Reference: #N118460

13 October 2017

Architecture Design Studio Pty Ltd
11 Egerton Street
SILVERWATER NSW 2128

Attention: Mr Ihab Shams

Dear Ihab

RE: TRAFFIC AND TRANSPORT ASSESSMENT FOR PLANNING PROPOSAL AT 4-8 HOXTON PARK ROAD, LIVERPOOL

A planning proposal is to be lodged with Liverpool City Council (Council) for land located at 4-8 Hoxton Park Road, Liverpool. The planning proposal seeks to amend the following:

- Zoning of the land from B6-Enterprise Corridor to B4-Mixed Use
- Maximum height of buildings to 50 metres
- Maximum floor space ratio (FSR) to 5:1.

Ozzy Tyres Holdings engaged GTA Consultants (GTA) to complete a transport impact assessment considering the planning proposal and indicative site layout prepared by Architecture Design Studio, considering the potential traffic generated by the adjacent 311 Hume Highway, Liverpool development.

Transport and Traffic Planning Associates (TTPA) prepared a report[1] dated January 2015 for the 311 Hume Highway, Liverpool development. Following this, TTPA submitted an addendum letter[2] to address the traffic and transport requirements based on the proposed vehicle access restriction for left-in/ left-out only at the Hoxton Park Road/ Gillespie Street intersection in May 2015.

Overview

The site is currently zoned as B6-Enterprise Corridor and occupied by a single storey warehouse/ commercial building for "Freight Services". Access to on-site loading and parking is via a two-lane, two-way driveway along Gillespie Street on the western edge of the site. It is understood that a small amount of on-site parking (up to four car spaces and one semi-trailer space) is currently provided, with up to three vehicles entering and exiting the site during any peak hours on a typical weekday.

The location of the subject site is identified in Figure 1.

[1] Planning Proposal for Mixed Use Development, 311 Hume Highway Liverpool – Assessment of Traffic and Parking Implications, Transport and Traffic Planning Associates, January 2015.

[2] Proposed Development - 311 Hume Highway Liverpool, May 2015.

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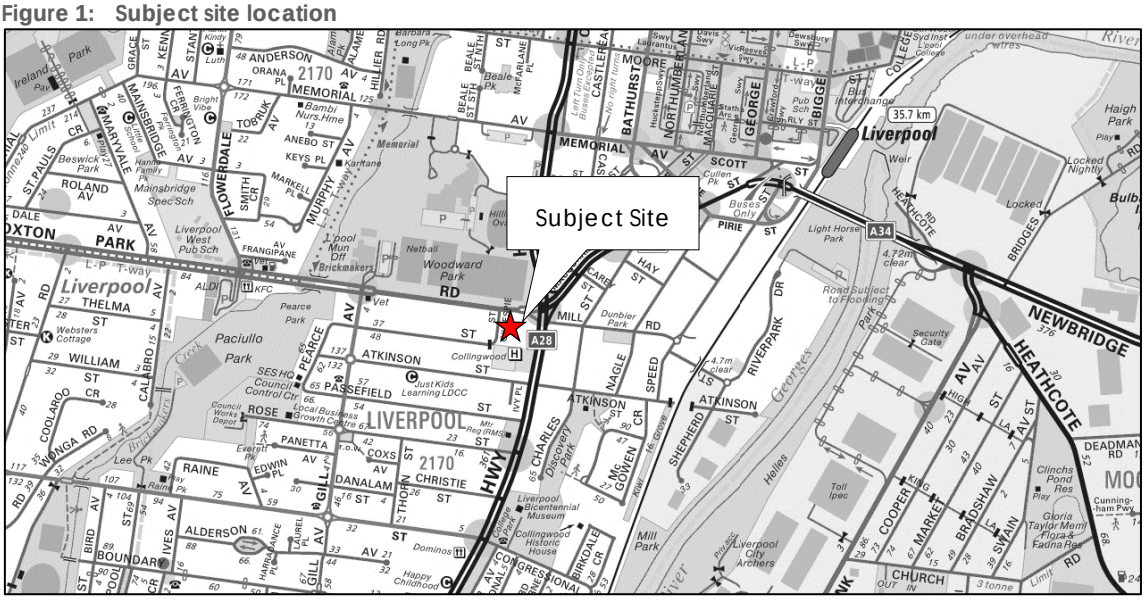
Figure 1: Subject site location



Base map source: Sydway

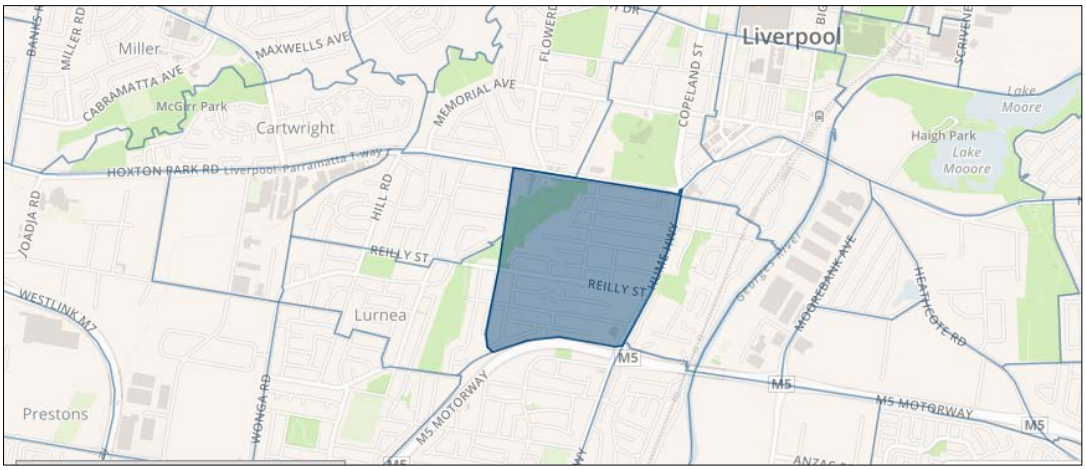
2011 Journey to Work Data

The Journey to Work (JTW) data published by the Bureau of Transport Statistics (BTS) from 2011 Census data by the Australian Bureau of Statistics provides the most robust picture of travel patterns to/ from the Liverpool.

The smallest geographical area for which JTW data is available is a Travel Zone (TZ). JTW data was analysed for the site catchment, to better understand the current travel patterns for people who live and work in the area.

Figure 2 shows the selected catchment represented as TZ 3846.

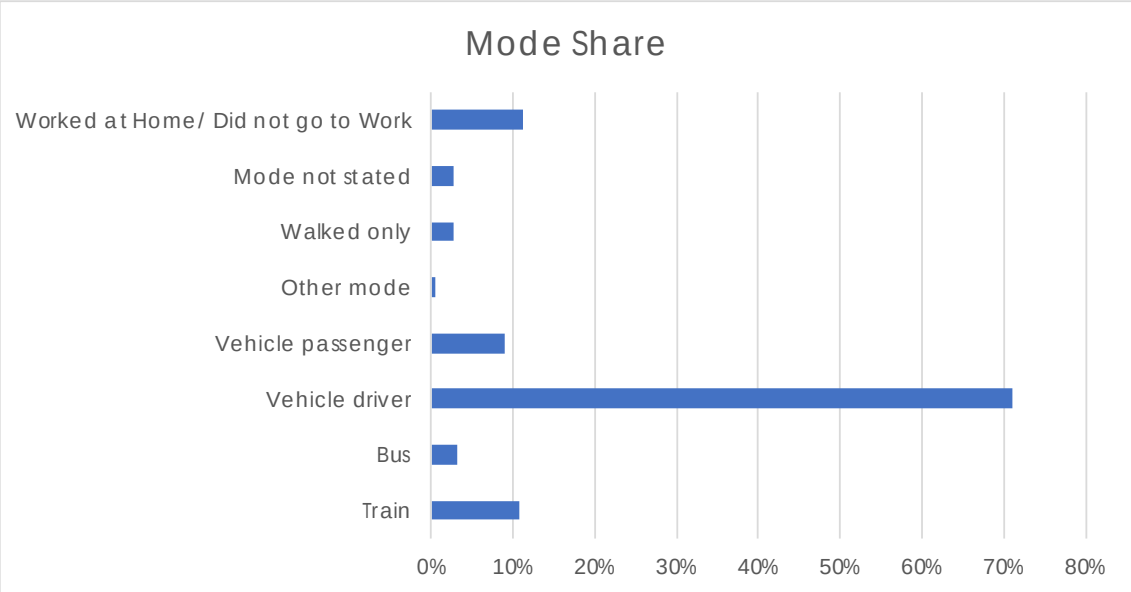
Figure 2: Selected TZ



Data source: Bureau of Transport Statistics, http://visual.bts.nsw.gov.au/jtwbasic/#3846, accessed 29 September 2017.

The 2011 JTW data indicates that a total of 1,062 people live in the selected TZ. Out of the 1,062 residents, a total of 108 residents (10 per cent) worked at home or did not go to work.

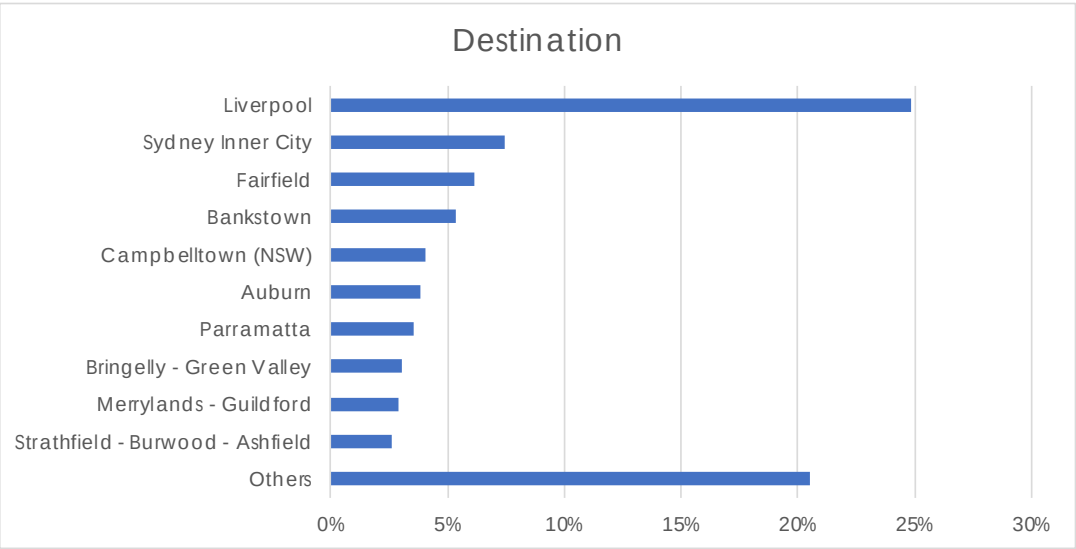
Figure 3: JTW travel modes by residents from selected TZ



Data source: http://visual.bts.nsw.gov.au/jtwbasic/#3846, accessed 29 September 2017.

Figure 3 indicates 80 per cent of working residents in the selected TZ travel to work by car either as a driver (71 per cent) or a passenger (nine per cent). The JTW data indicates bus services only make up three per cent of commuter travel, whilst train services make up 11 per cent of total commuter travel modes.

Figure 4: JTW destination by residents from selected TZ



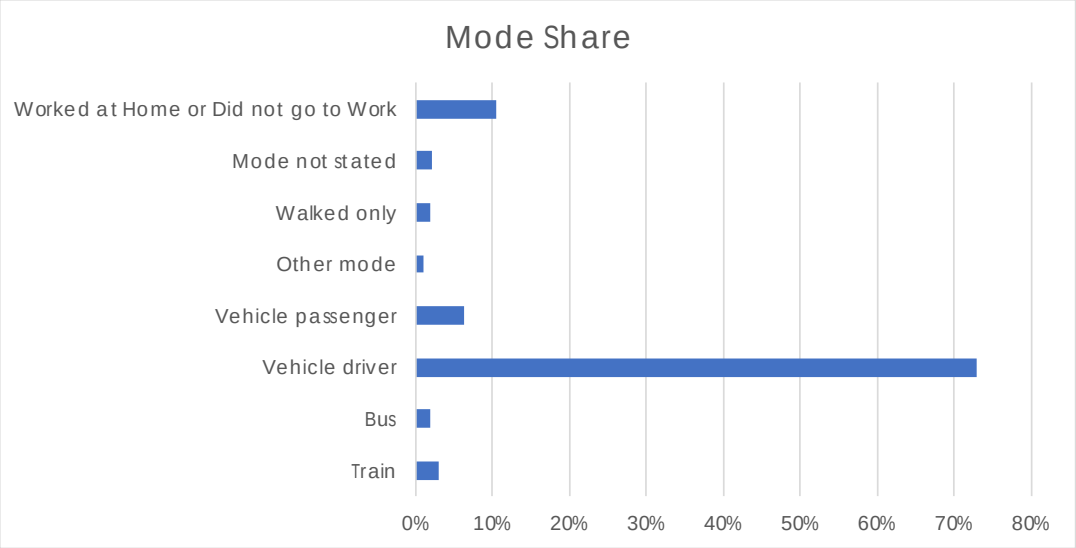
Data source: http://visual.bts.nsw.gov.au/jtwbasic/#3846, accessed 29 September 2017.

The JTW data also provides the destination areas for these residents from the selected TZ, as shown in Figure 4. Of these, Liverpool (25 per cent), Sydney CBD (seven per cent), Fairfield (six per cent), Bankstown (five per cent) and Campbelltown/ Parramatta/ Auburn (four per cent) are the most popular destinations.

The 2011 JTW data indicates that a total of 992 people work within the selected TZ.

Figure 5 shows the distribution of travel modes by workers employed in the selected Travel Zone, which indicates that approximately 79 per cent of workers who work in the selected TZ travel to work by car as a driver (73 per cent) or a passenger (six per cent). Public transportation modes such as train (three per cent) and bus (two per cent) services only make up five per cent of total commuter travel modes.

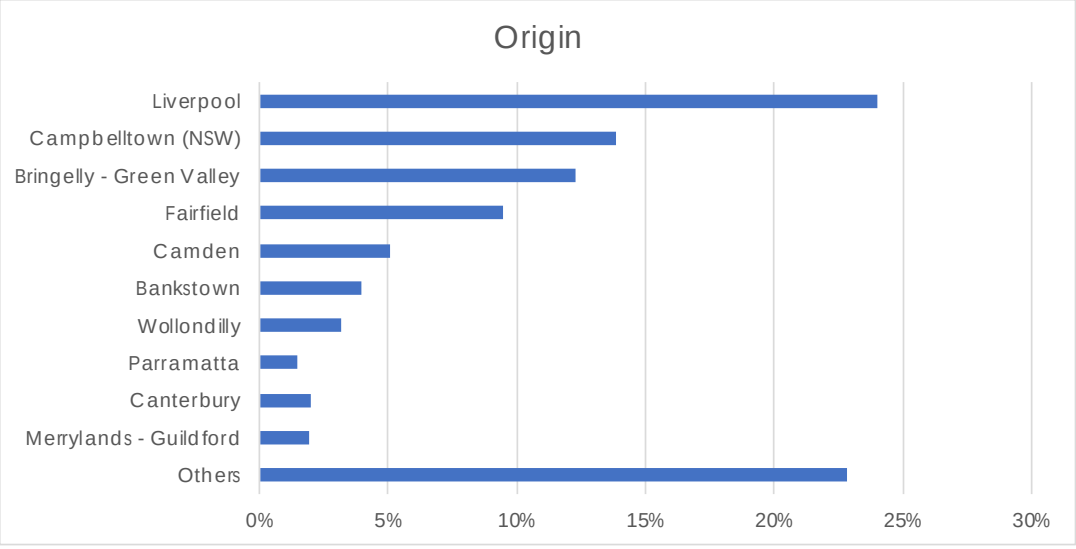
Figure 5: JTW travel modes by workers to the selected TZ



Data source: http://visual.bts.nsw.gov.au/jtwbasic/#3846, accessed 29 September 2017.

Figure 6 represents the top places of origin the 992 workers travelling to the selected TZ originate from. Liverpool is the top origin (24 per cent), with Campbelltown (14 per cent), Bringelly (12 per cent) and Fairfield (nine per cent) indicating a significant number of origins. Other minor places of origin include Camden (five per cent), Bankstown (four per cent) and Wollondilly (three per cent).

Figure 6: JTW origins by workers to selected TZ



Data source: http://visual.bts.nsw.gov.au/jtwbasic/#3846, accessed 29 September 2017.

Public Transport

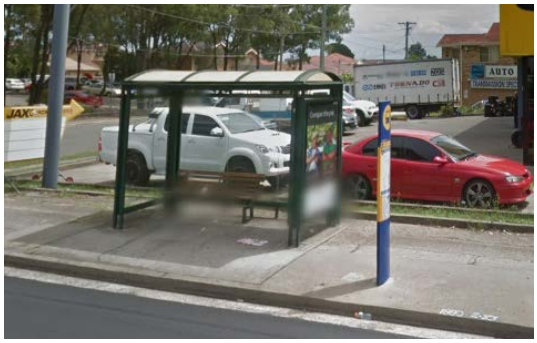
A review of the public transport available near the site is summarised in Table 1.

Table 1: Public transport provision

Service	Route Number	Route Description	Location of Stop	Distance to Nearest Stop	Frequency On/Off Peak
Bus	851	Carnes Hill Marketplace to Liverpool via Cowpasture Road	Hume Highway	330 m	30 minutes peak/ hourly off peak
	852	Carnes Hill Marketplace to Liverpool via Greenway Dr & Cowpasture Rd	Macquarie Street near Short Street	200 m	Hourly peak and off peak
	853	Liverpool to Carnes Hill via Hoxton Park Road	Hoxton Park Road near Gillespie Street	100 m	15 minutes peak/ hourly off peak
	855	Rutleigh Park to Liverpool via Austral and Leppington Station	Hume Highway	330 m	Irregular
	856	Bringelly to Liverpool			Irregular
	857	Narellan to Liverpool			30-60 minutes throughout day
	865	Casula to Liverpool via Lurnea Shops			30 minutes peak and off peak
	866	Casula to Liverpool			30 minutes peak and off peak
	869	Ingleburn to Liverpool via Edmondson Park and Prestons			30 minutes peak and off peak
	870	Campbelltown to Liverpool			30 minutes peak/ hourly off peak
	871	Campbelltown to Liverpool via Glenfield			Irregular
	872	Campbelltown to Liverpool via Macquarie Fields			30 minutes peak and off peak
Train	T5	Cumberland line -Campbelltown to Schofields	Liverpool Station	1.1 km	30 minutes peak/off-peak
	T3	Liverpool to City via Bankstown			30 minutes peak/off-peak
	T2	Airport line – Campbelltown or Leppington to City			5-10minutes peak/30 minutes off-peak

The existing bus stop facilities, including a mix of bus shelters, bus blade signs and bus stop signs (on utility pole) in the surrounding area are shown in Figure 7 to Figure 10.

Figure 7: Bus shelter on the Hume Highway (northbound) south of Hoxton Park Road



Source: Google Streetview

Figure 8: Bus blade sign on the Hume Highway (southbound) south of Hoxton Park Road

Source: Google Streetview

Figure 9: Bus stop sign and bus zone on Hoxton Park Road (eastbound) west of the Hume Highway

Source: Google Streetview

Figure 10: Bus stop sign on Hoxton Park Road (westbound) west of the Hume Highway

Source: Google Streetview

Walking

Pedestrian paths near the site are established on both sides of the surrounding roads as follows:

- Gillespie Street
- Hoxton Park Road
- Scott Street, providing access to Liverpool station
- Terminus Street
- Macquarie Street, providing access to Westfield Liverpool
- Hume Highway.

The surrounding pedestrian network which provides a safe walking environment for pedestrians, is shown in Table 2.

Table 2: Pedestrian facilities near the site

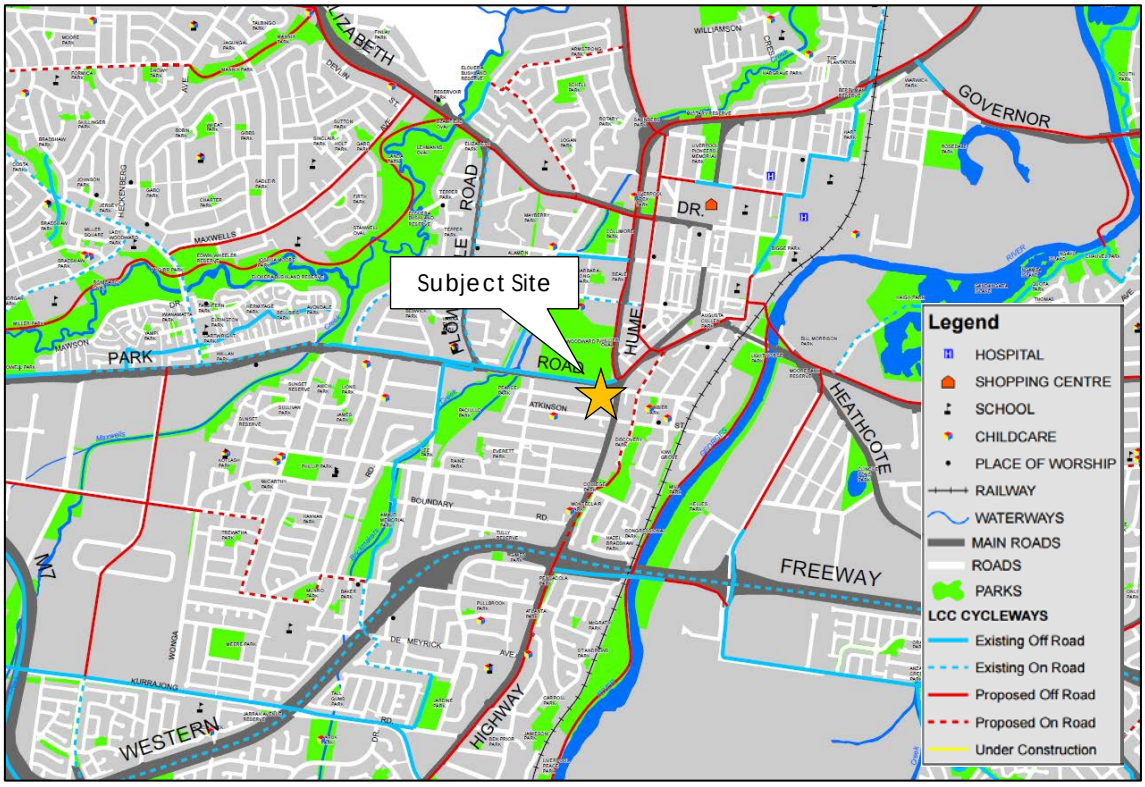
Road	Footpath Width	Footpath Condition
Gillespie Street	Eastern side: 1.2 m	
Hoxton Park Road	Northern side: 2.4 m Southern side: 1.2 m	
Scott Street	Northern side: 3 m Southern side: 3 m	 Image source: Google Streetview
Terminus Street	Northern side: 1 m - 3.5 m Southern side: 3.5 m	 Image source: Google Streetview
Macquarie Street	Northern side: 2.7 m Southern side: 3.5 m	
Hume Highway	Eastern side: 3.5 m Western side: 2.6 m	

Cycling

The site caters adequately for cyclists, with an existing off-road cycle path located along Hoxton Park Road. There is also an on-road cycle path along the Western Freeway to the south of the site, with on and off-road cycle paths proposed along the Hume Highway to provide connection between the site and Liverpool Station/ Western Freeway.

Figure 11 highlights Council's existing and future bike plan.

Figure 11: Liverpool Bike Plan (existing and proposed)



Source: http://www.liverpool.nsw.gov.au, accessed 4 October 2017.

Intersection Operation

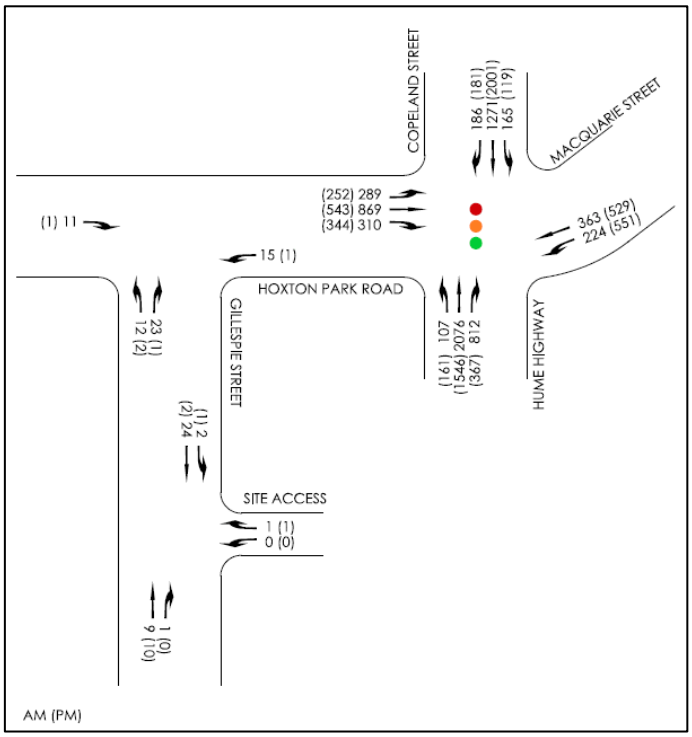
Council provided GTA with traffic volumes surveyed on 31 August 2016 and corresponding modelling that was prepared as part of the Liverpool City Centre project for the Hoxton Park Road/ Macquarie Street/ Hume Highway/ Copeland Street intersection.

GTA undertook traffic movement counts at the site access and Hoxton Park Road/ Gillespie Street intersection on 1 February 2017 during the following peak periods:

- 7am to 9am
- 4pm to 6pm.

The AM and PM peak hour traffic volumes for Hoxton Park Road/ Macquarie Street/ Hume Highway intersection are summarised in Figure 12.

Figure 12: Existing AM and PM peak hour traffic



The operation of the key intersections within the study area have been assessed using SIDRA Intersection, a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by Roads and Maritime Services (Roads and Maritime), is vehicle delay. SIDRA Intersection determines the average delay that vehicles encounter and provides a measure of the level of service. A level of service of D or better is generally considered acceptable operation.

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

Table 3: SIDRA Intersection level of service criteria

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

Table 4 presents a summary of the existing operation of the Hoxton Park Road/ Macquarie Street/ Hume Highway/ Copeland Street intersection, with full results presented in Attachment 1.

Table 4: Existing operating conditions

Peak	Leg	Degree of saturation [1]	Average delay (seconds)	95th percentile queue (m)	Level of service
AM	Copeland Street	1.04	121	446	F
	Macquarie Street	1.04	99	153	F
	Hume Highway	1.05	71	353	E
	Hoxton Park Road	1.04	89	197	F
	Overall	**1.05**	90	**446**	**F**
PM	Copeland Street	0.95	69	490	E
	Macquarie Street	0.93	70	174	E
	Hume Highway	0.95	50	287	D
	Hoxton Park Road	0.92	59	114	E
	Overall	**0.95**	61	**490**	**E**

[1] A measure of how much demand an intersection is experiencing compared to the total capacity. Also known as the volume/capacity ratio where v/c > 1.0 represents oversaturated conditions.

Based on the above assessment, the Hoxton Park Road/ Macquarie Street/ Hume Highway/ Copeland Street intersection operates at capacity with all approaches experiencing significant delays and queuing during the AM and PM peak periods.

Development Proposal

The proposal includes a mixed-use development on the site comprising approximately 90 residential apartments located above commercial land uses with vehicular crossover proposed along Gillespie Street. The indicative number of apartments and gross floor area (GFA) schedule for the conceptual scheme is detailed in Table 5.

Table 5: Indicative area schedule

Use	Dwelling type	No. apartments/ size (GFA)
Residential	1 Bedroom	18 apartments
	2 Bedroom	51 apartments
	3 Bedroom	21 apartments
	Total	90 apartments
Commercial		790 m^2

Traffic Impact Assessment

Existing Site Traffic Generation

A warehouse currently occupies the site and in operation during the traffic surveys. On-site observations during the AM and PM peak periods indicate that the existing site generates no more than three vehicles per hour.

Future Traffic Generation

Traffic generation estimates for the proposal have been sourced from the Roads and Maritime *Technical Direction TDT 2013/ 04 Guide to Traffic Generating Developments Updated traffic surveys* (TDT 2013/ 04).

TDT 2013/ 04 provides updated rates for high density residential flat dwellings (based on 2012 surveys) that are close to public transport services, greater than six storeys and almost exclusively residential in nature. TDT 2013/ 04 specifies a range of 0.39 to 0.67 and 0.22 to 0.42 trips per apartment for AM and PM peak hours, respectively.

As the site is not close to high frequency public transport services and based on JTW data which indicates that approximately 80 per cent of working residents in the selected TZ travel to work and workers who work in the selected TZ travel to work by car either as a driver or a passenger, the maximum rate for AM peak hour of 0.67 trips per dwelling and the maximum rate of PM peak hour of 0.42 trips per dwelling for high density residential flat dwellings are used for trip generation. These higher rates more accurately reflect the future residential uses.

As there is no specific land use in the Roads and Maritime Guide to *Traffic Generating Developments* and TDT 2013/ 04, a traffic generation of one movement per peak period has been assumed for the spaces allocated to the retail component.

TDT 2013/ 04 also provides updated rates for office blocks (based on 2010 surveys) within the Sydney urban area, Newcastle and Wollongong with most having access to the rail network. TDT 2013/ 04 specifies an average AM peak hour trip generation of 1.6 vehicle trips per 100 square metres GFA, with the PM peak hour rates slightly lower at 1.2 trips per hour.

Estimates of peak hour traffic volumes resulting from the adjacent 311 Hume Highway development and the proposal are set out in Table 6.

Table 6: Traffic generation for proposed developments

Site	Land use	Size	Traffic generation rate	Traffic generation estimate
311 Hume Highway	Residential	304 units	0.67-0.42 per unit	161-97
	Retail	163 m² GFA	1 per parking space	2
			Subtotal Increase	**206-130 trips**
4-8 Hoxton Park Road	Residential	90 units	0.67-0.42 per unit	48-28
	Commercial	790 m² GFA	1.6-1.2 per 100 m² GFA	13-10
			Subtotal Increase	**74-48 trips**
			Total Increase	**280-178 trips**

[1] Traffic generation rate based on 2 parking spaces.

Table 6 indicates that the proposed development and the planning proposal are anticipated to generate up to 280 vehicle trips in the AM peak hour and 178 vehicle trips in the PM peak hour.

When removing the existing traffic generation of the site (three vehicles per hour), the net increase of both developments is expected to be 277 vehicle trips in the AM peak hour and 175 vehicle trips in the PM peak hour.

Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by several factors, including the:

i Configuration of the arterial road network in the immediate vicinity of the site
ii Existing operation of intersections providing access between the local and arterial road network
iii Distribution of households near the site
iv Likely distribution of employees' residences in relation to the site
v Configuration of access points to the site.

The directional split of traffic (i.e. the ratio between the inbound and outbound traffic movements) during the peak hours is expected to be as follows:

- Residential: 20 per cent inbound and 80 per cent outbound during the AM peak hour and 80 per cent inbound and 20 per cent outbound during the PM peak hour
- Retail: 100 per cent inbound during the AM peak hour and 100 per cent outbound during the PM peak hour
- Commercial: 80 per cent inbound and 20 per cent outbound during the AM peak hour and 20 per cent inbound and 80 per cent outbound during the PM peak hour.

The traffic split for the proposed development traffic and the proposed cumulative traffic generated are set out in Table 7.

Table 7: Traffic generation split for proposed developments

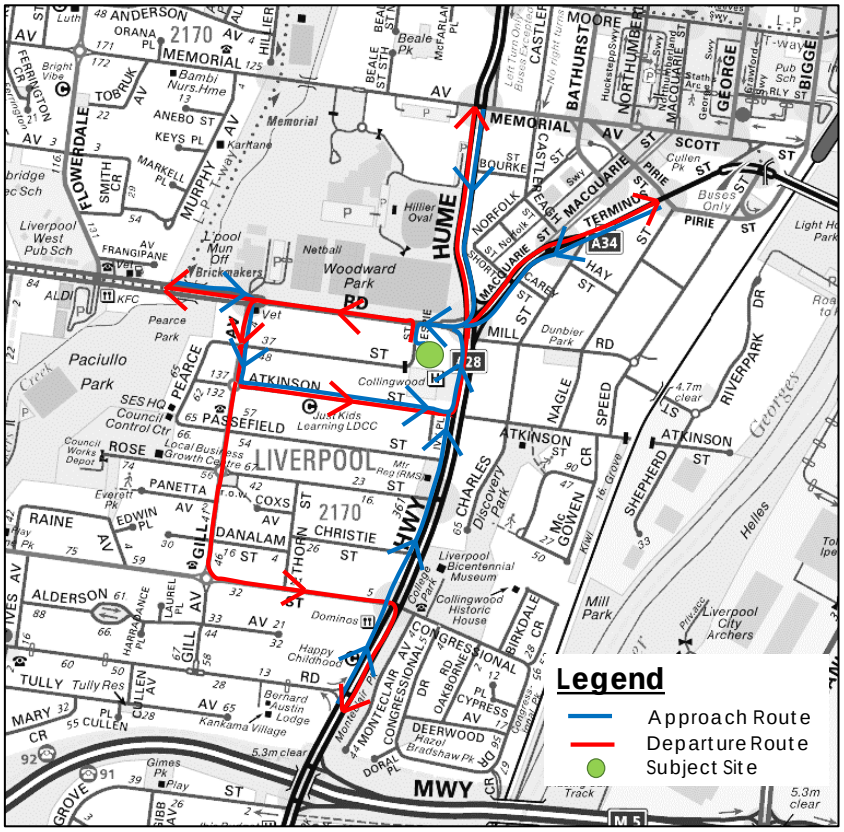
Development	Land use	Traffic generation estimate	AM peak vehicle trips		PM peak vehicle trips	
			In	Out	In	Out
311 Hume Highway	Residential	204-128	41	163	103	25
	Retail	2	2	0	0	2
4-8 Hoxton Park	Residential	61-38	13	48	31	7
	Commercial	13-10	11	2	2	8
Existing site (traffic to be removed)		-3	-2	-1	-1	-2
Total		**277–175 trips**	**65 trips**	**212 trips**	**135 trips**	**40 trips**

Proposed Traffic Scheme

In recognition of future traffic volumes and congestion on Hoxton Park Road, it is proposed to modify the Hoxton Park Road/ Gillespie Street to be left-in/ left-out only.

The available vehicle approach and departure routes are shown in Figure 13.

Figure 13: Proposed vehicle approach and departure routes



Traffic Impact

Based on the proposed traffic scheme, the future AM and PM peak hour traffic volumes for Hoxton Park Road/ Macquarie Street/ Hume Highway/ Copeland Street intersection with both the 311 Hume Highway and 4-8 Hoxton Park Road developments, is shown in Figure 14.

Figure 14: Future AM and PM peak hour traffic

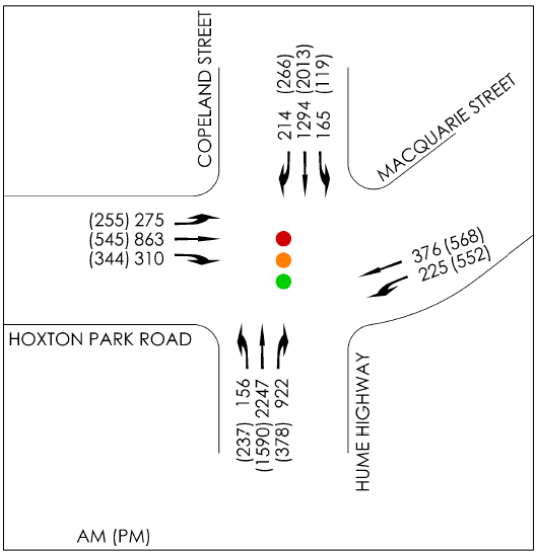


Table 8 presents the results of the intersection assessment for the Hoxton Park Road/ Macquarie Street/ Hume Highway/ Copeland Street intersection, with full results presented in Attachment 2.

Table 8: Future operating conditions with proposed developments

Peak	Leg	Degree of saturation [1]	Average delay (seconds)	95th percentile queue (m)	Level of service
AM	Copeland Street	1.10	154	498	F
	Macquarie Street	1.00	81	139	F
	Hume Highway	1.12	100	442	F
	Hoxton Park Road	1.09	92	173	F
	Overall	**1.12**	**109**	**498**	**F**
PM	Copeland Street	0.96	71	502	F
	Macquarie Street	0.97	76	195	F
	Hume Highway	0.97	52	301	D
	Hoxton Park Road	0.93	59	114	E
	Overall	**0.97**	**64**	**502**	**E**

[1] A measure of how much demand an intersection is experiencing compared to the total capacity. Also known as the volume/capacity ratio where v/c > 1.0 represents oversaturated conditions.

Table 9 shows that the intersection is operating at capacity as per the existing intersection performance, with the overall level service unchanged from existing operation.

It is also recognised that the site generated traffic volumes remain low when compared with existing traffic volumes (no more than 1.4 per cent of total traffic), as detailed in Table 9.

Table 9: Traffic contributions of proposed developments

Peak	Leg	AM peak existing traffic	311 Hume Highway development		4-8 Hoxton Park Road development	
			Peak site traffic	Peak site traffic contribution	Peak site traffic	Peak site traffic contribution
AM	Copeland Street	1,652	137	3.4%	24	0.6%
	Macquarie Street	593	97	4.0%	16	0.6%
	Hume Highway	3,071	267	5.5%	42	0.9%
	Hoxton Park Road	1,471	44	2.1%	19	0.9%
PM	Copeland Street	2,338	87	2.1%	16	0.4%
	Macquarie Street	1,092	42	2.0%	8	0.4%
	Hume Highway	2,131	89	1.8%	17	0.3%
	Hoxton Park Road	1,145	169	8.4%	27	1.4%

Proposed Mitigation Measures

GTA undertook traffic modelling of the Liverpool CBD as part of the Liverpool City Centre Precinct (LCCP) Study. The study aims to inform the NSW Department of Planning and Environment with the possible traffic impact resultant from the additional developments and the planning and development proposals that are submitted to the Council. The study envisages an additional 7,500 residential dwellings and converting a number of the existing B3 zones into B4. The study included the approved 311 Hume Highway development.

It is understood that the intersection modelling identified the potential mitigation measure which includes the construction of one additional through traffic lane on the Hume Highway (four lanes each direction) at the study intersection.

Table 10 presents the results of the future intersection assessment for the Hoxton Park Road/ Macquarie Street/ Hume Highway/ Copeland Street intersection with the proposed additional lane on Hume Highway and signal optimisation, with full results presented in Attachment 3.

Table 10: Future operating conditions with proposed mitigation measures

Peak	Leg	Degree of saturation [1]	Average delay (seconds)	95th percentile queue (m)	Level of service
AM	Copeland Street	1.02	55	172	LOS D
	Macquarie Street	0.97	59	151	LOS E
	Hume Highway	0.99	73	424	LOS F
	Hoxton Park Road	0.98	55	182	LOS D
	Overall	**1.02**	**63**	**424**	**LOS E**
PM	Copeland Street	1	69	343	LOS E
	Macquarie Street	0.99	65	215	LOS E
	Hume Highway	0.97	78	309	LOS F
	Hoxton Park Road	0.97	50	100	LOS D
	Overall	**1**	**68**	**343**	**LOS E**

[1] A measure of how much demand an intersection is experiencing compared to the total capacity. Also known as the volume/capacity ratio where v/c > 1.0 represents oversaturated conditions.

Table 10 indicates that the intersection is expected to improve slightly from level of service F to E during the AM peak period and unchanged at level of service E during the PM peak period. The intersection still operates at capacity with the proposed mitigation measure.

Traffic Impact with Proposed Mitigation Measures + Proposed Development

Table 11 presents the results of the intersection assessment for the Hoxton Park Road/ Macquarie Street/ Hume Highway/ Copeland Street intersection, with full results presented in Attachment 4.

Table 11: Future operating conditions with proposed mitigation measures and development

Peak	Leg	Degree of saturation [1]	Average delay (seconds)	95th percentile queue (m)	Level of service
AM	Copeland Street	1.02	55	173	LOS D
	Macquarie Street	1.02	77	176	LOS F
	Hume Highway	0.98	68	414	LOS E
	Hoxton Park Road	0.98	58	191	LOS E
	Overall	**1.02**	**64**	**414**	**LOS E**
PM	Copeland Street	1	63	328	LOS E
	Macquarie Street	0.97	62	219	LOS E
	Hume Highway	0.99	89	350	LOS F
	Hoxton Park Road	0.96	52	107	LOS D
	Overall	**1**	**70**	**350**	**LOS E**

[1] A measure of how much demand an intersection is experiencing compared to the total capacity. Also known as the volume/capacity ratio where v/c > 1.0 represents oversaturated conditions.

Table 11 shows that with the proposed development, the level of service for the intersection is unchanged from the future intersection performance with the proposed mitigation

measures without the development, during the AM and PM peak periods. Therefore, the additional traffic generated by the proposed development does not further impact the intersection, which is already operating at capacity.

The average delay of the intersection of the future intersection performance would reduce by 25 seconds and nine seconds during the AM and PM peak period compared with the existing intersection performance. Similarly, the 95th percentile queue for the improved intersection layout is anticipated to reduce by 32 metres and 140 metres as compared to the existing intersection layout.

Sustainable Transport Infrastructure

Given the multiple new developments in and surrounding the Liverpool City Centre, it is recognised that measures could be implemented to encourage alternate means of travel to the private car and encourage the use of more environmentally sustainable forms of travel. Investment is needed to improve public transport connectivity, public amenity and community facilities to accommodate increased population in the area.

Bicycle Facilities

Based on the JTW data, approximately 25 per cent of the residents and workers from and to the subject site are travelling to and from Liverpool itself. This is reflected in the Liverpool Bike Plan which outlines the proposals for on-road and off-road cycling routes along Hume Highway and Macquarie Street, to increase bicycle safety and improve cyclist movements around Liverpool.

Hoxton Park Road is a key cycling route near the proposed development site. As such, considerations should be given to improving to cycling access from the site, across the Hume Highway and Hoxton Park Road to access the cycling route on the northern side of Hoxton Park Road.

Further, as part of the planning proposal, it is recommended that a shared use path (pedestrians and cyclists) be located adjacent to the proposed development along the eastern side of Gillespie Road and the southern side of Hoxton Park Road.

The proposed development is required to provide bicycle parking in accordance with the requirements set out in the Council DCP.

Bicycle lockers intended for use by residents should be included within the secure areas of the building noting that where security devices are provided for resident car parking, these are acceptable and can replace bicycle lockers. Bicycle rails are intended for use by visitors and employees, and as such, need to be located in publicly accessible areas, within close proximity to the site.

Other suggested measures for bicycle facilities to be carried as part of the planning proposal could include way finding signage and line marking.

Pedestrian Network

The upgrading of pedestrian paths along Gillespie Road and Hoxton Park Road in the immediate vicinity of the site will improve the existing pedestrian environment that provides connection between Hoxton Park Road and Macquarie Street towards Liverpool Town Centre and the Liverpool Station.

It is also recommended that the proposal provides a minimum three-metre and a typical four-metre setback along Gillespie Road and Hoxton Park Road. These setbacks would

spatially define the roads and ensure adequate visibility for pedestrians and cars, complement the streetscape and allow for landscaping and open space, creating a more pedestrian-friendly environment.

The increased level and quality of lighting along Gillespie Road and Hoxton Park Road resulting from the proposed lighting along building frontages will also encourage night time use and increase the activity and passive surveillance of the area. This enhances pedestrians' sense of safety and encourage more walking trips.

It is recommended to provide a marked pedestrian crossing across Gillespie Road to the west of the planning proposal to ensure safety for pedestrians.

Public Transport

As discussed previously, the site is accessible by public transport with Liverpool Station located within 1.1 kilometre by either bus or bicycle.

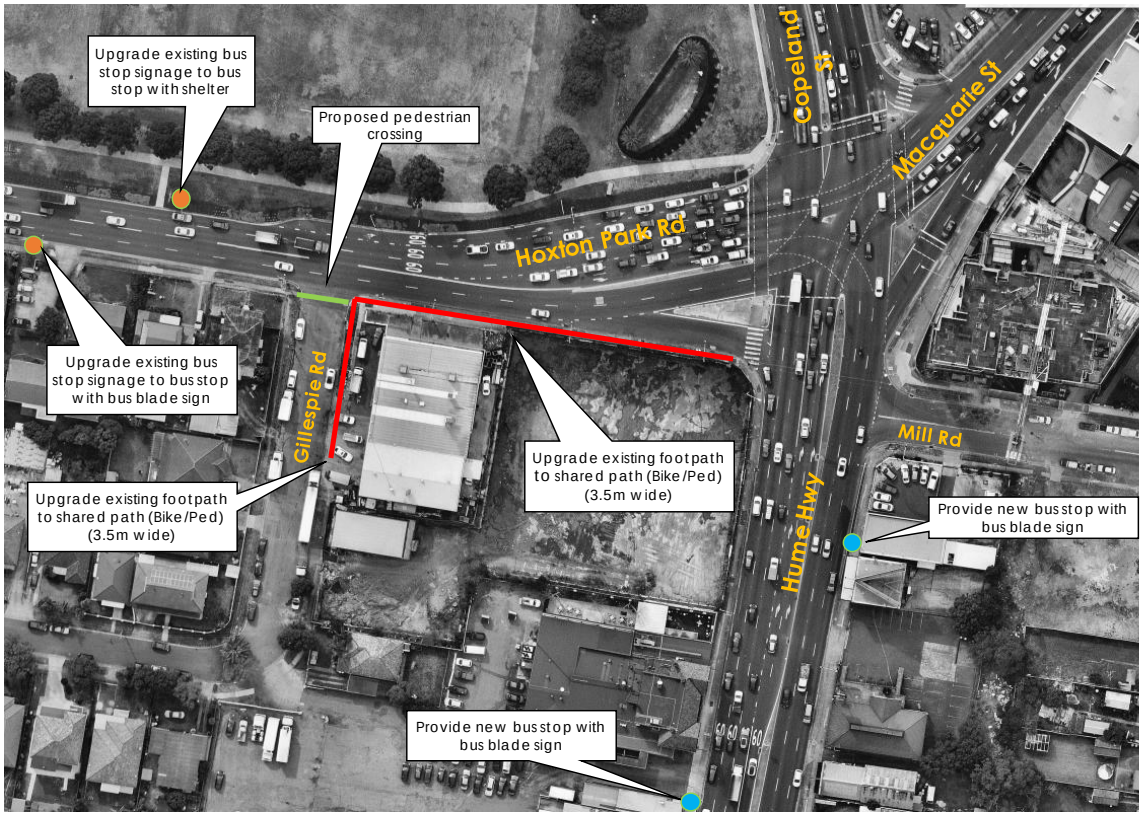
The site, being within 330 metres of the existing bus services along the Hume Highway, Hoxton Park Road and Macquarie Street, is well served by high frequency and highly accessible buses travelling along these roads and making use of Liverpool bus interchange.

Based on the JTW data, no more than 15 per cent of the residents and workers currently use public transport. There is an opportunity to encourage the use of public and active transport modes. As such, as part of the planning proposal, it is recommended to upgrade existing bus stops and to provide new bus stops along the Hume Highway and Macquarie Street. Such recommendation would require further investigations and consultation with Transport for NSW and bus operators to ensure there will be sufficient demand for the additional stops. The proximity to the proposed bus stops could contribute to increasing the use of public transport (bus only and bus/ rail) by residents and employees and discourage the use of private motor vehicles.

Summary

Figure 15 summarises the proposed infrastructure treatments to be carried out to improve safety for cyclists, pedestrians and public transport users near the site. These treatments can be included as part of the Council's updated Liverpool Bike Plan initiatives with the support and contribution from Ozzy Tyres Holdings. It is anticipated that the existing facilities with the proposed improvements is adequate to support the planning proposal.

Figure 15: Proposed infrastructure treatments for cyclists and pedestrians



Base source: Nearmap

Conclusion

This assessment indicates that the proposed development is anticipated to generate up to 277 vehicle trips in the AM peak hour and 175 vehicle trips in the PM peak hour.

The cumulative impact of the 311 Hume Highway development and the proposed development that is subject to this assessment will result in no change in level of service of the Hoxton Park Road/ Macquarie Street/ Hume Highway/ Copeland Street intersection, which is already operating at capacity under existing conditions. The intersection has been considered for upgrade to address existing congestion issues and planned growth within the Liverpool CBD.

The proposed development traffic represents a minor overall impact, representing a relatively small portion of the existing traffic volumes (no more than 1.4 per cent).

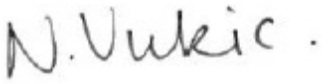
Hoxton Park Road, the Hume Highway, Copeland Street and Macquarie Street near the proposed development area are key pedestrian and cycling routes and adequate measures should be incorporated to ensure safe and efficient connectivity between the site and these active transport links.

The impact of the traffic associated with the development could be reduced with the provision of various measures such as adequate bus accessibility as well as better and safer pedestrian and cycle routes/ crossings.

I trust this provides the information you require, however should you have any queries or require further information, please do not hesitate to contact us on 02 8448 1800

Yours sincerely

GTA CONSULTANTS



Nicole Vukic

Director

encl.

Attachment 1	SIDRA Assessment for Existing Conditions
Attachment 2	SIDRA Assessment for Future Conditions
Attachment 3	SIDRA Assessment for Future Conditions with Mitigation Measures
Attachment 4	SIDRA Assessment for Future Conditions with Mitigation Measures + Proposed Development

Attachment 1

SIDRA Assessment for Existing Conditions

MOVEMENT SUMMARY

Site: Macquarie & hoxton Park & Hume - AM

New Site
Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given 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: Hume Hwy (S)											
1	L2	113	5.6	0.836	41.2	LOS C	43.4	317.9	0.93	0.98	37.4
2	T1	2207	5.5	0.836	34.2	LOS C	43.4	317.9	0.93	0.96	38.5
3a	R1	855	1.2	1.049	168.0	LOS F	49.9	352.7	1.00	1.29	16.1
Approach		3175	4.3	1.049	70.5	LOS E	49.9	352.7	0.95	1.05	28.0
NorthEast: Macquarie St (NE)											
24a	L1	237	4.9	0.137	17.8	LOS B	3.2	23.6	0.60	0.68	46.0
26a	R1	385	5.2	1.044	148.7	LOS F	21.0	153.4	1.00	1.25	17.6
Approach		622	5.1	1.044	98.9	LOS F	21.0	153.4	0.85	1.03	23.0
North: Copeland St (N)											
7b	L3	174	13.9	1.042	104.7	LOS F	43.9	335.0	1.00	1.14	22.8
8	T1	1362	8.9	1.042	127.7	LOS F	59.2	446.0	1.00	1.32	19.5
9	R2	197	13.4	0.851	87.3	LOS F	14.9	116.2	1.00	1.11	24.8
Approach		1733	9.9	1.042	120.8	LOS F	59.2	446.0	1.00	1.28	20.3
West: Hoxton Park Rd (W)											
10	L2	306	9.6	0.934	88.7	LOS F	26.0	196.9	0.98	1.00	24.1
10a	L1	916	3.1	0.774	62.3	LOS E	24.3	174.9	0.97	0.88	30.1
12	R2	326	3.9	1.041	161.4	LOS F	17.7	128.3	1.00	1.19	16.5
Approach		1548	4.6	1.041	88.4	LOS F	26.0	196.9	0.98	0.97	24.6
All Vehicles		7078	5.8	1.049	89.2	LOS F	59.2	446.0	0.96	1.09	24.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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
P6	NorthEast Full Crossing	53	23.1	LOS C	0.1	0.1	0.78	0.78
P6S	NorthEast Slip/Bypass Lane Crossing	53	42.7	LOS E	0.2	0.2	0.75	0.75
P3	North Full Crossing	53	60.0	LOS E	0.2	0.2	0.90	0.90
P4	West Full Crossing	53	36.1	LOS D	0.2	0.2	0.69	0.69
All Pedestrians		211	40.5	LOS E			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: Macquarie & hoxton Park & Hume - PM

New Site
Signals - Fixed Time Isolated Cycle Time = 148 seconds (User-Given 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: Hume Hwy (S)											
1	L2	169	6.8	0.785	48.8	LOS D	38.5	282.9	0.92	0.90	34.5
2	T1	1653	5.5	0.785	38.8	LOS C	39.2	287.0	0.90	0.83	36.7
3a	R1	386	1.6	0.945	97.7	LOS F	16.7	118.9	1.00	1.08	23.3
Approach		2208	4.9	0.945	49.9	LOS D	39.2	287.0	0.92	0.88	33.2
NorthEast: Macquarie St (NE)											
24a	L1	581	3.1	0.664	48.8	LOS D	17.0	122.0	0.87	0.80	33.1
26a	R1	557	5.3	0.931	90.6	LOS F	23.8	173.8	1.00	1.06	24.4
Approach		1138	4.2	0.931	69.3	LOS E	23.8	173.8	0.93	0.93	28.2
North: Copeland St (N)											
7b	L3	125	8.4	0.951	79.1	LOS F	65.7	478.6	1.00	1.11	27.3
8	T1	2119	4.0	0.951	69.7	LOS E	67.6	489.6	0.99	1.09	28.1
9	R2	193	7.7	0.361	48.7	LOS D	10.8	80.5	0.83	0.79	33.4
Approach		2437	4.5	0.951	68.5	LOS E	67.6	489.6	0.98	1.07	28.4
West: Hoxton Park Rd (W)											
10	L2	269	8.6	0.457	46.6	LOS D	15.1	113.5	0.83	0.81	33.4
10a	L1	574	3.9	0.304	42.4	LOS C	10.1	72.8	0.78	0.74	35.8
12	R2	362	3.5	0.921	92.1	LOS F	15.0	108.2	1.00	1.01	23.9
Approach		1205	4.8	0.921	58.2	LOS E	15.1	113.5	0.86	0.84	30.7
All Vehicles		6988	4.6	0.951	61.0	LOS E	67.6	489.6	0.93	0.95	30.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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
P6	NorthEast Full Crossing	53	17.6	LOS B	0.1	0.1	0.49	0.49
P6S	NorthEast Slip/Bypass Lane Crossing	53	26.2	LOS C	0.1	0.1	0.60	0.60
P3	North Full Crossing	53	47.1	LOS E	0.2	0.2	0.80	0.80
P4	West Full Crossing	53	38.0	LOS D	0.2	0.2	0.72	0.72
All Pedestrians		211	32.2	LOS D			0.65	0.65

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.

Attachment 2

SIDRA Assessment for Future Conditions

MOVEMENT SUMMARY

Site: Macquarie & hoxton Park & Hume - AM FUTURE

New Site
Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given 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: Hume Hwy (S)											
1	L2	144	4.4	0.922	61.0	LOS E	59.1	431.5	1.00	1.13	31.1
2	T1	2304	5.3	0.922	53.0	LOS D	59.1	431.5	1.00	1.12	32.2
3a	R1	924	1.1	1.116	219.9	LOS F	62.4	441.4	1.00	1.45	13.2
Approach		3373	4.1	1.116	99.1	LOS F	62.4	441.4	1.00	1.21	23.0
NorthEast: Macquarie St (NE)											
24a	L1	237	4.9	0.132	16.8	LOS B	3.1	22.7	0.58	0.67	46.6
26a	R1	392	5.1	0.994	118.3	LOS F	19.0	138.8	1.00	1.16	20.6
Approach		628	5.0	0.994	80.1	LOS F	19.0	138.8	0.84	0.98	26.0
North: Copeland St (N)											
7b	L3	174	13.9	1.092	142.8	LOS F	50.4	384.7	1.00	1.23	18.5
8	T1	1362	8.9	1.092	165.7	LOS F	66.1	497.7	1.00	1.46	16.3
9	R2	214	12.3	0.801	81.5	LOS F	15.4	119.2	1.00	1.08	25.8
Approach		1749	9.8	1.092	153.1	LOS F	66.1	497.7	1.00	1.39	17.2
West: Hoxton Park Rd (W)											
10	L2	289	10.2	0.864	72.9	LOS F	21.8	166.1	0.97	0.93	26.9
10a	L1	908	3.1	0.768	61.9	LOS E	24.0	172.7	0.97	0.87	30.1
12	R2	326	3.9	1.083	189.3	LOS F	19.5	141.3	1.00	1.26	14.7
Approach		1524	4.6	1.083	91.3	LOS F	24.0	172.7	0.98	0.96	24.1
All Vehicles		7275	5.7	1.116	108.8	LOS F	66.1	497.7	0.98	1.18	21.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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
P6	NorthEast Full Crossing	53	23.8	LOS C	0.1	0.1	0.80	0.80
P6S	NorthEast Slip/Bypass Lane Crossing	53	44.2	LOS E	0.2	0.2	0.77	0.77
P3	North Full Crossing	53	60.0	LOS E	0.2	0.2	0.90	0.90
P4	West Full Crossing	53	39.0	LOS D	0.2	0.2	0.72	0.72
All Pedestrians		211	41.7	LOS E			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: Macquarie & hoxton Park & Hume - PM FUTURE

New Site
Signals - Fixed Time Isolated Cycle Time = 148 seconds (User-Given 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: Hume Hwy (S)											
1	L2	215	5.4	0.808	48.3	LOS D	40.3	295.3	0.94	0.92	34.5
2	T1	1666	5.4	0.808	39.5	LOS C	41.0	300.2	0.92	0.85	36.4
3a	R1	394	1.6	0.963	103.3	LOS F	17.6	125.1	1.00	1.11	22.5
Approach		2275	4.8	0.963	51.4	LOS D	41.0	300.2	0.93	0.90	32.7
NorthEast: Macquarie St (NE)											
24a	L1	581	3.1	0.664	48.8	LOS D	17.0	122.0	0.87	0.80	33.1
26a	R1	580	5.1	0.969	103.1	LOS F	26.6	194.6	1.00	1.13	22.5
Approach		1161	4.1	0.969	75.9	LOS F	26.6	194.6	0.93	0.97	26.8
North: Copeland St (N)											
7b	L3	125	8.4	0.957	81.8	LOS F	67.4	490.7	1.00	1.12	26.8
8	T1	2119	4.0	0.957	72.4	LOS F	69.3	501.9	0.99	1.10	27.6
9	R2	242	6.1	0.447	50.0	LOS D	14.0	103.0	0.86	0.80	33.0
Approach		2486	4.4	0.957	70.7	LOS F	69.3	501.9	0.98	1.08	28.0
West: Hoxton Park Rd (W)											
10	L2	268	8.6	0.454	46.5	LOS D	15.0	113.0	0.83	0.81	33.4
10a	L1	574	3.9	0.304	42.4	LOS C	10.1	72.8	0.78	0.74	35.8
12	R2	362	3.5	0.921	92.1	LOS F	15.0	108.2	1.00	1.01	23.9
Approach		1204	4.8	0.921	58.3	LOS E	15.0	113.0	0.86	0.84	30.7
All Vehicles		7126	4.5	0.969	63.3	LOS E	69.3	501.9	0.94	0.96	29.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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
P6	NorthEast Full Crossing	53	17.6	LOS B	0.1	0.1	0.49	0.49
P6S	NorthEast Slip/Bypass Lane Crossing	53	26.2	LOS C	0.1	0.1	0.60	0.60
P3	North Full Crossing	53	47.1	LOS E	0.2	0.2	0.80	0.80
P4	West Full Crossing	53	38.0	LOS D	0.2	0.2	0.72	0.72
All Pedestrians		211	32.2	LOS D			0.65	0.65

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.

Attachment 3

SIDRA Assessment for Future Conditions with Mitigation Measures

MOVEMENT SUMMARY

Site: Macquarie & Hoxton Park & Hume - AM Future 2026 (MIT)

New Site
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

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: Hume Hwy (S)											
1	L2	173	6.7	0.987	88.0	LOS F	59.2	422.9	1.00	1.30	25.3
2	T1	2756	1.2	0.987	78.5	LOS F	59.8	423.2	0.99	1.28	26.4
3a	R1	815	0.5	0.797	47.4	LOS D	21.6	151.6	0.99	0.92	34.2
Approach		3743	1.3	0.987	72.1	LOS F	59.8	423.2	0.99	1.21	27.7
NorthEast: Macquarie St (NE)											
24a	L1	322	0.7	0.194	16.2	LOS B	3.8	26.6	0.65	0.68	47.4
26a	R1	592	2.7	0.963	81.8	LOS F	21.0	150.4	1.00	1.18	26.0
Approach		914	2.0	0.963	58.7	LOS E	21.0	150.4	0.88	1.01	30.9
North: Copeland St (N)											
7b	L3	254	2.5	0.821	51.7	LOS D	21.4	152.9	0.99	1.05	33.5
8	T1	1517	1.9	0.821	44.6	LOS D	24.2	171.9	1.00	0.97	34.7
9	R2	287	1.5	1.012	107.2	LOS F	23.4	165.6	1.00	1.24	21.9
Approach		2058	1.9	1.012	54.2	LOS D	24.2	171.9	1.00	1.01	32.0
West: Hoxton Park Rd (W)											
10	L2	359	1.2	0.749	45.5	LOS D	17.9	126.3	0.95	0.87	33.8
10a	L1	1204	5.5	0.846	50.6	LOS D	24.8	181.5	0.98	0.97	33.4
12	R2	224	3.3	0.971	88.1	LOS F	7.8	56.4	1.00	1.10	24.6
Approach		1787	4.4	0.971	54.3	LOS D	24.8	181.5	0.98	0.97	32.1
All Vehicles		8502	2.2	1.012	62.6	LOS E	59.8	423.2	0.98	1.09	29.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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	18.7	LOS B	0.1	0.1	0.79	0.79
P6S	NorthEast Slip/Bypass Lane Crossing	53	31.4	LOS D	0.1	0.1	0.76	0.76
P3	North Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	35.3	LOS D	0.1	0.1	0.80	0.80
All Pedestrians		211	33.6	LOS D			0.82	0.82

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: Macquarie & Hoxton Park & Hume - PM Future 2026 (MIT)

New Site
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

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: Hume Hwy (S)											
1	L2	232	3.2	0.966	86.5	LOS F	43.3	307.9	1.00	1.24	25.4
2	T1	1972	0.7	0.966	77.4	LOS F	43.8	308.7	1.00	1.22	26.6
3a	R1	523	0.2	0.913	73.8	LOS F	18.0	126.1	1.00	1.06	27.5
Approach		2726	0.8	0.966	77.5	LOS F	43.8	308.7	1.00	1.19	26.6
NorthEast: Macquarie St (NE)											
24a	L1	558	3.6	0.427	23.6	LOS B	9.1	65.7	0.81	0.77	43.2
26a	R1	751	0.6	0.985	94.7	LOS F	30.5	214.7	1.00	1.23	23.9
Approach		1308	1.9	0.985	64.4	LOS E	30.5	214.7	0.92	1.03	29.5
North: Copeland St (N)											
7b	L3	11	0.0	0.943	74.2	LOS F	48.7	342.9	1.00	1.14	28.6
8	T1	2629	0.7	0.943	64.0	LOS E	48.7	342.9	1.00	1.14	29.5
9	R2	396	1.3	0.993	100.3	LOS F	33.1	234.6	1.00	1.17	22.9
Approach		3036	0.8	0.993	68.8	LOS E	48.7	342.9	1.00	1.14	28.4
West: Hoxton Park Rd (W)											
10	L2	303	0.7	0.492	39.8	LOS C	14.1	99.4	0.85	0.82	35.7
10a	L1	743	5.4	0.403	36.8	LOS C	11.1	81.5	0.82	0.76	38.1
12	R2	299	0.0	0.966	91.8	LOS F	11.2	78.4	1.00	1.11	24.0
Approach		1345	3.1	0.966	49.7	LOS D	14.1	99.4	0.87	0.85	33.3
All Vehicles		8416	1.3	0.993	67.9	LOS E	48.7	342.9	0.97	1.09	28.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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	14.8	LOS B	0.1	0.1	0.70	0.70
P6S	NorthEast Slip/Bypass Lane Crossing	53	26.7	LOS C	0.1	0.1	0.67	0.67
P3	North Full Crossing	53	46.0	LOS E	0.2	0.2	0.88	0.88
P4	West Full Crossing	53	46.9	LOS E	0.2	0.2	0.89	0.89
All Pedestrians		211	33.6	LOS D			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.

Attachment 4

SIDRA Assessment for Future Conditions with Mitigation Measures + Proposed Development

MOVEMENT SUMMARY

Site: Macquarie & Hoxton Park & Hume - AM Future 2026 (MIT)

New Site
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

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: Hume Hwy (S)											
1	L2	184	6.3	0.977	81.8	LOS F	57.8	412.9	1.00	1.26	26.4
2	T1	2775	1.2	0.977	72.5	LOS F	58.5	413.6	0.99	1.25	27.5
3a	R1	832	0.5	0.801	46.9	LOS D	21.9	154.1	0.98	0.92	34.3
Approach		3791	1.3	0.977	67.4	LOS E	58.5	413.6	0.99	1.17	28.7
NorthEast: Macquarie St (NE)											
24a	L1	322	0.7	0.194	16.2	LOS B	3.8	26.7	0.65	0.68	47.4
26a	R1	592	2.7	1.020	110.0	LOS F	24.6	176.0	1.00	1.32	21.7
Approach		914	2.0	1.020	76.9	LOS F	24.6	176.0	0.88	1.10	26.8
North: Copeland St (N)											
7b	L3	260	2.4	0.823	51.5	LOS D	21.5	153.2	0.99	1.05	33.5
8	T1	1517	1.9	0.823	44.7	LOS D	24.3	173.0	1.00	0.97	34.7
9	R2	287	1.5	1.012	107.2	LOS F	23.4	165.6	1.00	1.24	21.9
Approach		2064	1.9	1.012	54.3	LOS D	24.3	173.0	1.00	1.02	31.9
West: Hoxton Park Rd (W)											
10	L2	359	1.2	0.784	48.1	LOS D	18.6	131.3	0.96	0.89	33.0
10a	L1	1204	5.5	0.874	54.8	LOS D	26.0	190.3	0.99	1.01	32.2
12	R2	224	3.3	0.971	88.1	LOS F	7.8	56.4	1.00	1.10	24.6
Approach		1787	4.4	0.971	57.7	LOS E	26.0	190.3	0.98	1.00	31.2
All Vehicles		8556	2.2	1.020	63.2	LOS E	58.5	413.6	0.98	1.09	29.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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
P6	NorthEast Full Crossing	53	18.9	LOS B	0.1	0.1	0.79	0.79
P6S	NorthEast Slip/Bypass Lane Crossing	53	31.4	LOS D	0.1	0.1	0.76	0.76
P3	North Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	34.5	LOS D	0.1	0.1	0.79	0.79
All Pedestrians		211	33.5	LOS D			0.82	0.82

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: Macquarie & Hoxton Park & Hume - PM Future 2026 (MIT)

New Site
Signals - Fixed Time Isolated Cycle Time = 130 seconds (Optimum Cycle Time - Minimum Delay)

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: Hume Hwy (S)											
1	L2	253	2.9	0.982	97.7	LOS F	49.0	348.0	1.00	1.26	23.5
2	T1	1976	0.7	0.982	88.8	LOS F	49.6	349.2	1.00	1.24	24.6
3a	R1	525	0.2	0.941	85.2	LOS F	20.3	142.5	1.00	1.11	25.3
Approach		2754	0.8	0.982	88.9	LOS F	49.6	349.2	1.00	1.22	24.6
NorthEast: Macquarie St (NE)											
24a	L1	558	3.6	0.423	25.2	LOS B	9.9	71.2	0.81	0.77	42.5
26a	R1	761	0.6	0.962	88.8	LOS F	31.1	218.5	1.00	1.15	24.8
Approach		1319	1.8	0.962	61.9	LOS E	31.1	218.5	0.92	0.99	30.1
North: Copeland St (N)											
7b	L3	11	0.0	0.907	66.2	LOS E	46.5	327.4	1.00	1.05	30.5
8	T1	2629	0.7	0.907	55.8	LOS D	46.5	327.5	1.00	1.04	31.5
9	R2	408	1.3	0.995	105.7	LOS F	36.6	258.8	1.00	1.15	22.1
Approach		3048	0.8	0.995	62.6	LOS E	46.5	327.5	1.00	1.05	29.8
West: Hoxton Park Rd (W)											
10	L2	303	0.7	0.485	42.0	LOS C	15.1	106.5	0.84	0.82	34.9
10a	L1	743	5.4	0.397	38.9	LOS C	11.9	87.3	0.81	0.76	37.3
12	R2	299	0.0	0.951	92.7	LOS F	11.7	81.6	1.00	1.08	23.9
Approach		1345	3.1	0.951	51.6	LOS D	15.1	106.5	0.86	0.84	32.8
All Vehicles		8466	1.3	0.995	69.3	LOS E	49.6	349.2	0.97	1.06	28.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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	15.3	LOS B	0.1	0.1	0.69	0.69
P6S	NorthEast Slip/Bypass Lane Crossing	53	27.8	LOS C	0.1	0.1	0.66	0.66
P3	North Full Crossing	53	47.5	LOS E	0.2	0.2	0.86	0.86
P4	West Full Crossing	53	49.2	LOS E	0.2	0.2	0.87	0.87
All Pedestrians		211	35.0	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.