track Width	2500mm
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12500mm

HRV - Heavy Rigid Vehicle

RL. 50.000
RL. 49.950
RL. 49.750
RL. 49.320
RL. 48.090
RL. 49.590
RL. 49.540
RL. 49.340
RL. 49.215
RL. 47.011
RL. 48.800
RL. 50.500

LINE OF BUILDING ABOVE
BOUNDARY
BUILDING OVERHEAD
TDOOR DINING
ICTION CENTRE
RETAIL LOBBY
RESI. LOBBY
COMMERICAL SPACE
STAIR
POTENTIAL COMMERICAL BREAKDOWN
LINE OF BASEMENT ACCESS ROAD BELOW
GREEEN ROOF TO LOADING DOCK
GROUND PLAN TERRACED TO ACCOMMODATE TOPOGRAPHY
COMMUNAL OPEN SPACE
ALLOW TO TERRACE
G EASEMENT
2 BED
1:6.5
1:4
1:8
1:14
1:16

Date: 16 September 2021
Filename: 21335CAD002-210916-CAR PARK REVIEW.dwg

REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	KM	KH	KH	16/09/21

ttpp transport planning

PROJECT
167 HUME HIGHWAY, CHULLORA

TITLE
SWEPT PATH ANALYSIS - GROUND LEVEL
AS2890.2 12.5m HEAVY RIGID VEHICLE

DWG No. 21335CAD002 FIGURE 3
DATE STAMP 16 SEPTEMBER 2021
PROJECT No. 21335
SCALE 1:300 @A3
REV. A

Attachment Three

SIDRA Results

MOVEMENT SUMMARY

Site: 1 [Hume & Muir AM- Existing Surveyed]

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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
NorthEast: Hume Highway (N)											
25	T1	2217	5.0	0.581	8.9	LOS A	22.1	161.4	0.52	0.48	49.1
26	R2	295	5.0	0.548	57.8	LOS E	8.2	59.8	0.98	0.80	30.5
Approach		2512	5.0	0.581	14.6	LOS B	22.1	161.4	0.58	0.52	44.6
NorthWest: Muir Road											
27	L2	234	5.0	0.300	10.8	LOS A	4.5	32.9	0.41	0.68	50.2
29	R2	161	5.0	0.234	50.3	LOS D	4.0	29.4	0.89	0.76	26.3
Approach		395	5.0	0.300	26.9	LOS B	4.5	32.9	0.60	0.71	39.1
SouthWest: Hume Highway (S)											
30	L2	76	5.0	0.055	6.9	LOS A	0.6	4.3	0.19	0.60	50.1
31	T1	1544	5.0	0.536	21.2	LOS B	20.1	146.7	0.73	0.65	39.3
Approach		1620	5.0	0.536	20.5	LOS B	20.1	146.7	0.70	0.65	39.7
All Vehicles		4526	5.0	0.581	17.8	LOS B	22.1	161.4	0.62	0.58	42.2

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P6	NorthEast Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	21.1	LOS C	0.1	0.1	0.59	0.59
All Pedestrians		105	37.7	LOS D			0.77	0.77

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: 2 [Hume & Muir AM- Existing (2021)]

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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
NorthEast: Hume Highway (N)											
25	T1	2461	5.0	0.645	9.6	LOS A	26.6	194.4	0.56	0.52	48.4
26	R2	327	5.0	0.609	58.4	LOS E	9.2	67.2	0.99	0.81	30.4
Approach		2788	5.0	0.645	15.3	LOS B	26.6	194.4	0.61	0.56	44.0
NorthWest: Muir Road											
27	L2	259	5.0	0.343	12.3	LOS A	5.8	42.5	0.47	0.70	49.3
29	R2	179	5.0	0.260	50.5	LOS D	4.5	32.9	0.89	0.76	26.2
Approach		438	5.0	0.343	27.9	LOS B	5.8	42.5	0.64	0.73	38.7
SouthWest: Hume Highway (S)											
30	L2	84	5.0	0.061	7.0	LOS A	0.7	5.1	0.20	0.60	49.9
31	T1	1714	5.0	0.599	22.1	LOS B	23.5	171.5	0.76	0.68	38.7
Approach		1798	5.0	0.599	21.4	LOS B	23.5	171.5	0.73	0.68	39.1
All Vehicles		5024	5.0	0.645	18.6	LOS B	26.6	194.4	0.66	0.61	41.6

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.
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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P6	NorthEast Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	21.1	LOS C	0.1	0.1	0.59	0.59
All Pedestrians		105	37.7	LOS D			0.77	0.77

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: 2 [Hume & Muir AM- Existing (2021) + Dev]

Network: N101 [Future AM]

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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
NorthEast: Hume Highway (N)													
25	T1	2482	5.0	2482	5.0	0.651	9.7	LOS A	27.1	197.5	0.57	0.52	39.9
26	R2	331	5.0	331	5.0	0.614	58.4	LOS E	9.3	67.9	0.99	0.81	24.1
Approach		2813	5.0	2813	5.0	0.651	15.4	LOS B	27.1	197.5	0.62	0.56	34.9
NorthWest: Muir Road													
27	L2	259	5.0	259	5.0	0.343	12.3	LOS A	5.8	42.5	0.47	0.70	43.1
29	R2	179	5.0	179	5.0	0.260	50.5	LOS D	4.5	32.9	0.89	0.76	26.2
Approach		438	5.0	438	5.0	0.343	27.9	LOS B	5.8	42.5	0.64	0.73	33.1
SouthWest: Hume Highway (S)													
30	L2	84	5.0	84	5.0	0.061	7.0	LOS A	0.7	5.1	0.20	0.60	49.9
31	T1	1714	5.0	1714	5.0	0.599	22.1	LOS B	23.5	171.5	0.76	0.68	18.9
Approach		1798	5.0	1798	5.0	0.599	21.4	LOS B	23.5	171.5	0.73	0.68	21.1
All Vehicles		5048	5.0	5048	5.0	0.651	18.6	LOS B	27.1	197.5	0.66	0.62	30.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 0.9 %
Number of Iterations: 9 (maximum specified: 10)

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
P6	NorthEast Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	21.1	LOS C	0.1	0.1	0.59	0.59
All Pedestrians		105	37.7	LOS D			0.77	0.77

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 [Site Egress AM (2021) + Dev]

Network: N101 [Future AM]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Site egress													
21	L2	32	0.0	32	0.0	0.081	10.2	LOS A	0.2	1.3	0.60	0.83	45.1
Approach		32	0.0	32	0.0	0.081	10.2	LOS A	0.2	1.3	0.60	0.83	45.1
NorthEast: Hume Highway (N)													
25	T1	2451	0.0	2451	0.0	0.533	0.1	LOS A	0.0	0.0	0.00	0.00	59.8
Approach		2451	0.0	2451	0.0	0.533	0.1	NA	0.0	0.0	0.00	0.00	59.8
SouthWest: Hume Highway (S)													
31	T1	1974	0.0	1974	0.0	0.337	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1974	0.0	1974	0.0	0.337	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		4456	0.0	4456	0.0	0.533	0.1	NA	0.2	1.3	0.00	0.01	59.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 0.9 %
Number of Iterations: 9 (maximum specified: 10)

MOVEMENT SUMMARY

Site: 3 [Hume & Muir PM- Existing Surveyed]

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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
NorthEast: Hume Highway (N)											
25	T1	2194	5.0	0.574	8.8	LOS A	21.6	158.0	0.52	0.48	49.2
26	R2	281	5.0	0.448	54.2	LOS D	7.5	54.7	0.94	0.80	31.5
Approach		2475	5.0	0.574	14.0	LOS A	21.6	158.0	0.57	0.51	45.0
NorthWest: Muir Road											
27	L2	193	5.0	0.224	8.9	LOS A	2.8	20.1	0.32	0.65	51.6
29	R2	282	5.0	0.410	52.1	LOS D	7.3	53.6	0.92	0.79	25.8
Approach		475	5.0	0.410	34.6	LOS C	7.3	53.6	0.68	0.73	34.6
SouthWest: Hume Highway (S)											
30	L2	33	5.0	0.024	6.7	LOS A	0.2	1.6	0.18	0.58	50.3
31	T1	1263	5.0	0.461	21.9	LOS B	16.2	118.1	0.71	0.63	38.8
Approach		1296	5.0	0.461	21.5	LOS B	16.2	118.1	0.70	0.63	39.1
All Vehicles		4245	5.0	0.574	18.6	LOS B	21.6	158.0	0.62	0.57	41.6

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.
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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P6	NorthEast Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	22.9	LOS C	0.1	0.1	0.62	0.62
All Pedestrians		105	38.6	LOS D			0.79	0.79

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 [Hume & Muir PM- Existing (2021)]

4
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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
NorthEast: Hume Highway (N)											
25	T1	2457	5.0	0.643	9.6	LOS A	26.5	193.1	0.56	0.52	48.5
26	R2	315	5.0	0.501	54.8	LOS D	8.5	62.0	0.95	0.80	31.3
Approach		2772	5.0	0.643	14.7	LOS B	26.5	193.1	0.61	0.55	44.5
NorthWest: Muir Road											
27	L2	216	5.0	0.261	9.9	LOS A	3.6	26.6	0.37	0.66	50.9
29	R2	316	5.0	0.459	52.6	LOS D	8.3	60.7	0.94	0.80	25.6
Approach		532	5.0	0.459	35.3	LOS C	8.3	60.7	0.70	0.74	34.3
SouthWest: Hume Highway (S)											
30	L2	37	5.0	0.027	6.8	LOS A	0.3	2.0	0.19	0.59	50.1
31	T1	1415	5.0	0.517	22.7	LOS B	18.8	137.1	0.74	0.66	38.3
Approach		1452	5.0	0.517	22.3	LOS B	18.8	137.1	0.73	0.65	38.6
All Vehicles		4755	5.0	0.643	19.3	LOS B	26.5	193.1	0.65	0.60	41.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P6	NorthEast Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	22.9	LOS C	0.1	0.1	0.62	0.62
All Pedestrians		105	38.6	LOS D			0.79	0.79

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 [Hume & Muir PM- Existing (2021) + Dev]

Network: N101 [Future PM]

4
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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
NorthEast: Hume Highway (N)													
25	T1	2515	5.0	2515	5.0	0.658	9.8	LOS A	27.6	201.7	0.57	0.53	48.3
26	R2	322	5.0	322	5.0	0.513	54.9	LOS D	8.7	63.6	0.96	0.80	25.0
Approach		2837	5.0	2837	5.0	0.658	14.9	LOS B	27.6	201.7	0.62	0.56	43.7
NorthWest: Muir Road													
27	L2	216	5.0	216	5.0	0.261	9.9	LOS A	3.6	26.6	0.37	0.66	45.6
29	R2	316	5.0	316	5.0	0.459	52.6	LOS D	8.3	60.7	0.94	0.80	31.9
Approach		532	5.0	532	5.0	0.459	35.3	LOS C	8.3	60.7	0.70	0.74	34.6
SouthWest: Hume Highway (S)													
30	L2	37	5.0	37	5.0	0.027	6.8	LOS A	0.3	2.0	0.19	0.59	53.1
31	T1	1415	5.0	1415	5.0	0.517	22.7	LOS B	18.8	137.1	0.74	0.66	34.7
Approach		1452	5.0	1452	5.0	0.517	22.3	LOS B	18.8	137.1	0.73	0.65	35.3
All Vehicles		4820	5.0	4820	5.0	0.658	19.4	LOS B	27.6	201.7	0.66	0.61	39.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 0.8 %
Number of Iterations: 10 (maximum specified: 10)

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
P6	NorthEast Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P7	NorthWest Full Crossing	53	22.9	LOS C	0.1	0.1	0.62	0.62
All Pedestrians		105	38.6	LOS D			0.79	0.79

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 [Site Egress PM (2021) + Dev]

Network: N101 [Future PM]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Site egress													
21	L2	88	0.0	88	0.0	0.230	10.7	LOS A	0.6	3.9	0.62	0.85	44.6
Approach		88	0.0	88	0.0	0.230	10.7	LOS A	0.6	3.9	0.62	0.85	44.6
NorthEast: Hume Highway (N)													
25	T1	2426	0.0	2426	0.0	0.543	0.1	LOS A	0.0	0.0	0.00	0.00	59.7
Approach		2426	0.0	2426	0.0	0.543	0.1	NA	0.0	0.0	0.00	0.00	59.7
SouthWest: Hume Highway (S)													
31	T1	1631	0.0	1631	0.0	0.279	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1631	0.0	1631	0.0	0.279	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		4145	0.0	4145	0.0	0.543	0.3	NA	0.6	3.9	0.01	0.02	59.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 0.8 %
Number of Iterations: 10 (maximum specified: 10)