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TRAFFIC & TRANSPORT STUDY
REZONING PROPOSAL
LOTS 34 AND 35 DP 456221
17 – 21 LONGFIELD STREET
CABRAMATTA

Ref: 13-133

NOVEMBER 2015

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APPENDICES

1. INTRODUCTION

A Planning Proposal is to be lodged with Fairfield City Council (Council) and the Planning and Infrastructure for the rezoning of 17 – 21 Longfield Street, Cabramatta. The proposal involves the rezoning of the land from B5 Business to R4 Residential under Fairfield LEP 2013. The rezoning is proposed to allow for the creation of an intergenerational community comprising various different forms of residential development with associated complementary high demand uses, such as an aged care facility and child care centre (herein referred to as 'the development').

The Planning Proposal is required to incorporate, among other specialist studies, a Traffic and Transport Study. Upon completion, the Planning Proposal, including the Traffic & Transport Study, will be submitted to Council for assessment and / or endorsement. Subsequent to Council's approval, the Proposal will be submitted to Planning and Infrastructure for comments and / or Gateway approval.

The Practice of Thompson Stanbury Associates has been engaged by FTD Holdings Pty. Ltd. to prepare the required Traffic & Transport Study to accompany the Planning Proposal. This report assesses and documents the potential parking, traffic and transport impacts of the development that is associated with the Planning Proposal on the surrounding road network in terms of traffic efficiency and safety. Particular consideration has been given to the following specific issues:

- Likely additional traffic generated by the rezoning;
- The impact of this additional traffic on the existing surrounding road network;
- The extent and timing of infrastructure upgrading works (related to all road users being vehicles, pedestrians and cyclists in conjunction with public transport considerations) required within and adjoining the subject land to adequately accommodate the proposal; and
- The proposed development access arrangements and suitability with respect to existing environmental and traffic conditions.

This report should be read in conjunction with a Concept Plan prepared by Antoniades Architects, a reduced copy of which (site plan only) is attached as **Appendix 1**.

The report has been prepared pursuant to State Environmental Planning Policy (Infrastructure) 2007.

2. SITE DETAILS

2.1 Site Location

The site provides a northern frontage to Chadderton Street and a southern frontage to Longfield Street, Cabramatta, being located approximately 30m and 250m to the west of Hume Highway at the southern and northern boundaries of the site respectively. The extent and location of the land is illustrated overleaf as **Figure 1** being an extract of UBD's *Australian City Streets – Version 4*.

2.2 Site Description

The site provides a legal description of Lots 34 and 35 DP 456221 and a street address of 17 – 21 Longfield Street, Cabramatta. It forms a predominantly rectangular shaped parcel of land providing approximate frontages of 164m and 161m to Chadderton and Longfield Streets respectively.

The total site area is approximately 3.97 hectares.

2.3 Existing Use

The subject site currently contains a number of industrial buildings as follows:

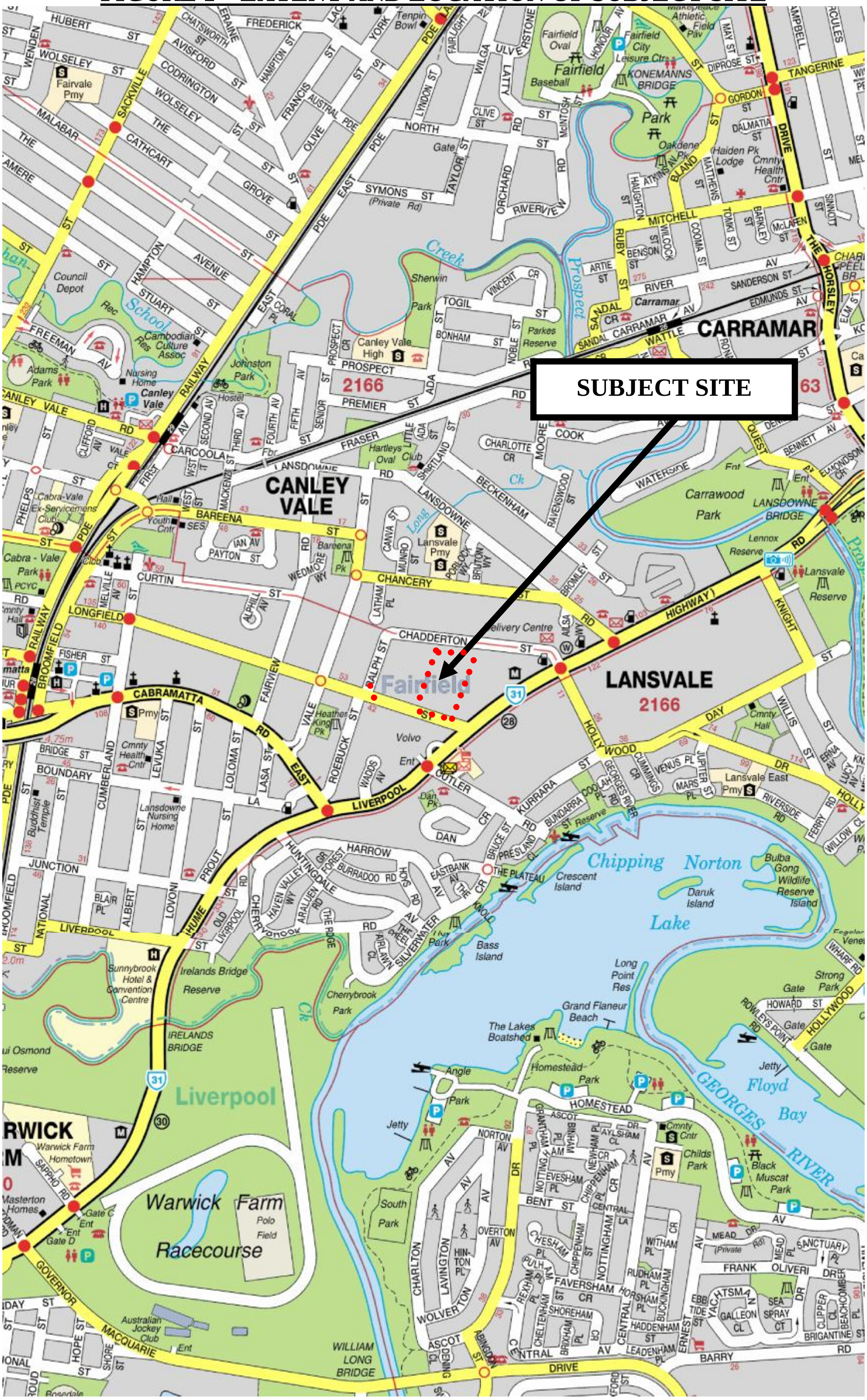
- A large industrial building located within the central southern portion of the site, providing 10,245m^2 warehouse space and 500m^2 office space;
- An industrial building located within the north-western corner of the site, providing 1,853m^2 warehouse space and 200m^2 office space; and
- An industrial building located within the north-eastern corner of the site, providing 1,605m^2 warehouse space and 200m^2 office space.

The first of the above buildings was unoccupied at the time of writing this report.

The two existing occupied buildings located within the northern portion of the site are understood to accommodate in the order of 60 employees.

The existing site uses are serviced by four driveways connecting with Chadderton Street and three driveways connecting with Longfield Street.

FIGURE 1 – EXTENT AND LOCATION OF SUBJECT SITE



2.4 Surrounding Uses

The site is located within a transition area between residential and industrial zoned land. In this regard, a number of commercial and warehouse buildings, a motel and a service station are located to the east of the site, fronting Longfield Street, Hume Highway and Chadderton Street. Detached residential dwellings occupy land to the south and north-west whilst medium density residential townhouse development primarily adjoins the site to the west.

The Ming Quang Buddhist Temple is located to the north on the opposite side of Chadderton Street.

3. PROPOSED DEVELOPMENT

3.1 Built Form

The subject proposal involves the rezoning of the site from B5 Business to R4 Residential under Fairfield LEP 2013 to allow for residential development with associated high demand uses.

A Concept Plan has been developed by Antoniades Architects to accompany the Planning Proposed. The Concept Plan is designed to create a vibrant and co-generational residential and mixed use environment, comprising the following mix of land-uses:

- Up to 450 standard residential apartments;
- Up to 150 independent living unit (seniors living) dwellings;
- A nursing home with up to 150 beds;
- Approximately 2,397m^2 of floor space for commercial / retail and other uses; and
- 500m^2 child care centre with an indicative capacity of up to 100 children.

The commercial / retail building is proposed to be located within the south-eastern corner of the site fronting Longfield Street, taking advantage of the proximity and exposure of this location to Hume Highway.

The remainder of the site is primarily proposed to accommodate a variety of residential and employment generating land-uses with the independent living units located within the south-western corner of the site fronting Longfield Street whilst the nursing home component located within the southern central portion of the site, being set-back from the public street frontages. The standard residential dwellings are proposed to be located within the northern portion of the site whilst the child care centre is proposed to be located within the north-eastern corner of the site fronting Chadderton Street.

The buildings are proposed to be between three to six storeys in height, with the reduced building heights fronting both Chadderton and Longfield Streets and the western site boundary and the maximum height buildings being located within the eastern and central portions of the site.

Various areas of open space are proposed to be provided throughout the site, including public plazas fronting Chadderton and Longfield Streets.

3.2 Site Access

A through site north-south pedestrian, cyclist and visual link is proposed between Chadderton and Longfield Streets, approximately central to the site frontages to the public roads. This link is also proposed to allow for emergency vehicles to traverse the site, and provide the public with access to dwellings / open space.

The northern portion of the through site link is proposed to facilitate vehicular access to the central and north-eastern buildings, through the provision of a separated carriageway intersecting with Chadderton Street to the north. A single further vehicular access is proposed to those buildings within the north-western corner of the site via a driveway connecting with Chadderton Street adjoining the western site boundary.

Separated vehicular connectivity to the commercial / retail and the seniors living components is proposed via driveways connecting with Longfield Street, located within the south-eastern and south-western corners of the site respectively.

The above access arrangements provide connectivity to underground parking for site residents and visitors.

In addition, public access indented angled street parking is also proposed within Chadderton Street for site visitors as well as the wider community. The ultimate number of on-street car parking spaces provided adjoining the northern site frontage within Chadderton Street is between 20 – 30 spaces, subject to detailed design.

4. EXISTING TRANSPORT CONDITIONS

4.1 Road Network Function and Controls

4.1.1 Regional Road Network

The Regional Road network in the vicinity of the subject site primarily accommodates Hume Highway and Cabramatta Road East.

4.1.1.1 Hume Highway

Hume Highway performs a State Road function under the care and control of the Roads & Maritime Services. In this regard, it forms an important arterial link between Parramatta Road at Summer Hill in the north-east and M5 / M7 Motorway at Casula in the south-west.

Within the vicinity of the subject site, Hume Highway forms a six lane divided carriageway, providing three through lanes in each direction. It forms signalised intersections with Cabramatta Road East and Cutler Road to the south and Chadderton Street / Hollywood Drive and Chancery Street to the north. S-Lane treatments often reduce the number of southbound through travel lanes to two to facilitate the provision of exclusive left and right turn lanes at these signalised intersections.

Hume Highway also forms a junction with Longfield Street in the immediate vicinity of the site under signage control. The central median along the Hume Highway restricts access to Longfield Street to left in-left out (for northbound vehicles along the Hume Highway).

In addition to its arterial function, Hume Highway provides direct access to a number of highway business uses within the vicinity of the site.

Traffic flow is governed by a sign posted speed limit of 70 km/h.

4.1.1.2 Cabramatta Road East

Cabramatta Road East performs a State Road under the care and control of the Roads & Maritime Services. It provides an east-west arterial function between Cabramatta Road West (which in turn continues to Elizabeth Drive at Bonnyrigg) in the west and Hume Highway at Lansvale in the east.

Cabramatta Road East primarily provides a 13m wide carriageway providing two through lanes in each direction. It forms signalised intersections with Hume Highway and Cumberland Street in the vicinity of the site. Pavement widening is provided on approach to these signalised intersections to accommodate additional exclusive turning lanes.

Cabramatta Road East also intersects with Fairview Road, Vale Street and Roebuck Street in the vicinity of the subject site under signage control. Whilst an exclusive right turn lane is provided in Cabramatta Road East facilitating access movements to Fairview Street, right turn egress movements are prohibited. Further, right turn (ingress and egress) restrictions also apply at the Cabramatta Road East junctions with Vale Street and Roebuck Street.

4.1.2 Local Road Network

4.1.2.1 Longfield Street

Longfield Street performs a Collector road function under the care and control of Council. In this regard, it provides an east-west connection between Hume Highway in the east and Broomfield Street in the west.

Longfield Street provides a 13m wide pavement providing one through lane of traffic in each direction in conjunction with parallel parking along both kerb alignments. It forms a signalised intersection with Cumberland Street and also intersects with Fairview Road and Vale Street under single lane circulating roundabout control. It forms an off-set cross intersection with Ralph Street and Roebuck Street in the immediate vicinity of the subject site under major / minor priority control with Longfield Street forming the priority route.

Traffic flow is governed by a sign posted speed limit of 50km/h.

4.1.2.2 Chadderton Street

Chadderton Street, with Ralph Street, performs a continuation of the abovementioned Longfield Street Collector Road linking Longfield Street to Hume Highway, with which it intersects under traffic signal control.

Chadderton Street provides a 13m wide pavement providing one through lane of traffic in each direction in conjunction with parallel parking along both kerb alignments. It provides an east-west alignment, prior to curving to the south at its western extremity where it forms Ralph Street. Speed humps, kerb extensions and short sections of central median are provided on approach to the 90 degree curve, also being supplemented with chevron signs at the curve.

Traffic flow is governed by a sign posted speed limit of 50km/h.

4.1.2.3 Cumberland Street

Cumberland Street performs a Collector Road function under the care and control of Council providing a north-south connection between the Cabravale Leisure Centre in the north and Liverpool Street in the south.

Cumberland Street provides a 13m wide pavement providing one through lane of traffic in each direction in conjunction with parallel parking along both kerb

alignments. It intersects with Cabramatta Road East and Longfield Street under traffic signal control. Parking restrictions on approach to these intersections facilitate the provision of two travel lanes on approach to these intersections. Cumberland Street also intersects with Curtin Street within the immediate vicinity under major / minor priority control within Cumberland Street forming the priority route

4.2 Existing Traffic Volumes

This Practice has undertaken extensive traffic surveys in the general vicinity of the subject site between 7.00am – 9.00am and 4.00pm – 6.00pm on various weekdays in February 2014, at the following intersections:

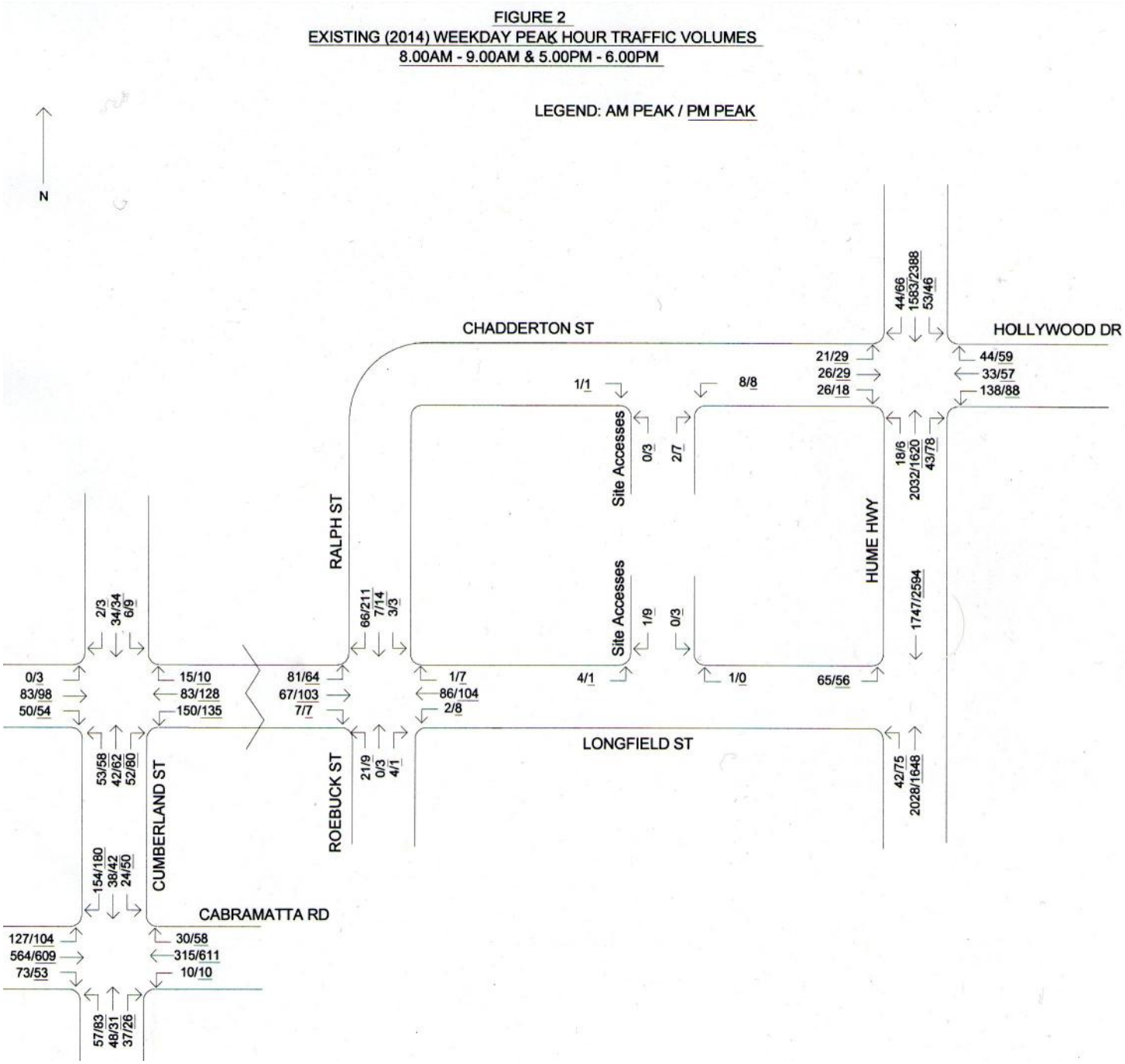
- Hume Highway, Chadderton Street and Hollywood Drive;
- Hume Highway and Longfield Street;
- Cabramatta Road East and Cumberland Street;
- Longfield Street, Ralph Street and Roebuck Street; and
- Longfield Street and Cumberland Street.

Further to the above, surveys of the driveways linking the subject site and Chadderton Street and Longfield Street were also undertaken.

Figure 2 overleaf illustrates the surveyed peak hour (8.00am – 9.00am and 5.00pm – 6.00pm) traffic flows at the surveyed intersections, whilst full details are available upon request. There are some minor net gains and losses between intersections associated with private development access locations, parking / unparking manoeuvres and differing survey days.

Figure 2 indicates the following peak hourly traffic flows:

- Hume Highway accommodates 3,800 – 4,300 vehicles;
- Cabramatta Road East accommodates 1,000 – 1,350 vehicles;
- Chadderton Street, adjoining the subject site, accommodates 150 – 200 vehicles;
- Longfield Street, adjoining the subject site, accommodates 150 – 200 vehicles;
- Cumberland Street accommodates 400 – 500 vehicles; and
- The subject site currently generates 15 – 30 vehicle movements to and from the site (Chadderton Street and Longfield Street driveways combined).



4.3 Existing Intersection Operation

In order to objectively assess the operation of the surveyed intersections, they have been analysed using SIDRA computer intersection analysis program. SIDRA is a computerised traffic arrangement program which, when volume and geometrical configurations of an intersection are imputed, provides an objective assessment of the operation efficiency under varying types of control (i.e. signs, signal and roundabouts). Key indicators of SIDRA include level of service where results are placed on a continuum from A to F, with A providing the greatest intersection efficiency and therefore being the most desirable by the Roads and Maritime Services.

Other key indicators provided by SIDRA are average vehicle delay, the number of stops per hour and the degree of saturation. Degree of saturation, known as the X-value, is the ratio of the arrival rate of vehicles to the capacity of the approach. The X-value is a useful and professionally accepted measure of intersection performance. A value of 0.75 permits the intersection to operate in a generally satisfactory manner and provides tolerance for minor disturbances and fluctuations in the traffic conditions. At values of 'X' at 0.8 the traffic will be subject to queuing and delays which could extend over more than one signal cycle. For intersections controlled by traffic signals both queue length and delay increase rapidly as DS approaches 1.0.

For intersections controlled by a roundabout or give way or stop signs, a degree of saturation of 0.8 or less indicates satisfactory intersection operation.

SIDRA provides analysis of the operating conditions that can be compared to the performance criteria set out in **Table 1** (being the RTA NSW method of calculation of Level of Service).

TABLE 1
LEVELS OF SERVICE CRITERIA FOR INTERSECTION

Level of Service	Average Delay per Vehicle (secs/veh)	Expected Delay
SIGNALISED INTERSECTIONS AND ROUNDABOUTS		
A	Less than 14	Little or no delay
B	15 to 28	Minimal delay and spare capacity
C	29 to 42	Satisfactory delays with spare capacity
D	43 to 56	Satisfactory by near capacity
E	57 to 70	At capacity, incidents will cause excessive delays
F	> 70	Extreme delay, unsatisfactory
GIVE WAY & STOP SIGNS		
A	Less than 14	Good
B	15 to 28	Acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Near capacity
E	57 to 70	At capacity and requires other control mode
F	> 70	Unsatisfactory and requires other control mode

4.3.1 Intersection Modelling Output

The results of the analyses are presented in **Table 2** overleaf whilst more detailed summaries are contained within **Appendix 2**.

TABLE 2 SIDRA ANALYSIS EXISTING CONDITIONS		
Intersection	**AM Peak**	**PM Peak**
Hume Hwy & Chadderton St		
Average Vehicle Delay	18.4	75.2
Degree of Saturation	0.69	1.07
Level of Service	B	F
Hume Hwy & Longfield St		
Average Vehicle Delay	12.6	11.0
Degree of Saturation	0.37	0.46
Level of Service	A	A
Cabramatta Rd East & Cumberland St		
Average Vehicle Delay	27.4	28.0
Degree of Saturation	0.43	0.46
Level of Service	B	B
Longfield St, Ralph St & Roebuck St		
Average Vehicle Delay	10.4	11.9
Degree of Saturation	0.10	0.35
Level of Service	A	A
Longfield St & Cumberland St		
Average Vehicle Delay	16.5	16.9
Degree of Saturation	0.18	0.23
Level of Service	B	B

Notes:

1. The off-set Longfield Street junctions with Ralph Street and Roebuck Street has been modelled as a standard cross intersection.

4.3.2 Discussion of Output

Table 2 indicates that the following:

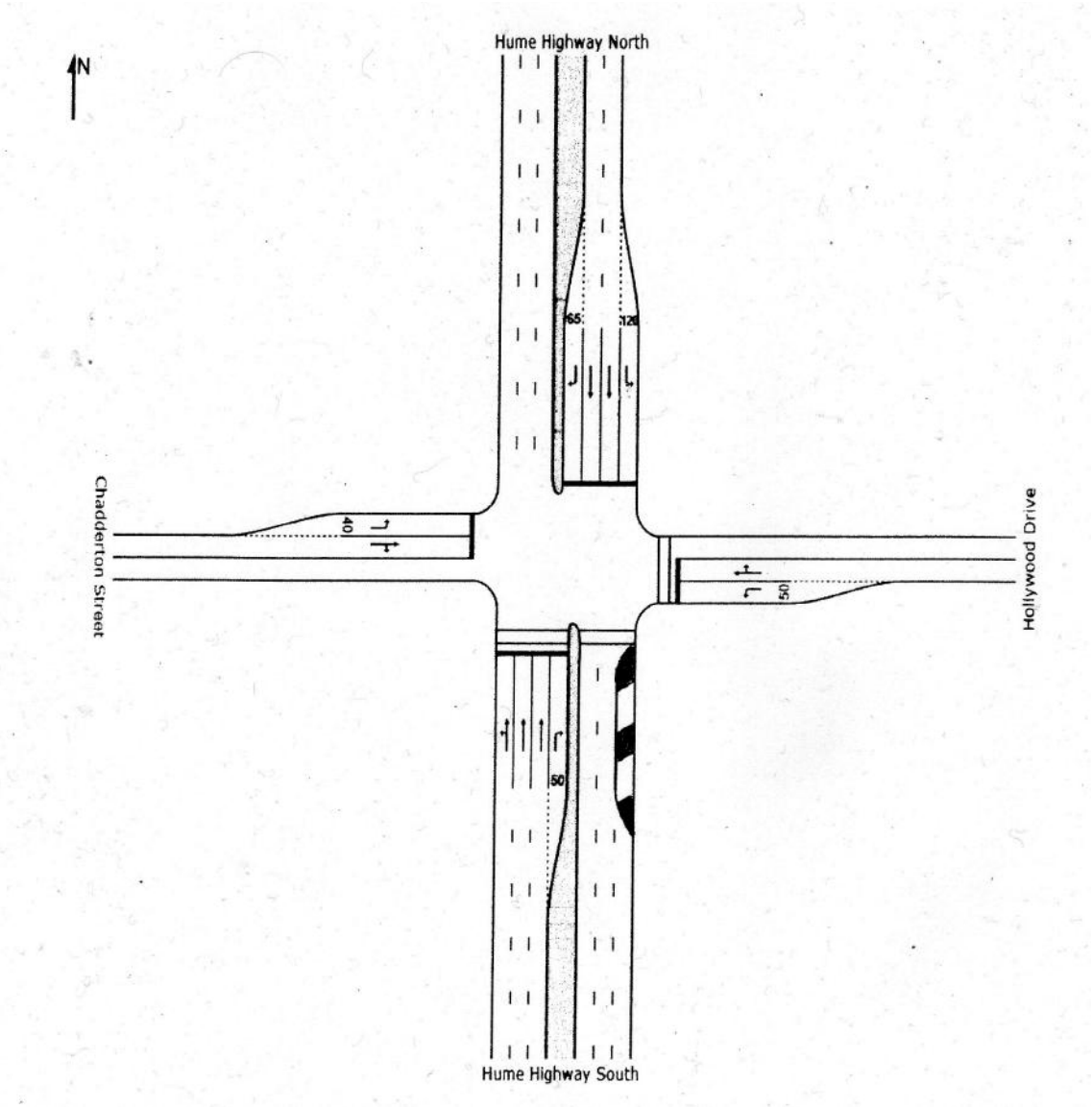
- Whilst the intersection of Hume Highway, Chadderton Street and Hollywood Drive operates with a good level of service (level of service 'B') during the morning peak period, poor conditions (level of service 'F') prevail during the evening peak; and

- All other modelled intersections provide a good level of service ('B' or better) during the morning and evening peak periods.

Inspection of the SIDRA output indicates that the poor level of service at the intersection of Hume Highway, Chadderton Street and Hollywood Drive during the evening peak period results from extended delays for through southbound Highway movements. The limitation of the southbound Highway carriageway to two through lanes restricts the capacity to accommodate the significant southbound traffic demands during the evening peak period.

Figure 3 provides a graphical representation of the existing lane configuration of the intersection.

FIGURE 3
EXISTING LANE CONFIGURATION AT THE INTERSECTION OF HUME HIGHWAY, CHADDERTON STREET & HOLLYWOOD DRIVE



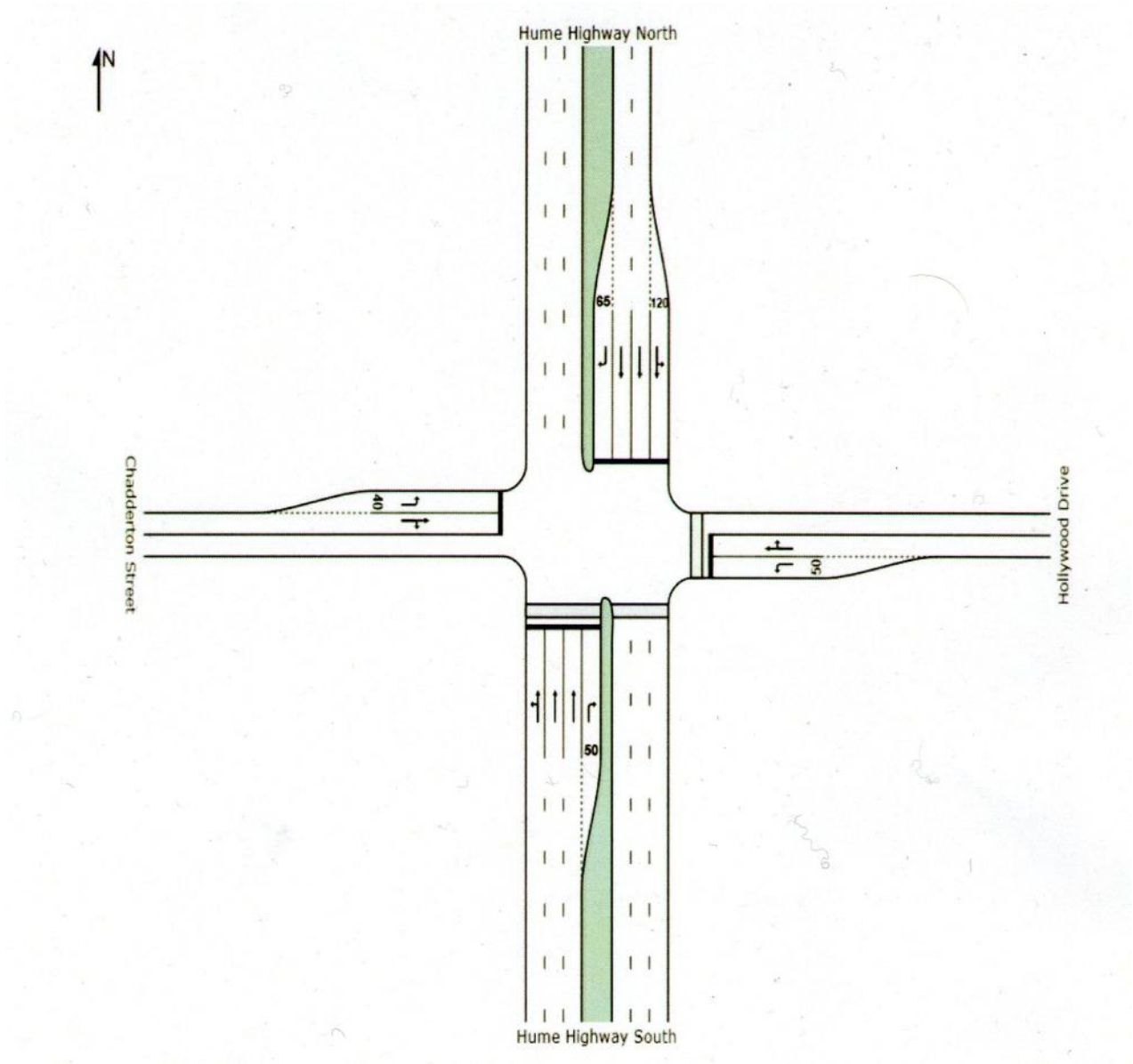
The previously described existing limitation to southbound Highway capacity can be assisted by the reconfiguration of the existing southbound carriageway lane arrangement as follows:

- Converting the existing exclusive left turn lane within the southbound Hume Highway approach to the intersection to a shared through / left turn lane; and

- Removal of the existing painted kerb extension within the southbound Highway departure from the intersection allowing the provision of a southbound through kerb side lane.

Figure 4 provides a graphical representation of the recommended intersection lane configuration.

FIGURE 4
EXISTING LANE CONFIGURATION AT THE INTERSECTION OF HUME HIGHWAY, CHADDERTON STREET & HOLLYWOOD DRIVE



Whilst the poor operational experienced at the intersection of Hume Highway, Chadderton Street and Hollywood Drive conditions during the evening peak represent an existing condition, and therefore not a result of the subject proposal, it is recommended that the above lane configuration alterations be undertaken as part of the development as the costs associated with which are primarily limited to road and

linemarking alterations. In this regard, no civil or signal alterations are required or recommended and as such, any unlikely costs associated with such, should not be borne by the proponent. These road and linemarking alterations have been supported by Roads & Maritime Services road network officers during preliminary discussions with respect to the subject proposal.

In order to undertake an assessment of the operational performance of the intersection of Hume Highway, Chadderton Street and Hollywood Drive, incorporating the recommended lane configuration alterations, a further SIDRA analysis has been undertaken. **Table 3** provides a summary of the SIDRA analysis results whilst more detailed summaries are contained within **Appendix 3**.

TABLE 3
SIDRA ANALYSIS
INTERSECTION OF HUME HIGHWAY, CHADDERTON STREET & HOLLYWOOD DRIVE

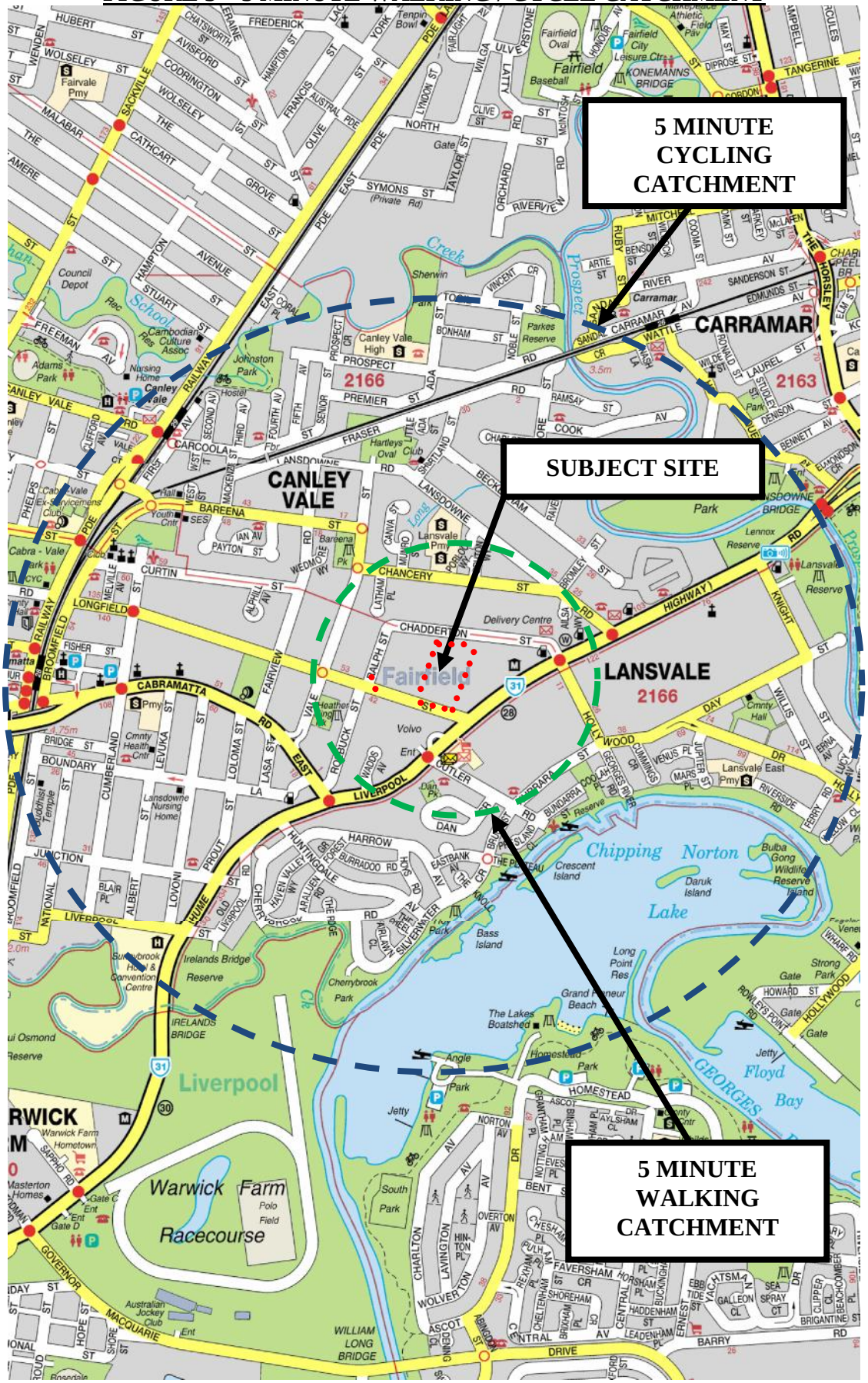
	Figure 3 Lane Configuration		**Figure 4 Lane Configuration**	
	AM Peak	**PM Peak**	**AM Peak**	**PM Peak**
Average Vehicle Delay	18.4	75.2	18.7	20.6
Degree of Saturation	0.69	1.07	0.63	0.75
Level of Service	B	F	B	B

Table 3 indicates that the recommended lane configuration alterations within the southbound Hume Highway carriageway are expected to result in a significant improvement to the existing operational performance of the intersection of the Highway, Chadderton Street and Hollywood Drive during the evening peak period.

4.4 Public Transport and Non-Car Travel

The subject site is located within close proximity to rail services within a 5 minute cycle and bus services within a 5 minute walk. **Figure 5** overleaf provides a graphical representation of the 5 minute cycle and walk catchments relative the subject site, being an extract of *UBD's Australian City Streets – Version 4*.

FIGURE 5 – 5 MINUTE WALKING / CYCLE CATCHMENT



4.4.1 Train

The subject site is located approximately 1.4km to the east of Cabramatta Railway Station. This is a junction station of the Sydney trains network where the Airport, Inner West & South Line, Cumberland Line and the Bankstown Line merge.

The Airport, Inner West & South Line provides connectivity between Liverpool, Macarthur and the Southern Highlands to the south and Lidcombe, Strathfield and the City to the east, The Airport and the East Hills region to the south-west. The Cumberland Line provides connectivity between Liverpool and Campbelltown in the south to Schofields in the north. The Bankstown Line provides connectivity between Liverpool in the south-west, Lidcombe to the north and the City to the east.

4.4.2 Bus

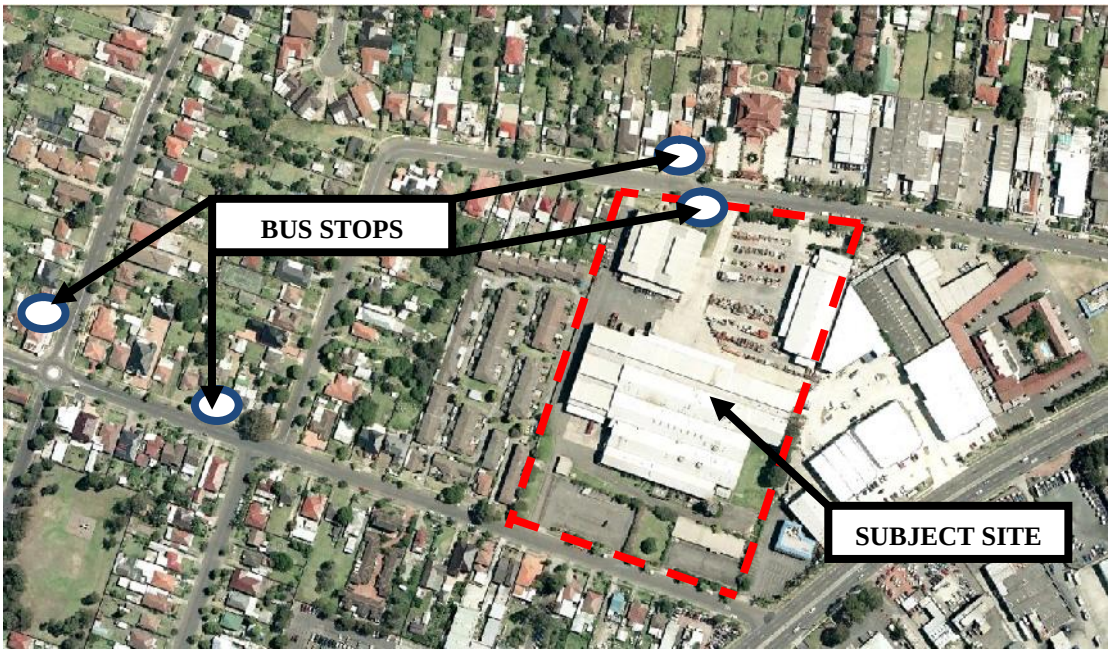
Veolia Transport operates the following routes in the immediate vicinity of the subject site:

- Route S1 between Fairfield and Liverpool via Cabramatta; and
- Route 904 between Fairfield and Liverpool via Canley Vale.

Route S1 provides connectivity between the site and Cabramatta Railway Station whilst Route 904 provides connectivity to / from Liverpool Railway Station.

The above routes are serviced by bus stops located on both sides of Chadderton Street approximately central to the site frontage. Further, bus stops are provided on the northern side of Longfield Street to the west of Ralph Street and the western side of Vale Street to the north of Longfield Street. The proximity of these stops to the subject site is illustrated by an aerial photograph provided as **Figure 6** overleaf, being an extract of Google Earth.

FIGURE 6
EXISTING BUS STOP LOCATIONS WITHIN THE IMMEDIATE PROXIMITY OF THE SUBJECT SITE



Route S1 provides an hourly service on weekdays between 8.45am and 3.35pm.

Route 904 provides a 30 minute frequency during weekday commuter peaks, lengthening to 60 minutes during other periods between 6.37am and 6.52pm. It provides an hourly service on Saturdays between 8.42am and 5.42pm and a two hourly service on Sundays and Public Holidays between 9.47am and 3.45pm.

The Parramatta-Liverpool-Bankstown Area Bus Services map (Regional 13), incorporating the above routes, prepared by Veolia Transport is attached as **Appendix 4** for reference.

4.4.3 Walk / Cycle

Pedestrians are provided with the following infrastructure in the vicinity of the subject site:

- Signalised crossings are provided over:
  - The southern Hume Highway and Hollywood Drive approaches at their intersection with Chadderton Street;
  - The southern and eastern approaches to the junction of Hume Highway and Cutler Road;
  - All approaches at the intersection of Longfield Street and Cumberland Street;
  - The southern approach to the junction of Hume Highway and Cabramatta Road East; and

  - All approaches at the intersection of Cabramatta Road East and Cumberland Street;
- Splitter island / refuges are provided over:
  - All approaches at the roundabout controlled intersection of Longfield Street and Vale Street; and
  - All approaches at the roundabout controlled intersection of Longfield Street and Fairview Road.

- A footpath is provided on:
  - The northern side of Chadderton Street;
  - Both sides of Longfield Street;
  - Both sides of Hume Highway; and
  - The western side of Ralph Street.

There are no established cycle routes within the immediate vicinity of the subject site. Notwithstanding this, the width and alignment (vertical and horizontal) of the surrounding local roads (primarily 13m) is suitable to accommodate on-road cycle activity in a safe and efficient manner.

5. PROJECTED TRANSPORT CONDITIONS

5.1 Traffic Generation

5.1.1 Existing Site Generation

Figure 2 indicates that the existing occupied site uses currently generate 17 and 32 morning and evening peak hour vehicle movements respectively to and from the site.

5.1.2 Existing Traffic Generating Capacity

Section 2.3 of this report presented that the largest of the three existing industrial buildings was unoccupied at the time of the undertaking of this assessment. This building provides 10,245m^2 of warehouse space and 500m^2 of office space. The Roads & Maritime Services have established average traffic generation rates for warehouse and office space as published within its *Guide to Traffic Generating Developments*, being 0.5 trips per 100m^2 and 2 trips per 100m^2 respectively.

Accordingly, the existing unoccupied building is therefore capable of generating 61 peak hour trips to and from the site. Adding this traffic generation to the surveyed site generation, the traffic generating capacity of the existing development is therefore estimated to be between 78 and 93 peak hour vehicle trips.

5.1.3 Proposed Rezoning

The Planning Proposal is accompanied by a Concept Plan, which incorporates a range of land-uses with differing traffic generating potential. The following subsections provide discussion on the traffic generating potential of each of the various land-uses proposed under the Concept Plan.

5.1.3.1 Standard Residential Dwellings

The proposal involves the provision of up to approximately 450 standard residential apartments.

The Roads & Maritime Services' *Guide to Traffic Generating Developments* specifies an average peak hour traffic generation rate of 0.29 trips per unit for standard residential apartments within high density developments in sub-regional locations. Application of this rate to the proposed 450 standard residential apartments results in a peak hour traffic generation estimate of 131 trips.

5.1.3.2 Seniors Living

The proposal involves the provision of up to 150 independent living units for seniors and a nursing home facility containing up to 150 beds.

The Roads & Maritime Services provides an average traffic generation rate of 0.1 – 0.2 trips per dwelling for 'Housing for Aged and Disabled Persons' within its *Guide to Traffic Generating Developments*.

The assisted living nature of the nursing home would suggest that a significant majority of the residents would, in fact not drive or own a vehicle given their limited abilities. Considering this, the lower of the abovementioned traffic generation rates (0.1) has been adopted for the nursing home component and the higher traffic generation rate (0.2) has been adopted for the independent living component, deriving a peak hour traffic generation estimate for the seniors living component of the proposal of 45 peak hour trips (whereby 15 trips are generated by the nursing home component and 30 trips are generated by the independent living units component).

5.1.3.3 Commercial / Retail

The proposal involves the provision of approximately 2,397m^2 of floor space for commercial / retail and other uses. The exact nature or split of the commercial / retail floor space is unknown at this stage however for the purposes of this assessment, it has been assumed that 75% of the floor space (1,798m^2) is standard retail shops whilst the remaining 25% is office or medical suite floor space (599m^2).

The Roads & Maritime Services provide average traffic generation rates for retail and office / medical floor space of 4.6 trips per 100m^2 and 2 trips per 100m^2 respectively within its *Guide to Traffic Generating Developments*. Application of these rates results in a traffic generation estimate for the commercial / retail component of the development of 95 trips.

It is however noted that extended shopping hours experienced throughout the retail sector now mean that the shoppers have much more choice over the times they choose to satisfy shopping needs. Having regard to this increased shopping time choice, it is unlikely that shoppers will choose to leave home and go shopping during peak traffic periods and therefore subject themselves to unnecessary delays.

It is further noted that the retail component of the subject development will most likely primarily service the residents of the development. In this regard, the types of retail uses are local-based uses appropriate to support the proposed aged care, such as a pharmacy, cafes and the like. It is therefore considered appropriate that a 20% reduction in the traffic generation of the retail component be applied. This is consistent with recommended reductions for linked and multi-purpose trips for retail developments associated with retail floor space as provided by the Roads & Maritime Services' *Guide to Traffic Generating Developments*. Application of this reduction to the retail based trips results in a reduced traffic generation estimate for the commercial / retail component of 78 peak hour trips.

5.1.3.4 Child Care Centre

The proposal involves the provision of a child care centre with an indicative capacity of 100 children.

The Roads & Maritime Services' *Guide to Traffic Generating Developments* specifies a maximum hourly traffic generation rate of 0.8 vehicle trips per child during peak periods for long day child care centres. Application of this rate to the child care centre component of the development results in a traffic generation estimate of 80 peak hour trips.

Similarly to that stated above for the retail component of the development, it is considered most likely that the child care centre will service the residential component of the subject development. Accordingly, a traffic generation reduction of 20% has been applied, resulting in a reduced traffic generation estimate of 64 peak hour trips.

5.1.3.5 Summary

The following provides a summary of the traffic generation estimation for the subject development:

Standard Residential Dwelling	- 131 trips
Independent Living Units	- 30 trips
Nursing Home	- 15 trips
Commercial / Retail	- 78 trips
Child Care Centre	- 64 trips

TOTAL	- 318 trips

The proposed development is therefore estimated to generate in the order of 318 peak hour vehicle movements to and from the site during peak periods.

Such a generation represents up to 301 additional peak hour trips over and above that currently generated by the subject site. The proposed development traffic generation estimate also represents up to 240 additional peak hour trips over and above that currently capable of being generated by the existing site development, assuming full occupation. Notwithstanding this, for the purposes of generating an absolute worst case scenario, the subject proposal has been assessed to generate 318 peak hour vehicle movements over and above that currently generated by the existing development.

5.2 Trip Assignment

In order to gauge the impact of the traffic projected to be generated by the proposal, it is necessary to determine the impact on surrounding route and intersection efficiency. The objective of this section is to distribute the traffic generated by the proposed development along the major approach routes before it dissipates throughout the general road network.

For the purposes of reaching the abovementioned objective, the additional trips projected to be generated by the proposed residential component has been split into

two types of trips; outgoing trips and incoming trips. For the purposes of this study, the following has been assumed:

- 80% of trips associated with the standard residential dwellings and the independent living units are outbound trips during the morning peak, with the remaining 20% being inbound;

- The reverse condition to that above applies during the evening peak for the standard residential dwellings and the independent living units;

- 20% of nursing home are outbound trips during the morning peak, with the remaining 80% being inbound;

- The reverse condition to that above applies during the evening peak for the nursing home; and

- Peak hour vehicle trips for the commercial / retail and child care centre components are evenly split during both the morning and evening peak periods.

Incorporating such an assignment, the subject development is projected to generate 115 inbound trips and 203 outbound trips during the morning peak period. The reverse condition is assigned during the evening peak, comprising 203 inbound trips and 115 outbound trips.

Section 3.1 of this report presents that the independent living units, nursing home and commercial / retail components of the site are to be located within the southern portion of the site, accessed via Longfield Street. Conversely, the standard residential dwellings and the child care centre are proposed to be contained within the northern portion of the site, accessed via Chadderton Street. The subject development is therefore projected to generate a total of 123 peak hour vehicle movements between the site and Longfield Street and 195 peak hour vehicle movements between the site and Chadderton Street, comprising:

- 57 inbound and 66 outbound trips via Longfield Street during the morning peak hour;

- 58 inbound and 137 outbound trips via Chadderton Street during the morning peak hour;

- 66 inbound and 57 inbound trips via Longfield Street during the evening peak hour; and

- 137 inbound and 58 outbound trips via Chadderton Street during the evening peak hour.

With respect to the greater regional road network, it is normal traffic engineering practice to assign traffic generation for new developments throughout the road system

based on current traffic distributions. In this regard, the following trips assignment has been applied to the greater road network with reference to existing traffic distributions illustrated within **Figure 2**:

- 30% of traffic is projected to approach and depart the site from and to the south via Hume Highway;
- 30% of traffic is projected to approach and depart the site from and to the north via Hume Highway;
- 20% of traffic is projected to approach and depart the site from and to the south-east via Cabramatta Road East; and
- 20% of traffic is projected to approach and depart the site from and to the north-east via Longfield Street.

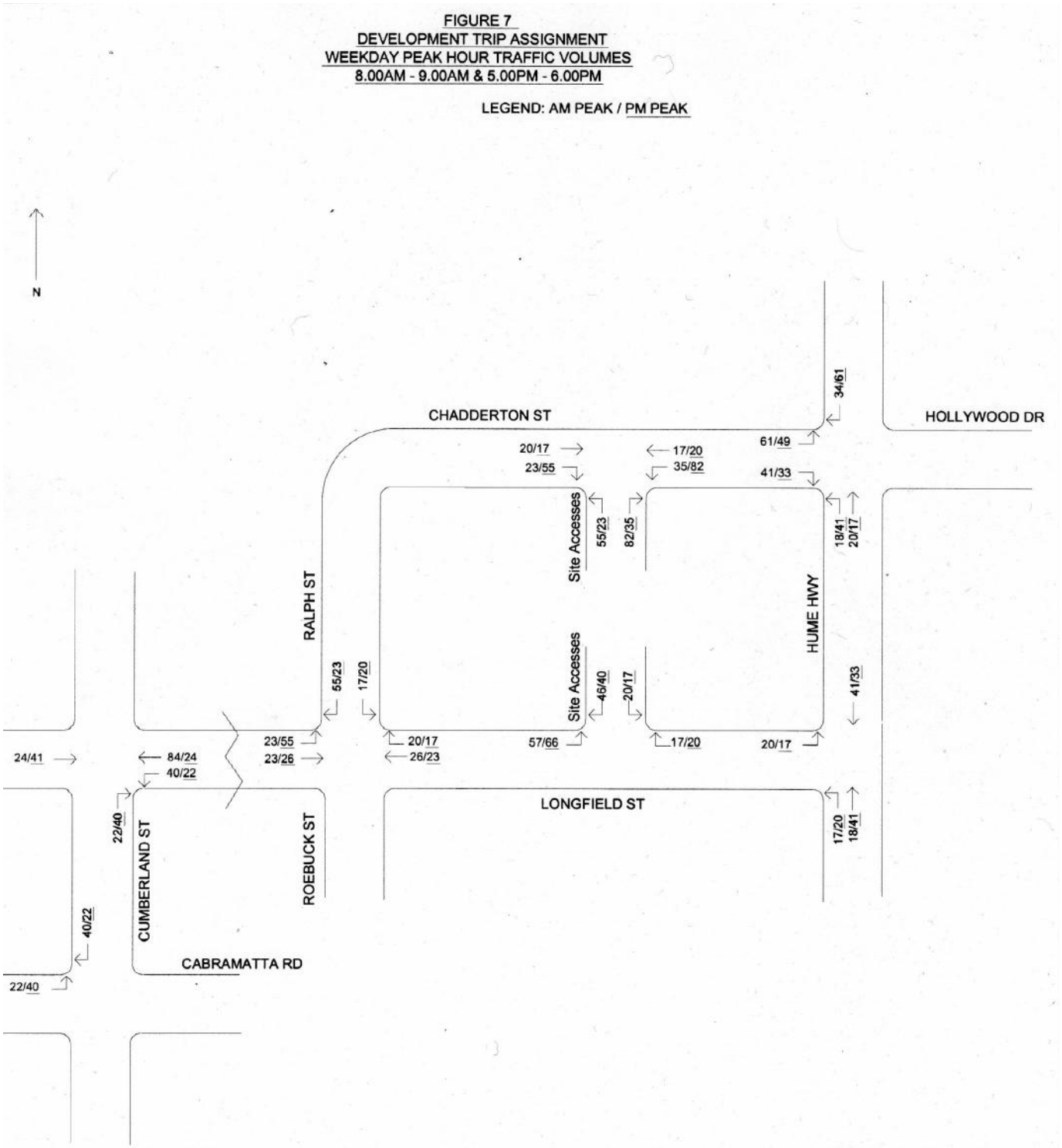
Figure 7 overleaf provides a graphical representation of the peak hour trip assignment associated with the additional traffic movements projected to be generated by the residential component of the proposal.

5.3 Projected Traffic Volumes

Based on the discussion provided previously on likely traffic generation and trip assignment, the projected peak hour traffic volumes have been formulated by adding the trip assignment presented above to the volumes existing surveyed peak conditions provided within **Figure 2**. **Figure 8** on page 26 provides an estimation of the future traffic volumes associated with and adjoining the subject site.

FIGURE 7
DEVELOPMENT TRIP ASSIGNMENT
WEEKDAY PEAK HOUR TRAFFIC VOLUMES
8.00AM - 9.00AM & 5.00PM - 6.00PM

LEGEND: AM PEAK / PM PEAK



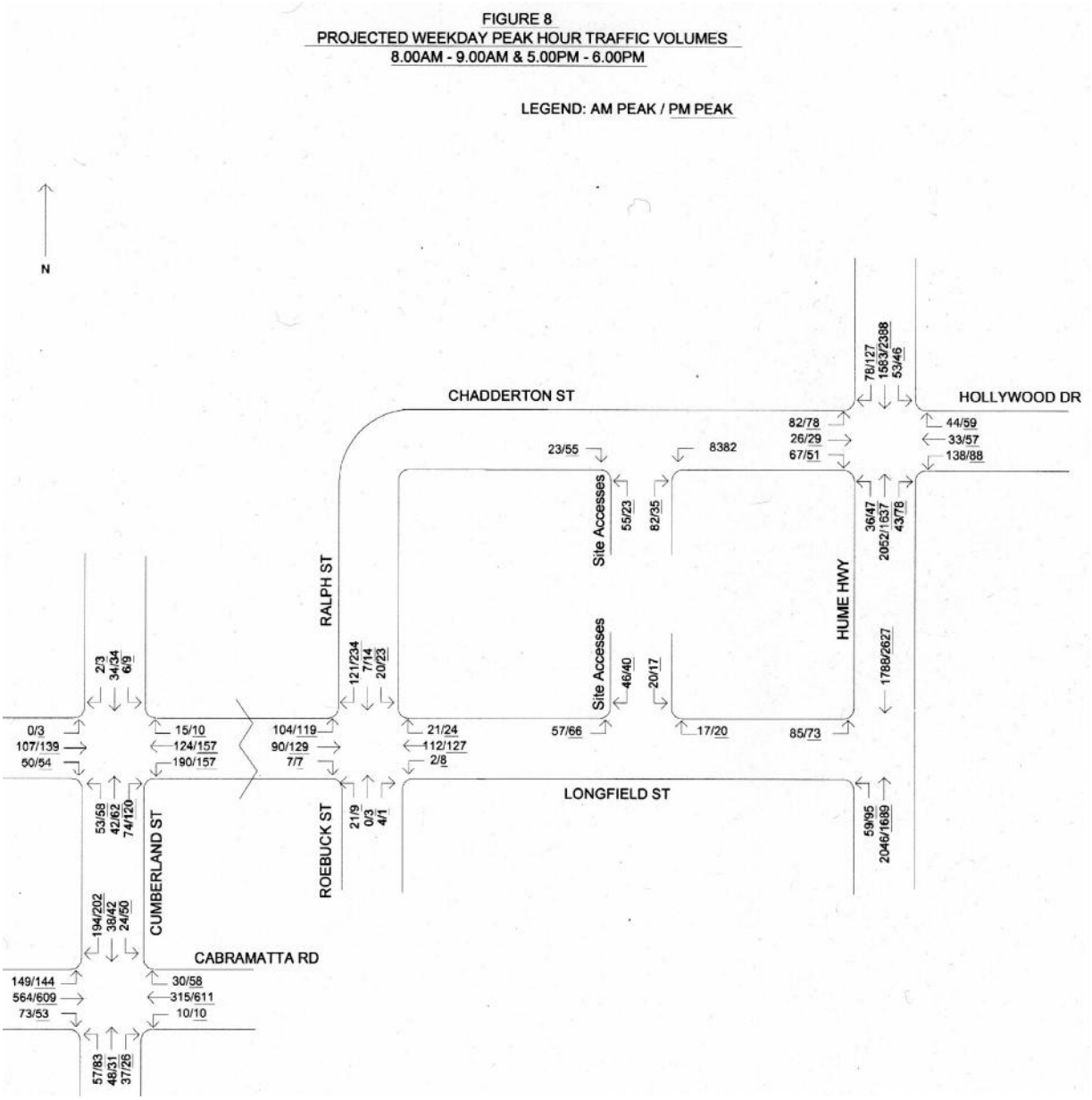


Table 4 overleaf provides a summary comparison of the existing and projected road network link traffic demands during peak periods, based on volumes presented within **Figure 6**.

TABLE 4 EXISTING & PROJECTED NETWORK PEAK HOUR TRAFFIC VOLUMES						
Road Link	**Existing Volumes**		**Projected Volumes**		**% Increase**	
	AM Peak	**PM Peak**	**AM Peak**	**PM Peak**	**AM Peak**	**PM Peak**
Hume Hwy (north of Chadderton St						
Northbound	2097	1708	2178	1774	4%	4%
Southbound	1680	2500	1714	2561	2%	2%
Total	3777	4208	3892	4335	3%	3%
Hume Hwy (south of Chadderton St						
Northbound	2093	1704	2131	1762	2%	3%
Southbound	1747	2594	1788	2627	2%	1%
Total	3840	4298	3919	4389	2%	2%
Cabramatta Rd (east of Cumberland St)						
Eastbound	625	685	625	685	0%	0%
Westbound	355	679	355	679	0%	0%
Total	980	1364	980	1364	0%	0%
Cabramatta Rd (west of Cumberland St)						
Eastbound	764	766	786	806	3%	5%
Westbound	526	874	566	896	8%	3%
Total	1290	1640	1352	1702	5%	4%
Chadderton St (west of Hume Highway)						
Eastbound	76	76	178	158	134%	79%
Westbound	95	129	147	231	55%	79%
Total	171	205	325	189	90%	79%
Longfield St (east of Ralph St)						
Eastbound	74	107	131	173	77%	62%
Westbound	89	119	135	159	52%	34%
Total	163	226	266	332	63%	47%
Longfield St (west of Ralph St)						
Eastbound	141	187	187	268	33%	43%
Westbound	248	273	329	319	33%	17%
Total	389	460	516	587	33%	28%
Longfield St (west of Cumberland St)						
Eastbound	133	155	157	196	18%	26%
Westbound	138	189	179	213	30%	13%
Total	271	344	336	409	24%	19%
Ralph St						
Northbound	82	74	125	146	52%	97%
Southbound	76	228	148	281	95%	23%
Total	158	302	273	427	73%	41%
Cumberland St (south of Longfield St)						
Northbound	147	200	169	240	15%	20%
Southbound	234	223	274	245	17%	10%
Total	381	423	443	485	16%	15%

5.4 Projected Intersection Performance

Utilising the projected traffic generation characteristics of the proposed development and the abovementioned assumed trip assignment, a number of significant junctions have been modelled in order to estimate the likely impact on traffic safety and efficiency. A summary of the most pertinent results are indicated within **Table 5** whilst more detailed summaries are provided as **Appendix 5**.

TABLE 5 POST DEVELOPMENT SIDRA ANALYSIS				
Intersection	**Existing Conditions**		**Projected Conditions**	
	AM Peak	**PM Peak**	**AM Peak**	**PM Peak**
Hume Hwy & Chadderton St				
Average Vehicle Delay	18.4	75.2	19.6	21.3
Degree of Saturation	0.61	1.07	0.64	0.75
Level of Service	B	F	B	B
Hume Hwy & Longfield St				
Average Vehicle Delay	12.6	11.0	12.6	11.0
Degree of Saturation	0.37	0.46	0.37	0.46
Level of Service	A	A	A	A
Cabramatta Rd East & Cumberland St				
Average Vehicle Delay	27.4	28.0	28.6	28.9
Degree of Saturation	0.43	0.46	0.49	0.50
Level of Service	B	B	C	C
Longfield St, Ralph St & Roebuck St				
Average Vehicle Delay	10.4	11.9	11.7	14.7
Degree of Saturation	0.10	0.35	0.21	0.44
Level of Service	A	A	A	B
Longfield St & Cumberland St				
Average Vehicle Delay	16.5	16.9	16.4	17.8
Degree of Saturation	0.18	0.23	0.23	0.28
Level of Service	B	B	B	B

Notes:

1. The existing performance levels of the intersection of Hume Highway, Chadderton Street and Hollywood Drive do not include the recommended lane configuration alterations to the southbound carriageway.
2. The projected performance levels of the intersection of Hume Highway, Chadderton Street and Hollywood Drive include the recommended lane configuration alterations to the southbound carriageway.

Table 5 indicates that the following:

- The intersection of Hume Highway, Chadderton Street and Hollywood Drive is projected to be suitably capable of accommodating the additional traffic projected to be generated by the subject development, incorporating the recommended alterations to the existing Hume Highway southbound carriageway lane configuration;

- The junction of Hume Highway and Longfield Street is projected to continue to provide a level of service ‘A’, incorporating the subject development;

- The level of service at the intersection of Cabramatta Road East and Cumberland Street is projected to reduce from ‘B’ to ‘C’ during peak periods

incorporating the subject development, however still providing motorists with satisfactory conditions;

- The intersection of Longfield Street, Ralph Street and Roebuck Street is projected to continue to provide motorists with good conditions incorporating the subject development, despite the level of service reducing from 'A' to 'B' during the evening peak; and

- The existing good level of service ('B') at the intersection of Longfield Street and Cumberland Street is projected to remain unchanged incorporating the subject development.

The public road intersections surrounding the subject site are therefore projected to provide motorists with acceptable levels of performance, incorporating the additional traffic associated with the subject development and the recommended infrastructure alterations at the intersection of Hume Highway, Chadderton Street and Longfield Street.

5.5 Local Road Link Performance

Section 3.1 of this report presents that Chadderton Street, Longfield Street, Ralph Street and Cumberland Street effectively perform collector functions within the surrounding local road hierarchy providing direct or indirect connectivity to the adjoining regional road network in Hume Highway and Cabramatta Road. The Roads & Maritime Services' *Guide to Traffic Generating Developments* provides an indicative environmental capacity for collector roads of 500 vehicles per hour.

Table 4 indicates that peak hour traffic demands within all surrounding local roads are not projected to exceed the above indicative environmental capacity of 500 vehicles per hour, with the exception of the section of Longfield Street between Ralph Street and Cumberland Street. This road link is however already provided with appropriate traffic calming and intersection treatments in the form of roundabout intersection control at Vale Street and Fairview Road as well as signalised intersection control at Cumberland Street. These measures, in conjunction with the wide pavement, are considered to result in Longfield Street being suitably capable of accommodating the projected moderate increase in traffic demands resulting from the subject development, without any unreasonable impact on abutting residential amenity.

Notwithstanding this above, this Practice considers that an improved traffic calming measure is likely to be necessitated at and on approach to the 90 degree curve in roadway at the junction of Chadderton Street and Ralph Street. The existing narrow central median, kerb blisters and speed hump on approach to the curve could be improved by the provision of a more visually prominent traffic management device such as a road narrowing treatment combined with a raised threshold treatment. Such an arrangement is therefore recommended to assist in the accommodation of the additional traffic demands resulting from the subject development. In consideration of this and the above discussion, the surrounding local road network is projected to be

suitably capable of accommodating the additional traffic associated with the subject proposal, incorporating the recommended infrastructure alterations.

5.6 Parking Considerations

The existing industrial land-use within the site has the potential to generate notable demand for on-street parking within Chadderton and Longfield Streets associated with employees of the development. This potential activity, combined with periods of high on-street parking demand associated with the Ming Quang Buddhist Temple located to the north of the site, can result in significant demand for on-street, particular within Chadderton Street.

The subject proposal is expected to reduce the potential for on-street parking, being self-sufficient with respect to the provision of on-site parking. Further, the proposal involves the provision of indented angled parking within Chadderton Street immediately adjacent to the subject development, thereby significantly increasing the capacity of the public road to accommodate the abovementioned periods of notable parking demand associated with the operation of the Ming Quang Buddhist Temple.

It is recommended that the abovementioned indented parking be provided at 90 degrees to ensure that it is readily accessible to east and westbound traffic along Chadderton Street.

5.7 Pedestrian Considerations

There is currently no footpath adjoining the site along the southern side of Chadderton Street. The provision of indented parking adjoining the site will necessitate the provision of a formalised footpath to provide connectivity between this on-street parking and the site. It is also recommended that pedestrian crossing treatments in the form of refuges be provided within Chadderton Street at both the eastern and western ends of the site to facilitate connectivity between the on-street parking (and the subject site) and the footpath on the northern side of Chadderton Street, the bus stop on the northern side of Chadderton Street and the Ming Quang Buddhist Temple.

6. BENEFITS OF THE PLANNING PROPOSAL

The following provides a summary of the benefits of the subject proposal, having regard to the contents of this report:

Road Network Operation

- The recommended lane configuration alterations at the intersection of Hume Highway, Chadderton Street and Hollywood Drive is projected to significantly improve the overall performance of the intersection, resulting in the evening level of service improving from 'F' to 'B';

- The proposal will result in the removal of notable volumes of heavy vehicle trips associated with the existing industrial land use along from the primarily residential collector streets of Chadderton, Ralph and Longfield Streets between the site and Hume Highway; and

- The recommended improved traffic management measures at the junction of Chadderton Street and Ralph Street will provide an improved traffic calming measure, thereby improving residential amenity and the overall level of safety within the immediate area.

Residential Amenity

- The proposal will result in the removal of noise from loading and operation of trucks within the site and other equipment associated with the industrial use.

Parking Considerations

- The proposal will result in a reduction in on-street parking demand associated with employees of the existing industrial uses within Chadderton and Longfield Streets; and

- The proposal seeks to provide additional public on-street parking within Chadderton Street to benefit the community users of the adjacent Temple.

Land-Use Transport Integration

- The proposal seeks to minimise external vehicle based trips providing a series of complementary land-uses within one site, with connectivity between uses being provided in a safe and efficient manner;

- The proposal promotes public transport utilisation through its proximity of bus and rail transport options within 5 minute walking and cycling catchments; and

- The recommended provision of pedestrian refuge/s within Chadderton Street will provide for safe and efficient connection between the site and the Temple.

7. CONCLUSION & RECOMMENDATIONS

This Practice has undertaken an assessment of the potential traffic and transport related impacts resulting from the proposed rezoning of 17 – 21 Longfield Street, Cabramatta. Based on this assessment, the following conclusions are provided:

- The subject proposal involves the rezoning of the site from B5 Business to R4 Residential under Fairfield LEP 2013 to allow for residential development with associated high demand uses. The Concept Plan is designed to create a vibrant and co-generational residential and mixed use environment, comprising the following mix of land-uses:

  - 450 standard residential apartments;
  - 150 independent living unit (seniors living) dwellings;
  - A nursing home with 150 beds;
  - Approximately 2,397m^2 of floor space for commercial / retail and other uses; and
  - 500m^2 of child care centre with an indicative capacity of 100 children.

- The limitation of the southbound Hume Highway carriageway to the north of Chadderton Street to two through lanes restricts the capacity of the Highway to accommodate the significant southbound traffic demands during the evening peak period. This results in the intersection of Hume Highway, Chadderton Street and Hollywood Drive providing poor conditions (level of service 'F') during the evening peak, resulting in extended delays for through southbound Highway movements.

- The previously described existing limitation to southbound Highway capacity can be assisted by the reconfiguration of the existing southbound carriageway lane arrangement as follows:

  - Converting the existing exclusive left turn lane within the southbound Hume Highway approach to the intersection to a shared through / left turn lane; and
  - Removal of the existing painted kerb extension within the southbound Highway departure from the intersection allowing the provision of a southbound through kerb side lane.

- SIDRA modelling indicates that the above lane configuration alterations within the southbound Hume Highway carriageway are expected to result in a significant improvement to the existing operational performance of the intersection of the Highway, Chadderton Street and Hollywood Drive during the evening peak period.

- All other modelled intersections surrounding the subject site currently provide a good level of service ('B' or better) during the morning and evening peak periods.

- The subject site is reasonably well serviced by public transport, with two bus services adjoining the site providing connectivity to Cabramatta and Liverpool Railway Stations.

- The proposed development is estimated to generate in the order of 318 peak hour vehicle movements to and from the site during peak periods.

- Such a generation represents up to 301 additional peak hour trips over and above that currently generated by the subject site. The proposed development traffic generation estimate also represents up to 240 additional peak hour trips over and above that currently capable of being generated by the existing site development, assuming full occupation. Notwithstanding this, for the purposes of generating an absolute worst case scenario, the subject proposal has been assessed to generate 318 peak hour vehicle movements over and above that currently generated by the existing development.

- Post development SIDRA modelling indicates that the public road intersections surrounding the subject site are projected to provide motorists with acceptable levels of performance, incorporating the additional traffic associated with the subject development and noted infrastructure alterations at the intersection of Hume Highway, Chadderton Street and Longfield Street.

- The additional traffic projected to be generated by the subject development is not projected to result in the environmental capacity of the surrounding collector road network being unreasonably exceeded, particularly considering the obvious benefits of the proposal with respect to the removal of existing undesirable heavy vehicle movements associated with the existing industrial land use within Chadderton, Longfield and Ralph Streets.

- Notwithstanding the above, this Practice considers that an improved traffic calming measure is likely to be necessitated at and on approach to the 90 degree curve in roadway at the junction of Chadderton Street and Ralph Street to assist in the accommodation of the additional traffic demands resulting from the subject development.

- The proposal involves the provision of indented angled parking within Chadderton Street immediately adjacent to the subject development, thereby significantly increasing the capacity of the public road to accommodate the periods of notable parking demand associated with the operation of the Ming Quang Buddhist Temple.

In consideration of the findings of this report and abovementioned conclusions, the following recommendations are provided:

- The existing lane configuration within the Hume Highway southbound carriageway be converted on approach and departure from its intersection with Chadderton Street and Hollywood Drive as follows:

  - The existing exclusive left turn lane within the southbound Hume Highway approach to the intersection be converted to a shared through / left turn lane; and
  - The existing painted kerb extension within the southbound Highway departure from the intersection be removed allowing the provision of an additional southbound travel lane.

- The existing narrow central median, kerb blisters and speed hump on approach to the curve could be improved by the provision of a more visually prominent traffic management device such as a landscaped road narrowing treatment combined with a raised threshold treatment.

- The following pedestrian infrastructure be provided:

  - A footpath extending for the frontage of the site along the southern side of Chadderton Street; and
  - Pedestrian refuges within Chadderton Street at both the eastern and western ends of the site to facilitate connectivity between the on-street parking (and the subject site) and the footpath on the northern side of Chadderton Street, the bus stop on the northern side of Chadderton Street and the Ming Quang Buddhist Temple.

Incorporating the implementation of the abovementioned recommendations, the surrounding local road network is projected to be suitably capable of accommodating the additional traffic associated with the subject proposal and accordingly, there are no traffic or transport related reasons why the subject planning proposal should be not be supported.

APPENDIX 1

ANTONIADES ARCHITECTS

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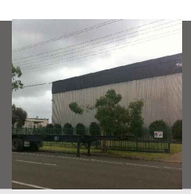


LONGFIELD STREET, CABRAMATTA
Urban Design Report
February 2012
GROUND FLOOR AND LANDSCAPE

APPENDIX 2

MOVEMENT SUMMARY

Site: Hume Highway & Chadderton Street

Existing AM Peak
Signals - Fixed Time 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hume Highway South											
1	L2	18	5.0	0.602	23.6	LOS B	24.6	179.2	0.67	0.62	40.2
2	T1	2032	5.0	0.602	15.3	LOS B	24.6	179.5	0.66	0.61	40.4
3	R2	43	5.0	0.221	22.9	LOS B	1.0	7.6	0.71	0.74	36.8
Approach		2093	5.0	0.602	15.5	LOS B	24.6	179.5	0.67	0.61	40.3
East: Hollywood Drive											
4	L2	138	5.0	0.264	43.2	LOS D	6.2	45.2	0.81	0.78	27.4
5	T1	33	5.0	0.318	49.4	LOS D	4.1	29.9	0.93	0.76	23.8
6	R2	44	5.0	0.318	57.4	LOS E	4.1	29.9	0.93	0.76	23.8
Approach		215	5.0	0.318	47.1	LOS D	6.2	45.2	0.85	0.77	26.0
North: Hume Highway North											
7	L2	53	5.0	0.049	18.1	LOS B	1.2	8.9	0.42	0.70	40.0
8	T1	1583	5.0	0.692	16.8	LOS B	30.8	224.6	0.73	0.67	39.1
9	R2	44	5.0	0.241	20.7	LOS B	1.0	7.0	0.66	0.73	38.2
Approach		1680	5.0	0.692	16.9	LOS B	30.8	224.6	0.72	0.67	39.2
West: Chadderton Street											
10	L2	21	5.0	0.040	40.5	LOS C	0.9	6.3	0.74	0.71	28.3
11	T1	26	5.0	0.225	49.5	LOS D	2.7	20.0	0.92	0.73	23.8
12	R2	26	5.0	0.225	57.5	LOS E	2.7	20.0	0.92	0.73	23.8
Approach		73	5.0	0.225	49.8	LOS D	2.7	20.0	0.87	0.73	25.0
All Vehicles		4061	5.0	0.692	18.4	LOS B	30.8	224.6	0.70	0.65	38.3

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	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	11	54.2	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	11	12.2	LOS B	0.0	0.0	0.45	0.45
All Pedestrians		21	33.2	LOS D			0.70	0.70

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: Hume Highway & Chadderton Street

Existing PM Peak
Signals - Fixed Time 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hume Highway South											
1	L2	6	5.0	0.479	21.9	LOS B	17.5	127.6	0.60	0.54	41.7
2	T1	1620	5.0	0.479	13.6	LOS A	17.5	127.6	0.59	0.53	41.9
3	R2	78	5.0	0.505	44.0	LOS D	3.3	24.1	1.00	0.75	27.1
Approach		1704	5.0	0.505	15.1	LOS B	17.5	127.6	0.61	0.54	40.8
East: Hollywood Drive											
4	L2	188	5.0	0.359	44.4	LOS D	8.7	63.6	0.84	0.80	27.0
5	T1	57	5.0	0.491	51.9	LOS D	6.4	46.9	0.96	0.79	23.2
6	R2	59	5.0	0.491	60.0	LOS E	6.4	46.9	0.96	0.79	23.2
Approach		304	5.0	0.491	48.8	LOS D	8.7	63.6	0.89	0.80	25.4
North: Hume Highway North											
7	L2	46	5.0	0.042	18.1	LOS B	1.1	7.7	0.42	0.70	40.0
8	T1	2388	5.0	1.068	125.0	LOS F	128.8	940.1	1.00	1.54	13.2
9	R2	66	5.0	0.291	18.1	LOS B	1.3	9.3	0.60	0.73	40.1
Approach		2500	5.0	1.068	120.2	LOS F	128.8	940.1	0.98	1.50	13.6
West: Chadderton Street											
10	L2	29	5.0	0.055	40.7	LOS C	1.2	8.8	0.75	0.72	28.3
11	T1	29	5.0	0.215	50.4	LOS D	2.5	18.3	0.92	0.73	23.7
12	R2	18	5.0	0.215	58.4	LOS E	2.5	18.3	0.92	0.73	23.7
Approach		76	5.0	0.215	48.6	LOS D	2.5	18.3	0.86	0.72	25.3
All Vehicles		4584	5.0	1.068	75.2	LOS F	128.8	940.1	0.83	1.09	19.1

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
P1	South Full Crossing	11	54.2	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	11	12.2	LOS B	0.0	0.0	0.45	0.45
All Pedestrians		21	33.2	LOS D			0.70	0.70

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: HUME HIGHWAY & LONGFIELD STREET

EXISTING AM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: HUME HIGHWAY SOUTH											
1	L2	42	5.0	0.366	8.2	LOS A	0.0	0.0	0.00	0.06	59.1
2	T1	2028	5.0	0.366	0.1	LOS A	0.0	0.0	0.00	0.02	59.6
Approach		2070	5.0	0.366	0.2	NA	0.0	0.0	0.00	0.02	59.6
North: HUME HIGHWAY NORTH											
8	T1	1747	5.0	0.308	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1747	5.0	0.308	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: LONGFIELD STREET											
10	L2	65	5.0	0.110	12.6	LOS A	0.4	2.8	0.57	0.85	44.6
Approach		65	5.0	0.110	12.6	LOS A	0.4	2.8	0.57	0.85	44.6
All Vehicles		3882	5.0	0.366	0.4	NA	0.4	2.8	0.01	0.03	59.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: HUME HIGHWAY & LONGFIELD STREET

EXISTING PM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: HUME HIGHWAY SOUTH											
1	L2	75	5.0	0.305	8.2	LOS A	0.0	0.0	0.00	0.13	58.2
2	T1	1648	5.0	0.305	0.0	LOS A	0.0	0.0	0.00	0.04	59.4
Approach		1723	5.0	0.305	0.4	NA	0.0	0.0	0.00	0.04	59.3
North: HUME HIGHWAY NORTH											
8	T1	2594	5.0	0.458	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		2594	5.0	0.458	0.1	NA	0.0	0.0	0.00	0.00	59.9
West: LONGFIELD STREET											
10	L2	56	5.0	0.076	11.0	LOS A	0.3	1.9	0.49	0.75	46.0
Approach		56	5.0	0.076	11.0	LOS A	0.3	1.9	0.49	0.75	46.0
All Vehicles		4373	5.0	0.458	0.3	NA	0.3	1.9	0.01	0.03	59.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: CABRAMATTA ROAD & CUMBERLAND STREET

EXISTING AM PEAK
Signals - Fixed Time 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: CUMBERLAND STREET SOUTH											
1	L2	57	5.0	0.069	27.4	LOS B	1.8	13.3	0.59	0.72	34.2
2	T1	48	5.0	0.161	30.2	LOS C	3.5	25.5	0.74	0.69	30.4
3	R2	37	5.0	0.161	38.3	LOS C	3.5	25.5	0.74	0.69	30.4
Approach		142	5.0	0.161	31.2	LOS C	3.5	25.5	0.68	0.70	31.8
East: CABRAMATTA ROAD EAST											
4	L2	10	5.0	0.195	29.9	LOS C	5.7	41.7	0.65	0.56	35.9
5	T1	315	5.0	0.195	21.7	LOS B	5.7	41.8	0.65	0.55	36.1
6	R2	30	5.0	0.091	25.1	LOS B	0.9	6.4	0.67	0.71	35.5
Approach		355	5.0	0.195	22.2	LOS B	5.7	41.8	0.65	0.56	36.0
North: CUMBERLAND STREET NORTH											
7	L2	24	5.0	0.029	26.9	LOS B	0.8	5.5	0.57	0.70	34.4
8	T1	38	5.0	0.429	34.5	LOS C	8.9	64.9	0.83	0.80	27.9
9	R2	154	5.0	0.429	42.6	LOS D	8.9	64.9	0.83	0.80	27.9
Approach		216	5.0	0.429	39.4	LOS C	8.9	64.9	0.80	0.79	28.5
West: CABRAMATTA ROAD WEST											
10	L2	127	5.0	0.432	32.8	LOS C	14.1	103.1	0.74	0.72	33.2
11	T1	564	5.0	0.432	24.4	LOS B	14.1	103.1	0.73	0.67	34.0
12	R2	73	5.0	0.144	24.2	LOS B	2.2	16.2	0.61	0.72	36.0
Approach		764	5.0	0.432	25.8	LOS B	14.1	103.1	0.72	0.68	34.0
All Vehicles		1477	5.0	0.432	27.4	LOS B	14.1	103.1	0.71	0.67	33.3

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
P1	South Full Crossing	53	22.9	LOS C	0.1	0.1	0.62	0.62
P2	East Full Crossing	53	33.8	LOS D	0.1	0.1	0.75	0.75
P3	North Full Crossing	53	22.9	LOS C	0.1	0.1	0.62	0.62
P4	West Full Crossing	53	33.8	LOS D	0.1	0.1	0.75	0.75
All Pedestrians		211	28.3	LOS C			0.68	0.68

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: CABRAMATTA ROAD & CUMBERLAND STREET

EXISTING PM PEAK
Signals - Fixed Time Cycle Time = 121 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: CUMBERLAND STREET SOUTH											
1	L2	83	5.0	0.098	26.9	LOS B	2.7	19.4	0.58	0.74	34.4
2	T1	31	5.0	0.103	27.8	LOS B	2.2	16.3	0.70	0.66	31.4
3	R2	26	5.0	0.103	36.0	LOS C	2.2	16.3	0.70	0.66	31.4
Approach		140	5.0	0.103	28.8	LOS C	2.7	19.4	0.63	0.70	33.1
East: CABRAMATTA ROAD EAST											
4	L2	10	5.0	0.384	33.3	LOS C	12.4	90.6	0.73	0.64	34.0
5	T1	611	5.0	0.384	25.1	LOS B	12.4	90.6	0.73	0.63	34.0
6	R2	58	5.0	0.185	26.8	LOS B	1.8	13.2	0.71	0.73	34.5
Approach		679	5.0	0.384	25.3	LOS B	12.4	90.6	0.73	0.64	34.1
North: CUMBERLAND STREET NORTH											
7	L2	50	5.0	0.059	26.5	LOS B	1.6	11.5	0.57	0.72	34.7
8	T1	42	5.0	0.461	32.6	LOS C	10.2	74.2	0.82	0.80	28.6
9	R2	180	5.0	0.461	40.7	LOS C	10.2	74.2	0.82	0.80	28.6
Approach		272	5.0	0.461	36.8	LOS C	10.2	74.2	0.77	0.79	29.6
West: CABRAMATTA ROAD WEST											
10	L2	104	5.0	0.454	34.2	LOS C	15.0	109.8	0.76	0.72	32.7
11	T1	609	5.0	0.454	25.9	LOS B	15.0	109.8	0.75	0.68	33.3
12	R2	53	5.0	0.151	26.0	LOS B	1.6	12.0	0.68	0.72	34.9
Approach		766	5.0	0.454	27.0	LOS B	15.0	109.8	0.75	0.69	33.3
All Vehicles		1857	5.0	0.461	28.0	LOS B	15.0	109.8	0.74	0.69	33.0

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
P1	South Full Crossing	53	23.9	LOS C	0.1	0.1	0.63	0.63
P2	East Full Crossing	53	32.8	LOS D	0.1	0.1	0.74	0.74
P3	North Full Crossing	53	23.9	LOS C	0.1	0.1	0.63	0.63
P4	West Full Crossing	53	32.8	LOS D	0.1	0.1	0.74	0.74
All Pedestrians		211	28.4	LOS C			0.68	0.68

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: LONGFIELD STREET & RALPH STREET

EXISTING AM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: ROEBUCK STREET											
1	L2	21	5.0	0.018	8.5	LOS A	0.1	0.4	0.18	0.60	48.2
2	T1	1	5.0	0.007	8.4	LOS A	0.0	0.2	0.34	0.60	47.5
3	R2	4	5.0	0.007	9.8	LOS A	0.0	0.2	0.34	0.60	47.5
Approach		26	5.0	0.018	8.7	LOS A	0.1	0.4	0.21	0.60	48.0
East: LONGIFLED STREET EAST											
4	L2	2	5.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.64	49.0
5	T1	86	5.0	0.046	0.6	LOS A	0.3	2.1	0.26	0.01	55.0
6	R2	1	5.0	0.046	8.9	LOS A	0.3	2.1	0.26	0.01	55.0
Approach		89	5.0	0.046	0.9	NA	0.3	2.1	0.26	0.03	54.9
North: RALPH STREET											
7	L2	3	5.0	0.002	8.4	LOS A	0.0	0.1	0.15	0.59	48.3
8	T1	7	5.0	0.104	9.0	LOS A	0.4	3.0	0.40	0.68	46.7
9	R2	66	5.0	0.104	10.4	LOS A	0.4	3.0	0.40	0.68	46.7
Approach		76	5.0	0.104	10.2	LOS A	0.4	3.0	0.39	0.67	46.8
West: LONGFIELD STREET WEST											
10	L2	81	5.0	0.045	8.2	LOS A	0.0	0.0	0.00	0.64	48.9
11	T1	67	5.0	0.041	0.3	LOS A	0.2	1.7	0.19	0.09	55.4
12	R2	7	5.0	0.041	8.6	LOS A	0.2	1.7	0.19	0.09	55.4
Approach		155	5.0	0.045	4.8	NA	0.2	1.7	0.09	0.38	51.8
All Vehicles		346	5.0	0.104	5.3	NA	0.4	3.0	0.21	0.37	51.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: LONGFIELD STREET & RALPH STREET

EXISTING PM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: ROEBUCK STREET											
1	L2	9	5.0	0.008	8.6	LOS A	0.0	0.2	0.19	0.59	48.1
2	T1	3	5.0	0.006	9.1	LOS A	0.0	0.2	0.42	0.58	47.6
3	R2	1	5.0	0.006	10.4	LOS A	0.0	0.2	0.42	0.58	47.6
Approach		13	5.0	0.008	8.8	LOS A	0.0	0.2	0.26	0.59	47.9
East: LONGIFLED STREET EAST											
4	L2	8	5.0	0.004	8.2	LOS A	0.0	0.0	0.00	0.64	49.0
5	T1	104	5.0	0.061	0.7	LOS A	0.4	2.8	0.29	0.06	54.2
6	R2	7	5.0	0.061	9.0	LOS A	0.4	2.8	0.29	0.06	54.2
Approach		119	5.0	0.061	1.7	NA	0.4	2.8	0.27	0.10	53.8
North: RALPH STREET											
7	L2	3	5.0	0.003	8.6	LOS A	0.0	0.1	0.19	0.58	48.1
8	T1	14	5.0	0.345	10.5	LOS A	1.8	13.1	0.52	0.78	45.2
9	R2	211	5.0	0.345	11.9	LOS A	1.8	13.1	0.52	0.78	45.2
Approach		228	5.0	0.345	11.8	LOS A	1.8	13.1	0.52	0.78	45.2
West: LONGFIELD STREET WEST											
10	L2	64	5.0	0.036	8.2	LOS A	0.0	0.0	0.00	0.64	48.9
11	T1	103	5.0	0.060	0.5	LOS A	0.4	2.6	0.23	0.06	55.2
12	R2	7	5.0	0.060	8.8	LOS A	0.4	2.6	0.23	0.06	55.2
Approach		174	5.0	0.060	3.6	NA	0.4	2.6	0.15	0.27	52.7
All Vehicles		534	5.0	0.345	6.8	NA	1.8	13.1	0.34	0.46	49.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: LONGFIELD STREET & CUMBERLAND STREET

EXISTING AM PEAK
Signals - Fixed Time Cycle Time = 60 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: CUMBERLAND STREET SOUTH											
1	L2	53	5.0	0.089	23.1	LOS B	1.1	7.9	0.72	0.73	36.6
2	T1	42	5.0	0.179	15.6	LOS B	2.0	14.6	0.74	0.70	37.7
3	R2	52	5.0	0.179	23.8	LOS B	2.0	14.6	0.74	0.70	37.7
Approach		147	5.0	0.179	21.2	LOS B	2.0	14.6	0.73	0.71	37.3
East: LONGFIELD STREET EAST											
4	L2	150	5.0	0.179	18.3	LOS B	2.6	18.8	0.61	0.75	39.9
5	T1	83	5.0	0.121	9.8	LOS A	1.6	11.9	0.59	0.53	44.3
6	R2	15	5.0	0.121	18.0	LOS B	1.6	11.9	0.59	0.53	44.3
Approach		248	5.0	0.179	15.4	LOS B	2.6	18.8	0.61	0.67	41.5
North: CUMBERLAND STREET NORTH											
7	L2	6	5.0	0.014	22.6	LOS B	0.2	1.2	0.69	0.63	38.0
8	T1	34	5.0	0.055	14.7	LOS B	0.7	4.9	0.71	0.55	40.3
9	R2	2	5.0	0.055	22.9	LOS B	0.7	4.9	0.71	0.54	40.4
Approach		42	5.0	0.055	16.2	LOS B	0.7	4.9	0.70	0.56	39.9
West: LONGFIELD STREET WEST											
10	L2	1	5.0	0.039	17.5	LOS B	0.5	3.9	0.57	0.44	45.6
11	T1	83	5.0	0.156	10.1	LOS A	1.8	12.8	0.60	0.57	43.2
12	R2	50	5.0	0.156	18.9	LOS B	1.8	12.8	0.62	0.65	41.7
Approach		134	5.0	0.156	13.4	LOS A	1.8	12.8	0.61	0.60	42.6
All Vehicles		571	5.0	0.179	16.5	LOS B	2.6	18.8	0.65	0.65	40.5

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
P1	South Full Crossing	53	14.7	LOS B	0.1	0.1	0.70	0.70
P2	East Full Crossing	53	20.9	LOS C	0.1	0.1	0.84	0.84
P3	North Full Crossing	53	14.7	LOS B	0.1	0.1	0.70	0.70
P4	West Full Crossing	53	20.9	LOS C	0.1	0.1	0.84	0.84
All Pedestrians		211	17.8	LOS B			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: LONGFIELD STREET & CUMBERLAND STREET

EXISTING PM PEAK
Signals - Fixed Time Cycle Time = 60 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: CUMBERLAND STREET SOUTH											
1	L2	58	5.0	0.081	20.3	LOS B	1.1	7.7	0.65	0.73	38.5
2	T1	62	5.0	0.228	13.0	LOS A	2.8	20.4	0.70	0.70	39.5
3	R2	80	5.0	0.228	21.2	LOS B	2.8	20.4	0.70	0.70	39.5
Approach		200	5.0	0.228	18.4	LOS B	2.8	20.4	0.68	0.71	39.2
East: LONGFIELD STREET EAST											
4	L2	135	5.0	0.188	20.9	LOS B	2.6	18.9	0.68	0.76	38.1
5	T1	128	5.0	0.190	12.7	LOS A	2.7	19.4	0.68	0.58	42.0
6	R2	10	5.0	0.190	20.9	LOS B	2.7	19.4	0.68	0.58	42.0
Approach		273	5.0	0.190	17.1	LOS B	2.7	19.4	0.68	0.67	40.0
North: CUMBERLAND STREET NORTH											
7	L2	9	5.0	0.013	19.8	LOS B	0.2	1.2	0.62	0.67	38.9
8	T1	34	5.0	0.051	11.9	LOS A	0.7	4.8	0.64	0.51	42.7
9	R2	3	5.0	0.051	20.1	LOS B	0.7	4.8	0.64	0.51	42.8
Approach		46	5.0	0.051	14.0	LOS A	0.7	4.8	0.63	0.54	41.9
West: LONGFIELD STREET WEST											
10	L2	3	5.0	0.052	20.1	LOS B	0.7	5.1	0.64	0.51	42.8
11	T1	98	5.0	0.209	12.6	LOS A	2.3	16.6	0.67	0.61	41.0
12	R2	54	5.0	0.209	21.2	LOS B	2.3	16.6	0.69	0.68	40.0
Approach		155	5.0	0.209	15.7	LOS B	2.3	16.6	0.68	0.63	40.6
All Vehicles		674	5.0	0.228	16.9	LOS B	2.8	20.4	0.68	0.66	40.0

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
P1	South Full Crossing	53	17.7	LOS B	0.1	0.1	0.77	0.77
P2	East Full Crossing	53	17.7	LOS B	0.1	0.1	0.77	0.77
P3	North Full Crossing	53	17.7	LOS B	0.1	0.1	0.77	0.77
P4	West Full Crossing	53	17.7	LOS B	0.1	0.1	0.77	0.77
All Pedestrians		211	17.7	LOS B			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.

APPENDIX 3

MOVEMENT SUMMARY

Site: Hume Highway & Chadderton Street

Existing AM Peak
Signals - Fixed Time 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hume Highway South											
1	L2	18	5.0	0.628	25.6	LOS B	26.2	191.1	0.71	0.66	38.6
2	T1	2032	5.0	0.628	17.3	LOS B	26.2	191.4	0.71	0.65	38.8
3	R2	43	5.0	0.195	19.0	LOS B	0.9	6.4	0.60	0.72	39.4
Approach		2093	5.0	0.628	17.4	LOS B	26.2	191.4	0.70	0.65	38.8
East: Hollywood Drive											
4	L2	138	5.0	0.243	40.7	LOS C	6.0	43.5	0.78	0.78	28.3
5	T1	33	5.0	0.264	45.2	LOS D	3.9	28.5	0.89	0.75	24.9
6	R2	44	5.0	0.264	53.2	LOS D	3.9	28.5	0.89	0.75	24.9
Approach		215	5.0	0.264	44.0	LOS D	6.0	43.5	0.82	0.77	27.0
North: Hume Highway North											
7	L2	53	5.0	0.496	23.7	LOS B	18.3	133.9	0.63	0.60	39.9
8	T1	1583	5.0	0.496	15.5	LOS B	18.4	134.6	0.63	0.58	40.2
9	R2	44	5.0	0.245	22.2	LOS B	1.0	7.1	0.70	0.74	37.3
Approach		1680	5.0	0.496	15.9	LOS B	18.4	134.6	0.63	0.58	40.1
West: Chadderton Street											
10	L2	21	5.0	0.037	38.2	LOS C	0.8	6.1	0.72	0.71	29.2
11	T1	26	5.0	0.191	45.4	LOS D	2.6	19.1	0.88	0.72	25.0
12	R2	26	5.0	0.191	53.4	LOS D	2.6	19.1	0.88	0.72	25.0
Approach		73	5.0	0.191	46.2	LOS D	2.6	19.1	0.84	0.72	26.1
All Vehicles		4061	5.0	0.628	18.7	LOS B	26.2	191.4	0.68	0.63	38.1

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
P1	South Full Crossing	11	54.2	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	11	13.5	LOS B	0.0	0.0	0.48	0.48
All Pedestrians		21	33.9	LOS D			0.71	0.71

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: Hume Highway & Chadderton Street

Existing PM Peak
Signals - Fixed Time 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hume Highway South											
1	L2	6	5.0	0.500	23.8	LOS B	18.7	136.2	0.63	0.57	40.2
2	T1	1620	5.0	0.500	15.5	LOS B	18.7	136.3	0.63	0.57	40.3
3	R2	78	5.0	0.495	37.0	LOS C	3.1	22.3	0.97	0.79	29.7
Approach		1704	5.0	0.500	16.5	LOS B	18.7	136.3	0.65	0.58	39.7
East: Hollywood Drive											
4	L2	188	5.0	0.331	41.8	LOS C	8.4	61.2	0.81	0.80	27.9
5	T1	57	5.0	0.423	48.6	LOS D	6.2	45.2	0.94	0.78	24.0
6	R2	59	5.0	0.423	56.6	LOS E	6.2	45.2	0.94	0.78	24.0
Approach		304	5.0	0.423	45.9	LOS D	8.4	61.2	0.86	0.79	26.3
North: Hume Highway North											
7	L2	46	5.0	0.745	27.7	LOS B	34.8	253.9	0.80	0.75	36.9
8	T1	2388	5.0	0.745	19.4	LOS B	34.9	254.7	0.79	0.73	37.2
9	R2	66	5.0	0.300	19.5	LOS B	1.4	10.0	0.63	0.74	39.1
Approach		2500	5.0	0.745	19.5	LOS B	34.9	254.7	0.79	0.73	37.2
West: Chadderton Street											
10	L2	29	5.0	0.051	38.4	LOS C	1.2	8.5	0.72	0.72	29.1
11	T1	29	5.0	0.183	47.1	LOS D	2.4	17.6	0.90	0.72	24.6
12	R2	18	5.0	0.183	55.1	LOS D	2.4	17.6	0.90	0.72	24.6
Approach		76	5.0	0.183	45.7	LOS D	2.4	17.6	0.83	0.72	26.2
All Vehicles		4584	5.0	0.745	20.6	LOS B	34.9	254.7	0.74	0.68	36.8

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.

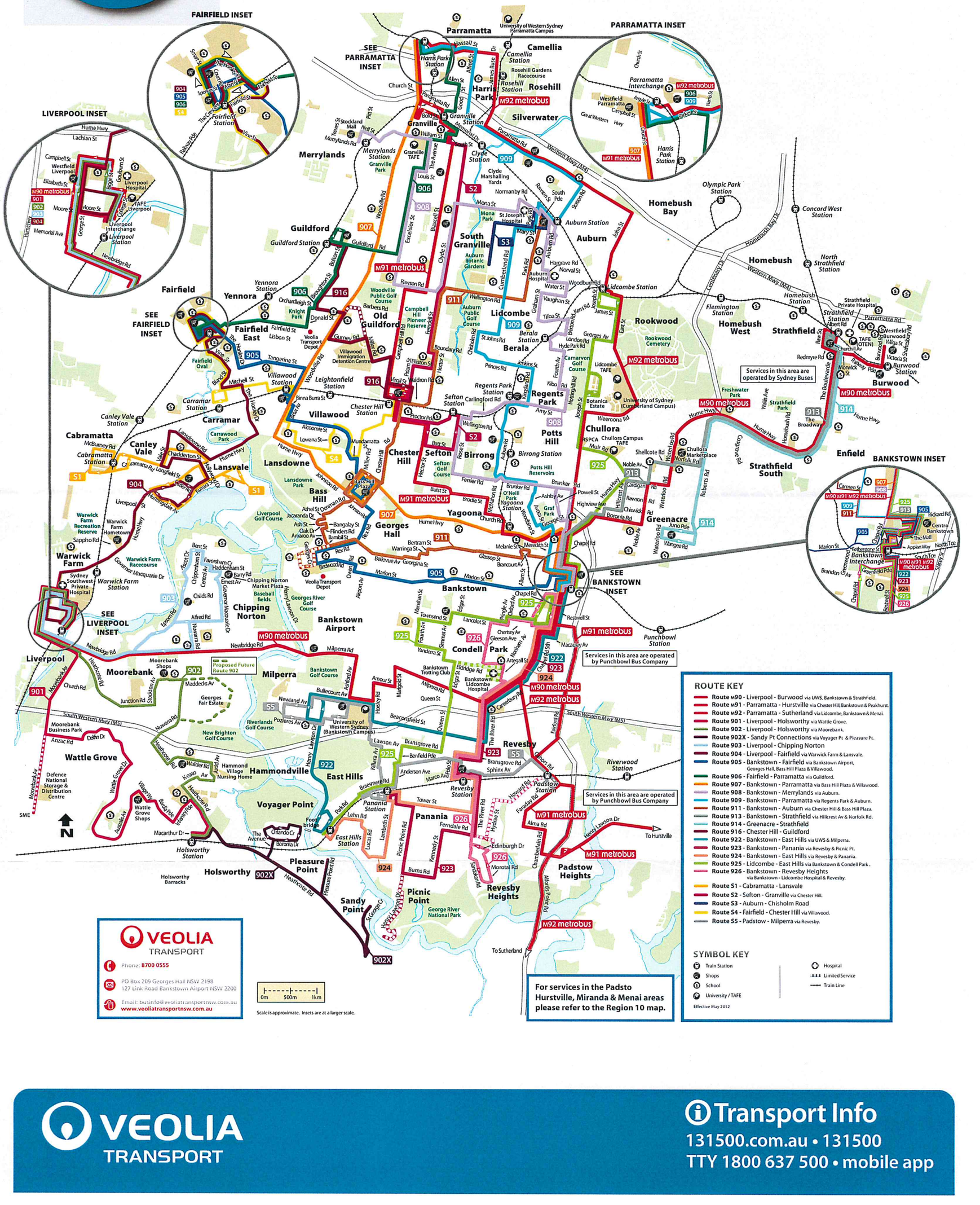
Movement Performance - Pedestrians

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
P1	South Full Crossing	11	54.2	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	11	13.5	LOS B	0.0	0.0	0.48	0.48
All Pedestrians		21	33.9	LOS D			0.71	0.71

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.

APPENDIX 4

Parramatta-Liverpool-Bankstown Area Bus Services (Region 13)



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APPENDIX 5

MOVEMENT SUMMARY

Site: Hume Highway & Chadderton Street

Projected AM Peak
Signals - Fixed Time 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hume Highway South											
1	L2	36	5.0	0.640	25.8	LOS B	26.9	196.7	0.72	0.67	38.4
2	T1	2052	5.0	0.640	17.5	LOS B	27.0	197.2	0.71	0.66	38.6
3	R2	43	5.0	0.195	19.0	LOS B	0.9	6.4	0.60	0.72	39.4
Approach		2131	5.0	0.640	17.7	LOS B	27.0	197.2	0.71	0.66	38.6
East: Hollywood Drive											
4	L2	138	5.0	0.243	40.7	LOS C	6.0	43.5	0.78	0.78	28.3
5	T1	33	5.0	0.283	46.4	LOS D	4.0	28.9	0.90	0.75	24.6
6	R2	44	5.0	0.283	54.4	LOS D	4.0	28.9	0.90	0.75	24.6
Approach		215	5.0	0.283	44.4	LOS D	6.0	43.5	0.83	0.77	26.8
North: Hume Highway North											
7	L2	53	5.0	0.496	23.7	LOS B	18.3	133.9	0.63	0.60	39.9
8	T1	1583	5.0	0.496	15.5	LOS B	18.4	134.6	0.63	0.58	40.2
9	R2	78	5.0	0.440	24.3	LOS B	2.1	15.7	0.79	0.78	36.0
Approach		1714	5.0	0.496	16.2	LOS B	18.4	134.6	0.64	0.59	40.0
West: Chadderton Street											
10	L2	82	5.0	0.144	39.5	LOS C	3.4	24.9	0.75	0.76	28.7
11	T1	26	5.0	0.384	48.5	LOS D	5.0	36.2	0.93	0.78	23.8
12	R2	67	5.0	0.384	56.5	LOS E	5.0	36.2	0.93	0.78	23.8
Approach		175	5.0	0.384	47.4	LOS D	5.0	36.2	0.85	0.77	25.9
All Vehicles		4235	5.0	0.640	19.6	LOS B	27.0	197.2	0.69	0.64	37.5

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
P1	South Full Crossing	11	54.2	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	11	13.5	LOS B	0.0	0.0	0.48	0.48
All Pedestrians		21	33.9	LOS D			0.71	0.71

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: Hume Highway & Chadderton Street

Projected PM Peak
Signals - Fixed Time 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hume Highway South											
1	L2	47	5.0	0.519	24.0	LOS B	19.6	143.2	0.65	0.61	39.7
2	T1	1637	5.0	0.519	15.7	LOS B	19.7	143.8	0.64	0.59	40.0
3	R2	78	5.0	0.495	37.0	LOS C	3.1	22.3	0.97	0.79	29.7
Approach		1762	5.0	0.519	16.9	LOS B	19.7	143.8	0.65	0.59	39.4
East: Hollywood Drive											
4	L2	188	5.0	0.331	41.8	LOS C	8.4	61.2	0.81	0.80	27.9
5	T1	57	5.0	0.452	49.8	LOS D	6.3	45.9	0.95	0.78	23.7
6	R2	59	5.0	0.452	57.8	LOS E	6.3	45.9	0.95	0.78	23.7
Approach		304	5.0	0.452	46.4	LOS D	8.4	61.2	0.86	0.79	26.1
North: Hume Highway North											
7	L2	46	5.0	0.752	27.9	LOS B	35.4	258.3	0.81	0.75	36.8
8	T1	2388	5.0	0.752	19.4	LOS B	35.5	259.1	0.79	0.73	37.2
9	R2	127	5.0	0.597	22.0	LOS B	3.2	23.3	0.77	0.79	37.4
Approach		2561	5.0	0.752	19.7	LOS B	35.5	259.1	0.79	0.74	37.2
West: Chadderton Street											
10	L2	78	5.0	0.137	39.4	LOS C	3.2	23.6	0.75	0.75	28.7
11	T1	29	5.0	0.376	50.3	LOS D	4.3	31.7	0.94	0.77	23.5
12	R2	51	5.0	0.376	58.3	LOS E	4.3	31.7	0.94	0.77	23.5
Approach		158	5.0	0.376	47.5	LOS D	4.3	31.7	0.85	0.76	25.8
All Vehicles		4785	5.0	0.752	21.3	LOS B	35.5	259.1	0.75	0.69	36.4

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
P1	South Full Crossing	11	54.2	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	11	13.5	LOS B	0.0	0.0	0.48	0.48
All Pedestrians		21	33.9	LOS D			0.71	0.71

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: HUME HIGHWAY & LONGFIELD STREET

PROJECTED AM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: HUME HIGHWAY SOUTH											
1	L2	59	5.0	0.372	8.2	LOS A	0.0	0.0	0.00	0.09	58.8
2	T1	2046	5.0	0.372	0.1	LOS A	0.0	0.0	0.00	0.03	59.5
Approach		2105	5.0	0.372	0.3	NA	0.0	0.0	0.00	0.03	59.5
North: HUME HIGHWAY NORTH											
8	T1	1788	5.0	0.316	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1788	5.0	0.316	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: LONGFIELD STREET											
10	L2	85	5.0	0.143	12.6	LOS A	0.5	3.6	0.58	0.85	44.5
Approach		85	5.0	0.143	12.6	LOS A	0.5	3.6	0.58	0.85	44.5
All Vehicles		3978	5.0	0.372	0.4	NA	0.5	3.6	0.01	0.03	59.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: HUME HIGHWAY & LONGFIELD STREET

PROJECTED PM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: HUME HIGHWAY SOUTH											
1	L2	95	5.0	0.316	8.2	LOS A	0.0	0.0	0.00	0.16	57.8
2	T1	1689	5.0	0.316	0.0	LOS A	0.0	0.0	0.00	0.05	59.3
Approach		1784	5.0	0.316	0.5	NA	0.0	0.0	0.00	0.05	59.2
North: HUME HIGHWAY NORTH											
8	T1	2627	5.0	0.464	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		2627	5.0	0.464	0.1	NA	0.0	0.0	0.00	0.00	59.9
West: LONGFIELD STREET											
10	L2	73	5.0	0.099	11.0	LOS A	0.3	2.5	0.50	0.77	46.0
Approach		73	5.0	0.099	11.0	LOS A	0.3	2.5	0.50	0.77	46.0
All Vehicles		4484	5.0	0.464	0.4	NA	0.3	2.5	0.01	0.03	59.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: LONGFIELD STREET & RALPH STREET

PROJECTED AM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: ROEBUCK STREET											
1	L2	21	5.0	0.018	8.6	LOS A	0.1	0.5	0.21	0.60	48.0
2	T1	1	5.0	0.008	9.3	LOS A	0.0	0.2	0.42	0.62	46.6
3	R2	4	5.0	0.008	10.6	LOS A	0.0	0.2	0.42	0.62	46.6
Approach		26	5.0	0.018	8.9	LOS A	0.1	0.5	0.25	0.60	47.8
East: LONGIFLED STREET EAST											
4	L2	2	5.0	0.001	8.2	LOS A	0.0	0.0	0.00	0.64	49.0
5	T1	112	5.0	0.078	0.9	LOS A	0.5	3.5	0.32	0.14	53.0
6	R2	21	5.0	0.078	9.2	LOS A	0.5	3.5	0.32	0.14	53.0
Approach		135	5.0	0.078	2.3	NA	0.5	3.5	0.31	0.15	53.0
North: RALPH STREET											
7	L2	20	5.0	0.017	8.5	LOS A	0.1	0.4	0.18	0.60	48.2
8	T1	7	5.0	0.208	10.3	LOS A	0.9	6.4	0.50	0.76	45.4
9	R2	121	5.0	0.208	11.7	LOS A	0.9	6.4	0.50	0.76	45.4
Approach		148	5.0	0.208	11.2	LOS A	0.9	6.4	0.46	0.74	45.8
West: LONGFIELD STREET WEST											
10	L2	104	5.0	0.058	8.2	LOS A	0.0	0.0	0.00	0.64	48.9
11	T1	90	5.0	0.053	0.5	LOS A	0.3	2.3	0.23	0.07	55.1
12	R2	7	5.0	0.053	8.8	LOS A	0.3	2.3	0.23	0.07	55.1
Approach		201	5.0	0.058	4.8	NA	0.3	2.3	0.11	0.37	51.7
All Vehicles		510	5.0	0.208	6.2	NA	0.9	6.4	0.27	0.43	49.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: LONGFIELD STREET & RALPH STREET

PROJECTED PM PEAK
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: ROEBUCK STREET											
1	L2	9	5.0	0.008	8.7	LOS A	0.0	0.2	0.22	0.59	48.0
2	T1	3	5.0	0.007	10.2	LOS A	0.0	0.2	0.49	0.62	46.5
3	R2	1	5.0	0.007	11.6	LOS A	0.0	0.2	0.49	0.62	46.5
Approach		13	5.0	0.008	9.2	LOS A	0.0	0.2	0.30	0.60	47.5
East: LONGIFLED STREET EAST											
4	L2	8	5.0	0.004	8.2	LOS A	0.0	0.0	0.00	0.64	49.0
5	T1	127	5.0	0.090	1.2	LOS A	0.6	4.2	0.37	0.14	52.3
6	R2	24	5.0	0.090	9.5	LOS A	0.6	4.2	0.37	0.14	52.3
Approach		159	5.0	0.090	2.8	NA	0.6	4.2	0.35	0.16	52.1
North: RALPH STREET											
7	L2	23	5.0	0.020	8.7	LOS A	0.1	0.5	0.22	0.60	48.0
8	T1	14	5.0	0.440	13.3	LOS A	2.7	20.0	0.63	0.94	42.8
9	R2	234	5.0	0.440	14.7	LOS B	2.7	20.0	0.63	0.94	42.8
Approach		271	5.0	0.440	14.1	LOS A	2.7	20.0	0.59	0.91	43.1
West: LONGFIELD STREET WEST											
10	L2	119	5.0	0.066	8.2	LOS A	0.0	0.0	0.00	0.64	48.9
11	T1	129	5.0	0.074	0.6	LOS A	0.5	3.4	0.26	0.05	54.8
12	R2	7	5.0	0.074	8.9	LOS A	0.5	3.4	0.26	0.05	54.8
Approach		255	5.0	0.074	4.4	NA	0.5	3.4	0.14	0.33	51.9
All Vehicles		698	5.0	0.440	7.9	NA	2.7	20.0	0.37	0.52	48.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: LONGFIELD STREET & CUMBERLAND STREET

PROJECTED AM PEAK
Signals - Fixed Time Cycle Time = 60 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: CUMBERLAND STREET SOUTH											
1	L2	53	5.0	0.089	23.1	LOS B	1.1	7.9	0.72	0.73	36.6
2	T1	42	5.0	0.224	15.9	LOS B	2.5	18.3	0.76	0.73	37.2
3	R2	74	5.0	0.224	24.1	LOS B	2.5	18.3	0.76	0.73	37.2
Approach		169	5.0	0.224	21.8	LOS B	2.5	18.3	0.74	0.73	37.0
East: LONGFIELD STREET EAST											
4	L2	190	5.0	0.227	18.5	LOS B	3.3	24.4	0.63	0.76	39.7
5	T1	124	5.0	0.168	10.0	LOS A	2.4	17.3	0.61	0.54	44.3
6	R2	15	5.0	0.168	18.2	LOS B	2.4	17.3	0.61	0.54	44.3
Approach		329	5.0	0.227	15.3	LOS B	3.3	24.4	0.62	0.67	41.5
North: CUMBERLAND STREET NORTH											
7	L2	6	5.0	0.014	22.6	LOS B	0.2	1.2	0.69	0.63	38.0
8	T1	34	5.0	0.055	14.7	LOS B	0.7	4.9	0.71	0.55	40.3
9	R2	2	5.0	0.055	22.9	LOS B	0.7	4.9	0.71	0.54	40.4
Approach		42	5.0	0.055	16.2	LOS B	0.7	4.9	0.70	0.56	39.9
West: LONGFIELD STREET WEST											
10	L2	1	5.0	0.046	17.5	LOS B	0.6	4.7	0.57	0.44	45.6
11	T1	107	5.0	0.185	10.3	LOS A	2.1	15.3	0.61	0.57	43.2
12	R2	50	5.0	0.185	19.0	LOS B	2.1	15.3	0.63	0.64	41.9
Approach		158	5.0	0.185	13.1	LOS A	2.1	15.3	0.62	0.59	42.8
All Vehicles		698	5.0	0.227	16.4	LOS B	3.3	24.4	0.66	0.66	40.5

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	14.7	LOS B	0.1	0.1	0.70	0.70
P2	East Full Crossing	53	20.9	LOS C	0.1	0.1	0.84	0.84
P3	North Full Crossing	53	14.7	LOS B	0.1	0.1	0.70	0.70
P4	West Full Crossing	53	20.9	LOS C	0.1	0.1	0.84	0.84
All Pedestrians		211	17.8	LOS B			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: LONGFIELD STREET & CUMBERLAND STREET

PROJECTED PM PEAK
Signals - Fixed Time Cycle Time = 60 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: CUMBERLAND STREET SOUTH											
1	L2	58	5.0	0.075	18.9	LOS B	1.0	7.3	0.61	0.72	39.4
2	T1	62	5.0	0.276	12.0	LOS A	3.5	25.5	0.68	0.72	39.9
3	R2	120	5.0	0.276	20.2	LOS B	3.5	25.5	0.68	0.72	39.9
Approach		240	5.0	0.276	17.8	LOS B	3.5	25.5	0.66	0.72	39.8
East: LONGFIELD STREET EAST											
4	L2	157	5.0	0.239	22.6	LOS B	3.2	23.7	0.73	0.77	36.9
5	T1	157	5.0	0.251	14.5	LOS B	3.5	25.3	0.74	0.62	40.5
6	R2	10	5.0	0.251	22.7	LOS B	3.5	25.3	0.74	0.62	40.5
Approach		324	5.0	0.251	18.7	LOS B	3.5	25.3	0.73	0.69	38.7
North: CUMBERLAND STREET NORTH											
7	L2	9	5.0	0.012	18.5	LOS B	0.2	1.1	0.59	0.67	39.8
8	T1	34	5.0	0.047	10.6	LOS A	0.6	4.6	0.60	0.49	44.0
9	R2	3	5.0	0.047	18.8	LOS B	0.6	4.6	0.60	0.49	44.0
Approach		46	5.0	0.047	12.7	LOS A	0.6	4.6	0.60	0.52	43.1
West: LONGFIELD STREET WEST											
10	L2	3	5.0	0.071	21.5	LOS B	0.9	6.8	0.68	0.54	41.6
11	T1	139	5.0	0.284	14.9	LOS B	3.2	23.4	0.73	0.64	39.4
12	R2	54	5.0	0.284	23.8	LOS B	3.2	23.4	0.76	0.70	38.4
Approach		196	5.0	0.284	17.4	LOS B	3.2	23.4	0.74	0.66	39.2
All Vehicles		806	5.0	0.284	17.8	LOS B	3.5	25.5	0.71	0.68	39.4

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
P1	South Full Crossing	53	19.2	LOS B	0.1	0.1	0.80	0.80
P2	East Full Crossing	53	16.2	LOS B	0.1	0.1	0.73	0.73
P3	North Full Crossing	53	19.2	LOS B	0.1	0.1	0.80	0.80
P4	West Full Crossing	53	16.2	LOS B	0.1	0.1	0.73	0.73
All Pedestrians		211	17.7	LOS B			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: CABRAMATTA ROAD & CUMBERLAND STREET

PROJECTED AM PEAK
Signals - Fixed Time 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	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CUMBERLAND STREET SOUTH											
1	L2	57	5.0	0.067	26.2	LOS B	1.8	12.9	0.57	0.72	34.8
2	T1	48	5.0	0.147	26.5	LOS B	3.3	23.8	0.70	0.67	32.1
3	R2	37	5.0	0.147	34.6	LOS C	3.3	23.8	0.70	0.67	32.1
Approach		142	5.0	0.147	28.5	LOS B	3.3	23.8	0.65	0.69	33.2
East: CABRAMATTA ROAD EAST											
4	L2	10	5.0	0.203	31.2	LOS C	5.9	43.0	0.67	0.57	35.1
5	T1	315	5.0	0.203	23.0	LOS B	5.9	43.1	0.67	0.56	35.2
6	R2	30	5.0	0.097	26.6	LOS B	0.9	6.6	0.71	0.71	34.6
Approach		355	5.0	0.203	23.6	LOS B	5.9	43.1	0.67	0.58	35.2
North: CUMBERLAND STREET NORTH											
7	L2	24	5.0	0.028	25.8	LOS B	0.7	5.3	0.55	0.70	35.1
8	T1	38	5.0	0.489	33.2	LOS C	10.7	78.3	0.83	0.81	28.4
9	R2	194	5.0	0.489	41.3	LOS C	10.7	78.3	0.83	0.81	28.4
Approach		256	5.0	0.489	38.6	LOS C	10.7	78.3	0.81	0.80	28.9
West: CABRAMATTA ROAD WEST											
10	L2	149	5.0	0.465	34.6	LOS C	15.2	111.0	0.77	0.75	32.2
11	T1	564	5.0	0.465	26.1	LOS B	15.2	111.0	0.76	0.69	33.0
12	R2	73	5.0	0.149	25.4	LOS B	2.3	16.8	0.63	0.72	35.3
Approach		786	5.0	0.465	27.6	LOS B	15.2	111.0	0.75	0.70	33.1
All Vehicles		1539	5.0	0.489	28.6	LOS C	15.2	111.0	0.73	0.69	32.7

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
P1	South Full Crossing	53	24.1	LOS C	0.1	0.1	0.63	0.63
P2	East Full Crossing	53	32.3	LOS D	0.1	0.1	0.73	0.73
P3	North Full Crossing	53	24.1	LOS C	0.1	0.1	0.63	0.63
P4	West Full Crossing	53	32.3	LOS D	0.1	0.1	0.73	0.73
All Pedestrians		211	28:2	LOS C			0.68	0.68

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: CABRAMATTA ROAD & CUMBERLAND STREET

PROJECTED PM PEAK
Signals - Fixed Time Cycle Time = 121 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: CUMBERLAND STREET SOUTH											
1	L2	83	5.0	0.097	26.3	LOS B	2.6	19.1	0.57	0.73	34.8
2	T1	31	5.0	0.101	27.1	LOS B	2.2	16.1	0.69	0.66	31.8
3	R2	26	5.0	0.101	35.3	LOS C	2.2	16.1	0.69	0.66	31.8
Approach		140	5.0	0.101	28.2	LOS B	2.6	19.1	0.62	0.70	33.5
East: CABRAMATTA ROAD EAST											
4	L2	10	5.0	0.392	34.0	LOS C	12.6	92.1	0.74	0.65	33.6
5	T1	611	5.0	0.392	25.8	LOS B	12.6	92.1	0.74	0.64	33.6
6	R2	58	5.0	0.198	27.8	LOS B	1.8	13.4	0.74	0.73	34.0
Approach		679	5.0	0.392	26.1	LOS B	12.6	92.1	0.74	0.65	33.7
North: CUMBERLAND STREET NORTH											
7	L2	50	5.0	0.058	25.9	LOS B	1.5	11.3	0.56	0.72	35.0
8	T1	42	5.0	0.498	32.4	LOS C	11.3	82.2	0.83	0.81	28.7
9	R2	202	5.0	0.498	40.6	LOS C	11.3	82.2	0.83	0.81	28.7
Approach		294	5.0	0.498	36.9	LOS C	11.3	82.2	0.78	0.79	29.6
West: CABRAMATTA ROAD WEST											
10	L2	144	5.0	0.492	35.4	LOS C	16.4	119.6	0.78	0.75	31.8
11	T1	609	5.0	0.492	27.0	LOS B	16.4	119.6	0.77	0.70	32.6
12	R2	53	5.0	0.154	26.6	LOS B	1.7	12.2	0.69	0.72	34.6
Approach		806	5.0	0.492	28.5	LOS B	16.4	119.6	0.77	0.71	32.6
All Vehicles		1919	5.0	0.498	28.9	LOS C	16.4	119.6	0.75	0.70	32.5

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
P1	South Full Crossing	53	24.6	LOS C	0.1	0.1	0.64	0.64
P2	East Full Crossing	53	32.1	LOS D	0.1	0.1	0.73	0.73
P3	North Full Crossing	53	24.6	LOS C	0.1	0.1	0.64	0.64
P4	West Full Crossing	53	32.1	LOS D	0.1	0.1	0.73	0.73
All Pedestrians		211	28.3	LOS C			0.68	0.68

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.