GTAconsultants

Archer Street Planning Proposal
Chatswood Chase
Transport Impact Assessment

Client // Vicinity Limited
Office // NSW
Reference // 15S1304102
Date // 08/07/16

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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1. Introduction

1.1 Background

A Planning Proposal is being lodged with Willoughby City Council for a proposed expansion to the existing Chatswood Chase Shopping Centre in Chatswood. Preliminary investigations indicate that the Planning Proposal will seek to expand the existing shopping centre from 58,650sq.m to 75,650sq.m, an increase of 17,000sq.m.

GTA Consultants was commissioned by Vicinity Limited in March 2016 to undertake a transport impact assessment for the proposed development to accompany the pre-Gateway planning process.

To inform the scope of this report, early discussion was held with RMS on Tuesday 8th March 2016 to identify the level of detail required to support lodgement of a Planning Proposal. This meeting clarified the extent and type of modelling exercise to be carried out and confirmed that the assessment should take into account the traffic from any known development approvals / planning proposals. This report has been prepared on the basis of this discussion.

1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the anticipated future development, including consideration of the following:

i existing traffic conditions surrounding the site
ii suitability of the intended parking provision in terms of supply (quantum)
iii service vehicle requirements
iv pedestrian and bicycle requirements
v the traffic generating characteristics of the intended development
vi suitability of the intended access arrangements for the site
vii the transport impact of the intended development on the surrounding road network.

1.3 References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- Willoughby City Council Bike Plan, prepared by PBAI Australia, September 2006
- Willoughby City Council Local Environmental Plan (LEP) 2012
- Willoughby City Council Development Control Plan (DCP) 2006
- traffic and car parking surveys referenced in the context of this report
- '36-50 Hercules Street & 256-260 Victoria Avenue, Chatswood' prepared by Varga Traffic Planning, dated 22 June 2015
- 'Mandarin Centre Planning Proposal Transport Impact Assessment' prepared by GTA Consultants, dated 13 April 2016
- other documents and data as referenced in this report.

2. Existing Conditions

2.1 Subject Site

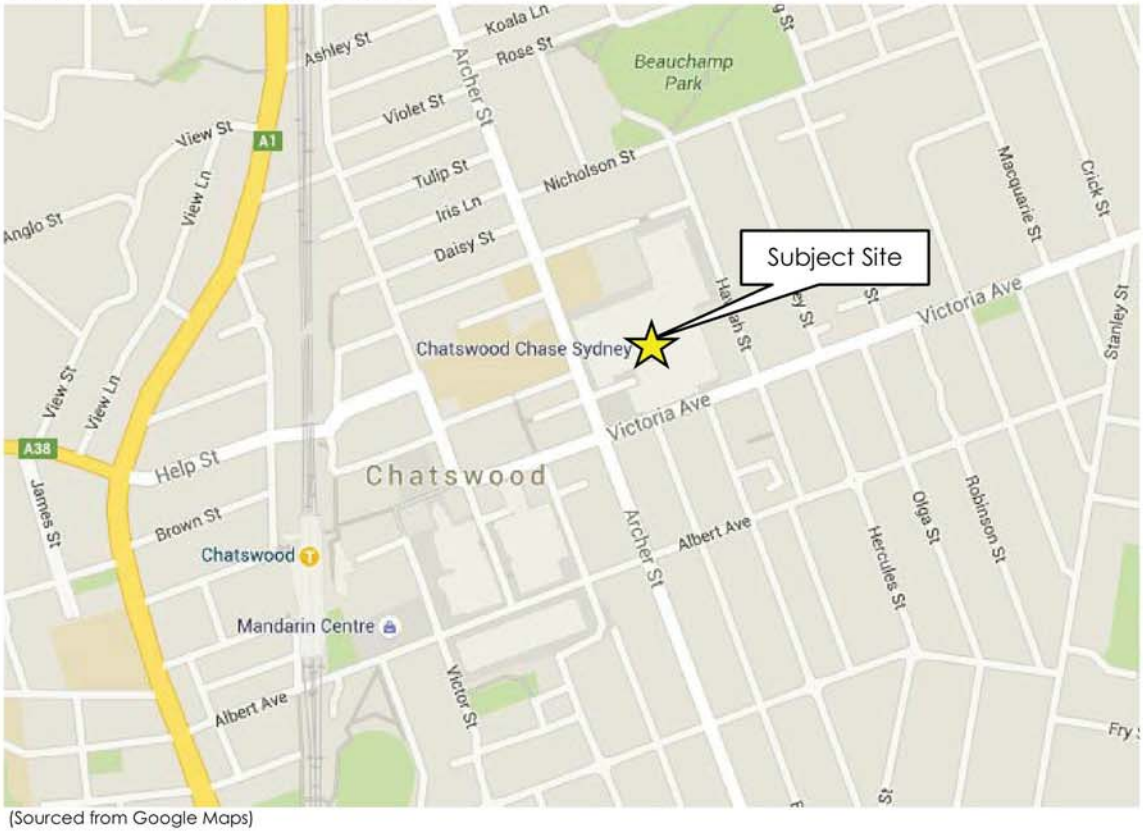
The subject site is bordered by Archer Street, Victoria Avenue, Havilah Street and Malvern Avenue in Chatswood. The site is occupied by the Chatswood Chase Shopping Centre ('the Centre') and has a frontage of approximately 100m to Archer Street and Victoria Street, 120m to Havilah Street and 75m to Malvern Avenue. The site has a land use classification of 'B3 – Commercial Core' under the Willoughby City Council Local Environmental Plan (LEP) 2012.

The Centre comprises of approximately 58,650sq.m of retail uses, including major retailers, specialty stores, restaurants and food court uses, set across four levels. These land uses are supported by approximately 2,500 car spaces provided over 11 car parking levels. Vehicle access to the car park is via Malvern Avenue to the north, Victoria Avenue to the south or via an access ramp to the rooftop carpark from Archer Street in the west.

The site is located within the Chatswood Central Business District (CBD), with surrounding properties predominantly comprising of retail and commercial uses and low density residential dwellings. The Mercy Catholic College immediately neighbours the site to the north-west and St Pius X College is located across Archer Street. A number of shopping centres, including Westfield Chatswood, Mandarin Centre and Lemon Grove Shopping Centre, are located in close proximity to the site, within the Chatswood CBD.

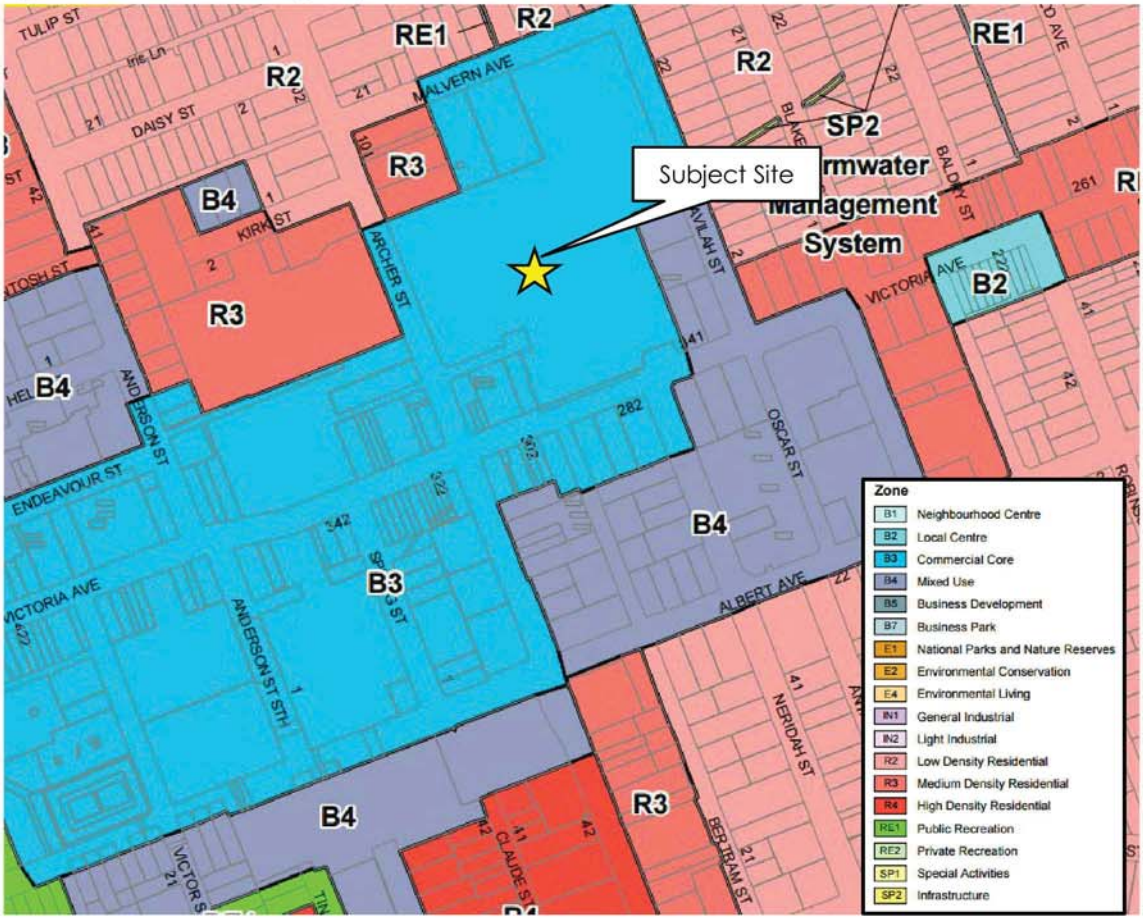
The location of the site and its surrounding environs is shown in Figure 2.1 and Figure 2.2.

Figure 2.1: Subject Site and Its Environs



(Sourced from Google Maps)

Figure 2.2: Land Use Zoning Map



(Adapted from Willoughby City Council Local Environmental Plan 2012)

2.2 Road Network

2.2.1 Adjoining Roads

Archer Street

Archer Street functions as a higher order local road and in the vicinity of the site is aligned in a north-south direction connecting Boundary Street in the north to Mowbray Road in the south. It is a two-way road configured with a 4-lane, 12.5 metre wide carriageway, set within a 19 metre wide road reserve (approx.).

Kerbside parking is permitted in segments of the western side (northbound lanes) of Archer Street, outside of clearway times and subject to time restrictions. There is no provision for car parking on the eastern side (southbound lanes) of Archer Street.

Archer Street is shown in Figure 2.3 and carries approximately 14,500 vehicles per day[1].

1 Based on the weekday PM peak hour traffic counts undertaken by GTA in March 2016 and assuming a peak-to-daily ratio 10% for local roads.

Victoria Avenue

Victoria Avenue functions as a higher order Council road and in the vicinity of the site is aligned in an east-west direction. It is a two-way road configured with a 2-lane, 7 metre wide carriageway, broadening to a 4-lane, 14 metre wide carriageway at the intersection with Neridah Street. Victoria Avenue is set within a 20 metre wide road reserve (approx.).

Kerbside parking is indented at the western end of Victoria Avenue, near the intersection with Archer Street, and is marked on the northern side. On the southern side, parking is also marked in a traffic lane between Neridah Street and Bertram Street, subject to time restrictions.

Victoria Avenue is shown in Figure 2.4 and carries approximately 8,500 vehicles per day[2].

Malvern Avenue

Malvern Avenue is classified as a local road with its main function being to provide vehicle access to the Chatswood Chase Shopping Centre. It is truncated as a thoroughfare towards the eastern end by a vegetation treatment. The eastern segment is thus designed as a cul-de-sac, with the western segment funnelling traffic into and out of the car park entrance, separated by a central median. In the vicinity of the site, the road is aligned in an east-west direction. It is a two-way road configured with a 2-lane, 12 metre wide carriageway, set within a 21 metre wide road reserve (approx.).

A kerbside parking lane is marked on both sides of the street in the western segment, subject to time restrictions. Kerbside parking is also permitted on both sides of the eastern segment, subject to time restrictions.

Malvern Avenue is shown in Figure 2.5 and carries approximately 6,200 vehicles per day[3].

Havilah Street

Havilah Street functions as a local road and in the vicinity of the site is aligned in a north-south direction. It is a two-way road configured with a 2-lane, 18 metre wide carriageway, set within a 28 metre wide road reserve (approx.).

Parallel parking spaces are indented on both sides of the street, subject to time restrictions.

Havilah Street is shown in Figure 2.6 below.

Figure 2.3: Archer Street

Figure 2.4: Victoria Avenue

Source: Google

2 Based on the weekday PM peak hour traffic counts undertaken by GTA in March 2016 and assuming a peak-to-daily ratio of 10% for local roads.

3 Based on the weekday PM peak hour traffic counts undertaken by GTA in March 2016 and assuming a peak-to-daily ratio of 10% for local roads.

Figure 2.5: Malvern Avenue

Figure 2.6: Havilah Street

Source: Google

2.2.2 Surrounding Intersections

The following intersections currently exist in the immediate vicinity of the site:

- Archer Street / Malvern Avenue / Wattle Lane (signalised)
- Archer Street / Kirk Street (unsignalised)
- Archer Street / Ferguson Lane (signalised)
- Archer Street / Mills Lane (signalised)
- Archer Street / Victoria Avenue (signalised)
- Archer Street / western car park access ramp (unsignalised)
- Victoria Avenue / Bertram Street (unsignalised)
- Victoria Avenue / Neridah Street / southern car park access (signalised)
- Victoria Avenue / Havilah Street / Oscar Street (unsignalised)
- Havilah Street / Malvern Avenue (unsignalised)
- Malvern Avenue / northern car park access (unsignalised)

For the assessment of the performance of the broader road network surrounding the site, the following intersections were analysed with traffic movement surveys and SIDRA Intersection and network analyses, as presented later in this report:

- Archer Street / Boundary Street (signalised)
- Archer Street / Ashley Street (signalised)
- Archer Street / Malvern Avenue / Wattle Lane (signalised)
- Archer Street / Victoria Avenue (signalised)
- Victoria Avenue / Neridah Street / southern car park access (signalised)
- Archer Street / Albert Avenue (signalised)
- Archer Street / Mowbray Road (signalised)

2.3 Traffic Volumes

GTA commissioned traffic movement counts on key roads in the vicinity of the site (as outlined above) on Thursday 17th and Saturday 19th March 2016 during the following peak periods:

- Thursday PM peak: 3:30pm – 6:30pm (peak hour: 5:00pm – 6:00pm)
- Saturday peak: 11:30am – 2:30pm (peak hour: 12:45pm – 1:45pm).

The weekday PM and Saturday peak hour traffic volumes are summarised in Figure 2.7 and Figure 2.8, with full results contained in Appendix A.

Figure 2.7: Existing Weekday PM peak traffic movements

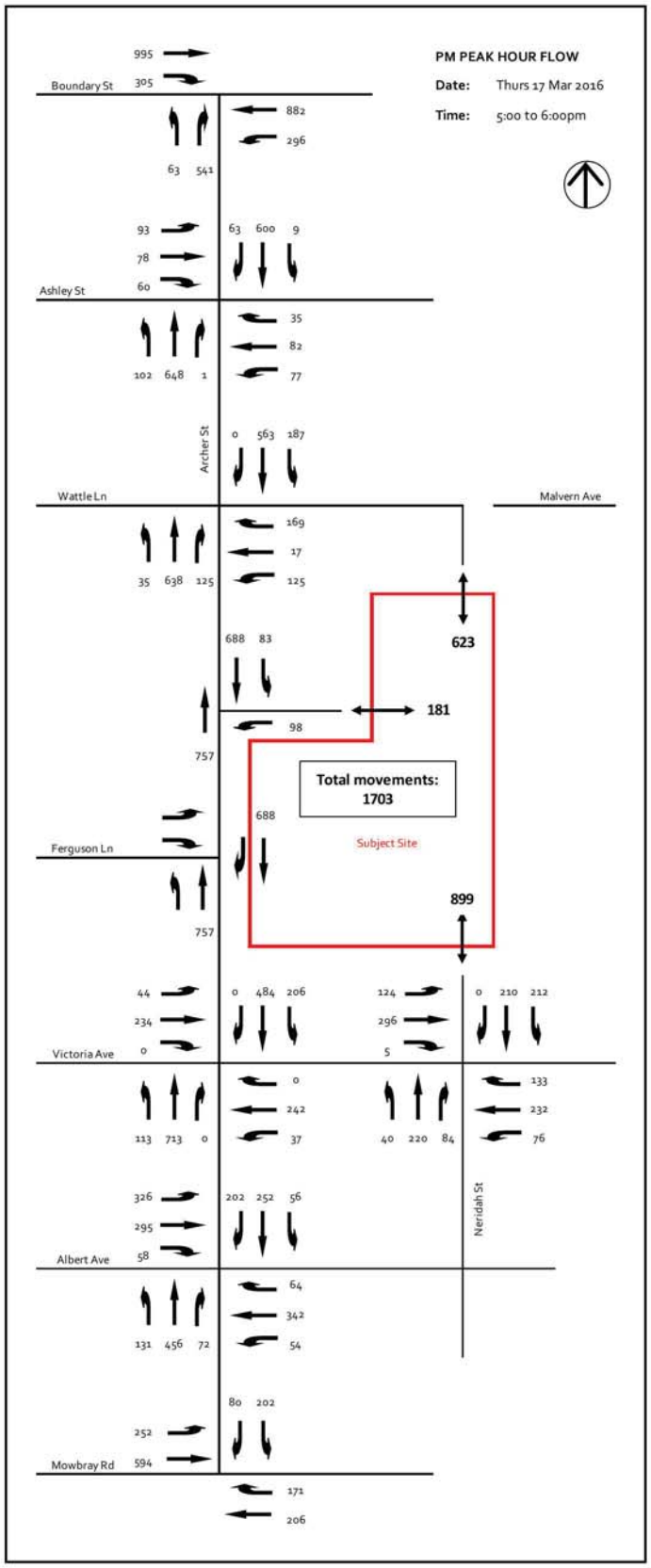
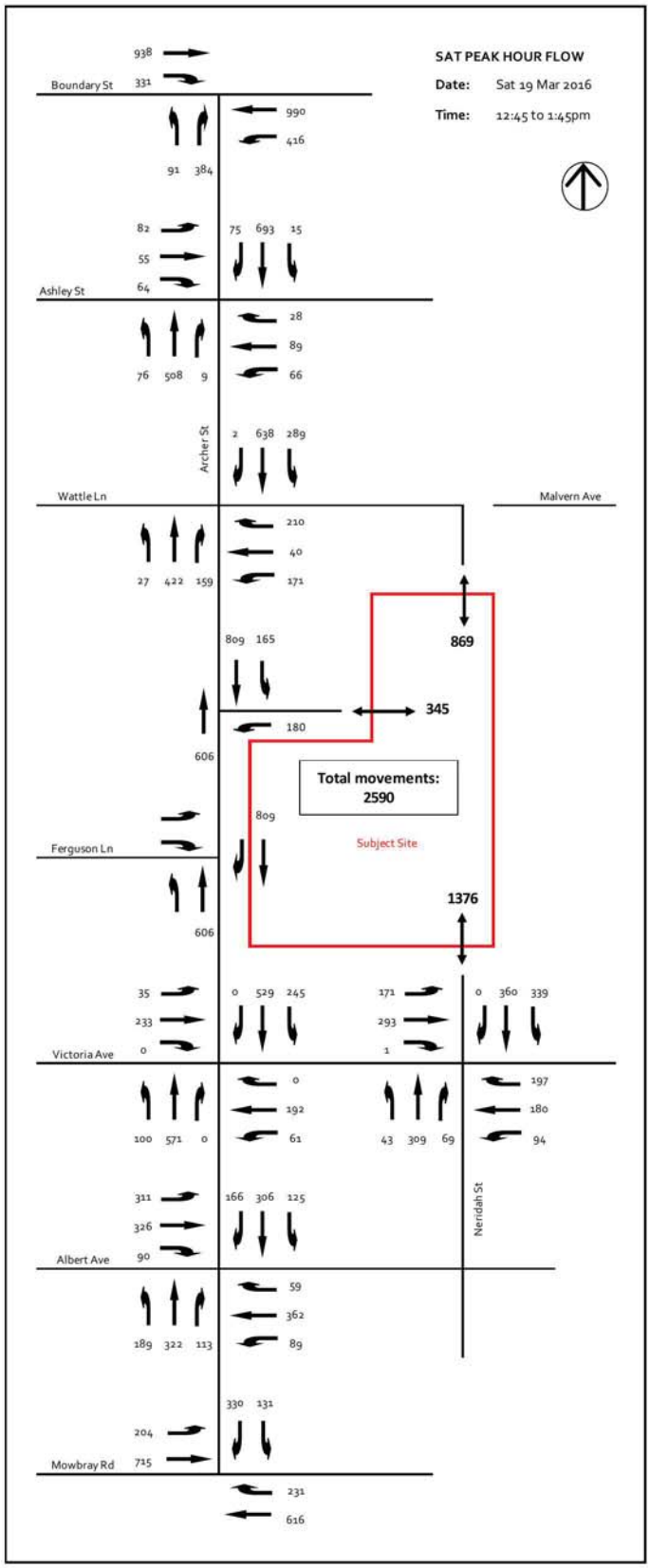


Figure 2.8: Existing Saturday peak traffic movements



The existing conditions indicate volumes into and out of the Centre as follows:

- Thursday PM peak: 1,703 vehicles[4]
- Saturday peak: 2,590 vehicles[4]

Notwithstanding, the existing traffic generation rate has been derived from boom gate entry and exit data provided by Wilson Parking. These volumes more accurately reflect traffic which is generated specifically by the Centre.

Based on the existing Centre area of 58,650sqm, the boom gate volumes equate to rates as shown in Table 2.1.

Table 2.1: Existing Traffic Generation Shopping Centre

Peak Hour	Floor Area	No. of Movements	Traffic Generation Rate
Weekday AM (Thurs 10 March 2016)	58,650sq.m	442	0.75 movements per 100sq.m
Weekday PM (Thurs 10 March 2016)		1,625	2.77 movements per 100sq.m
Saturday Lunchtime (Sat 5 March 2016)		2,358	4.02 movements per 100sq.m

Table 2.1 indicates that the existing centre generates traffic at a rate of 0.75, 2.77 and 4.02 movements per 100sq.m during the weekday AM and PM and Saturday lunchtime peak periods, respectively.

2.4 Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA INTERSECTION[5], a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by the RMS, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.2 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

4 Assumes all traffic into and out of Malvern Avenue is generated by the Centre.

5 Program used under license from Akcelik & Associates Pty Ltd.

Table 2.2: SIDRA INTERSECTION Level of Service Criteria

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

The intersections presented below were assessed as a network model, with the exception of Archer Street / Boundary Street and Archer Street / Mowbray Road intersections, which were assessed individually due to substantial distance from the remainder of the network.

Table 2.3 presents a summary of the existing operation of the intersections, with full results presented in Appendix B of this report.

Table 2.3: Existing Operating Conditions

Peak Hour	Intersection	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
PM	Boundary Street / Archer Street	0.952	32.0	220.5	LOS C
	Ashley Street / Archer Street	0.571	14.3	90.1	LOS A
	Malvern Avenue / Archer Street	0.485	16.8	79.9	LOS B
	Victoria Avenue / Archer Street	0.682	37.1	154.1	LOS C
	Albert Avenue / Archer Street	0.897	39.9	158.3	LOS C
	Mowbray Road / Archer Street	0.863	30.4	219.3	LOS C
	Neridah Street / Victoria Avenue	0.505	14.2	42.8	LOS A
Sat	Boundary Street / Archer Street	0.788	26.7	285.1	LOS B
	Ashley Street / Archer Street	0.883	19.7	124.1	LOS B
	Malvern Avenue / Archer Street	0.546	20.3	132.1	LOS B
	Victoria Avenue / Archer Street	0.720	34.3	152.8	LOS C
	Albert Avenue / Archer Street	1.161	41.7	143.5	LOS C
	Mowbray Road / Archer Street	0.847	29.7	170.0	LOS C
	Neridah Street / Victoria Avenue	0.561	23.2	93.3	LOS B

Table 2.3 indicates that all intersections generally operate with Levels of Service of C or better, with acceptable average vehicle delays not exceeding 42 seconds.

Notwithstanding this, it is noted that the modelled DOS of 1.161 for the Albert Avenue / Archer Street intersection indicates that the existing traffic volumes exceed the capacity of the intersection in the Saturday peak; theoretically yielding queues of 143.5m and an average delay of over 40 seconds, albeit classified as a LOS C under RMS standards. In addition, the intersection of Boundary Street / Archer Street currently operates near its theoretical capacity during the weekday PM peak, with satisfactory average vehicle delays.

2.5 Public Transport

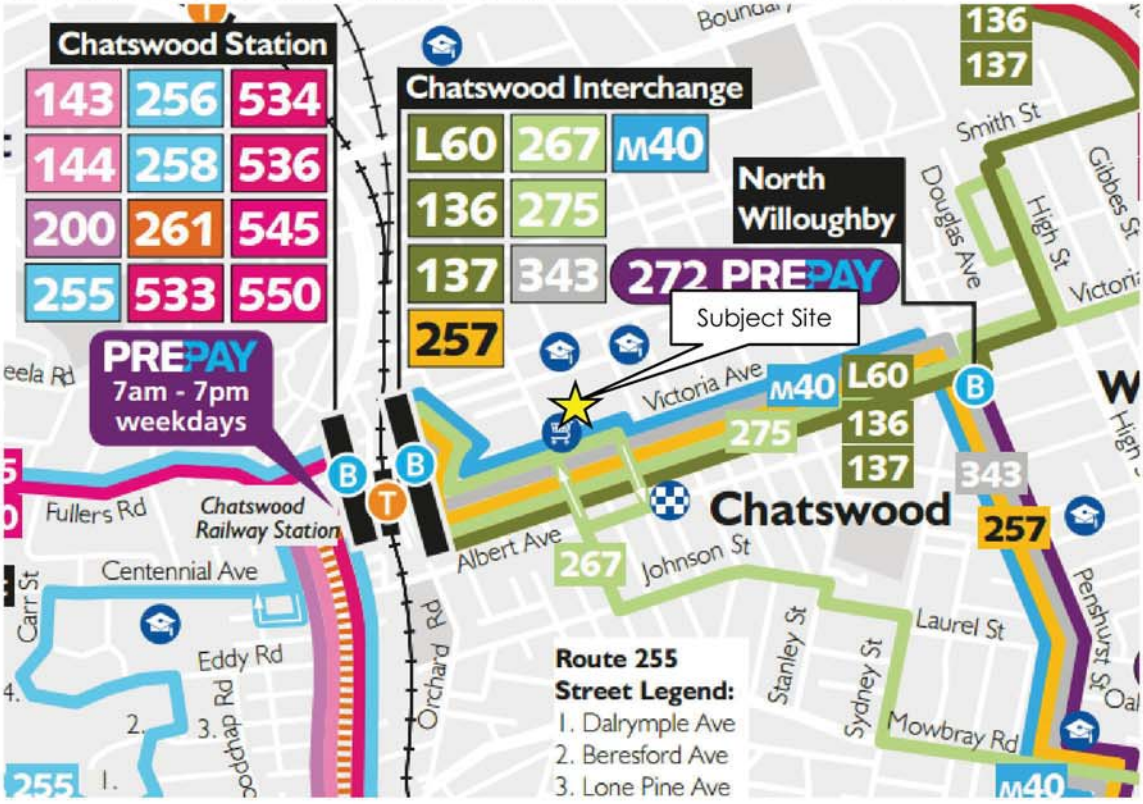
The site is well serviced by public transport, with a number of bus services running adjacent to the site along Victoria Avenue and Archer Street. These routes service a range of destinations both locally and across metropolitan Sydney, including the Northern Beaches, North Sydney, Bondi Junction, the central business district and extending south to Kingsford.

The Chatswood Transport Interchange is also located approximately 500m to the west of the site and is considered a major node in the CityRail network and significant bus and rail hub for the Chatswood area and surrounding suburbs. The Interchange provides bus links to the south and west of Chatswood, as well as access to the Sydney metropolitan and regional rail network. The station is well serviced by the North Shore, Northern and Western Lines (T1), as well as peak period services on the Central Coast and Newcastle Line, as shown in Table 2.5.

In addition to the TfNSW public bus services, the Willoughby City Council operates a free bus service ('The Loop') to key destinations in the municipality. 'The Loop' runs adjacent to the site on Victoria Avenue and can be boarded from any safe point along the route, providing local access to Castle Cove (Monday and Tuesday) and Northbridge (Wednesday and Friday) every 45 minutes in the inter-peak period.

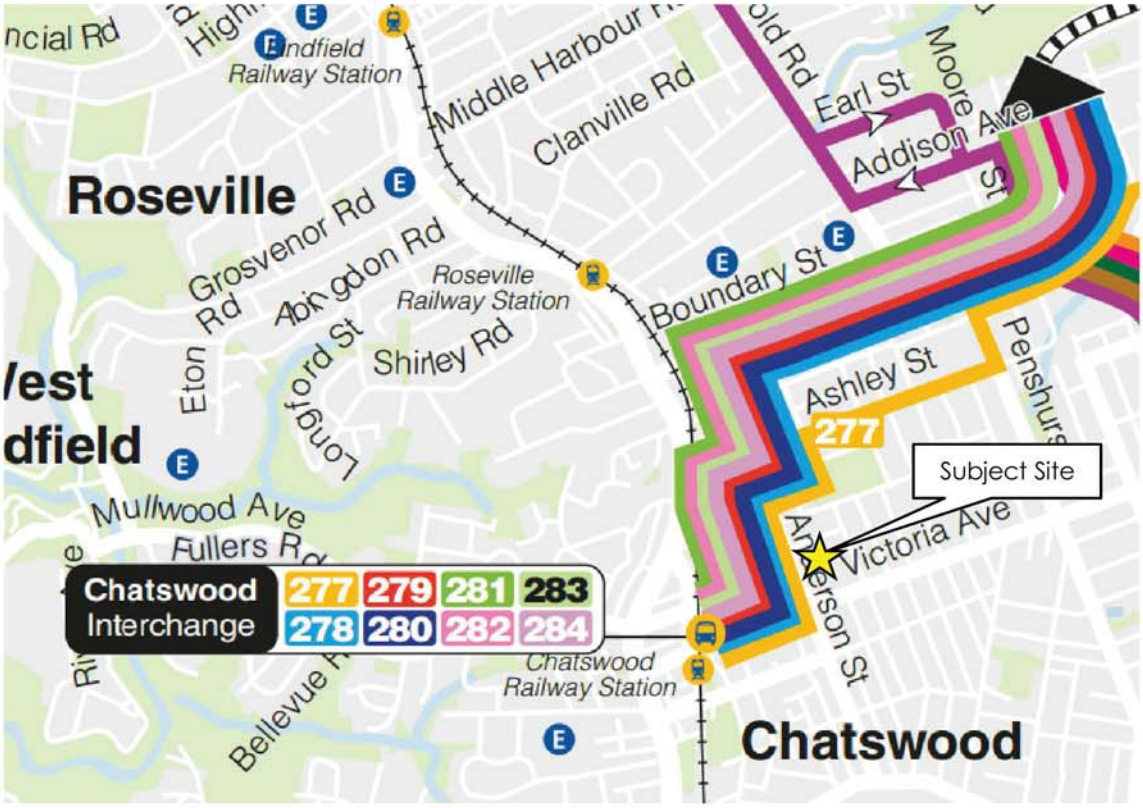
A map of the bus services provided by two bus operators in the area, Sydney Buses and Forest Bus Lines, are provided in Figure 2.9 and Figure 2.10. A review of the bus public transport available in the vicinity of the site is summarised in Table 2.4, with rail services summarised in Table 2.5.

Figure 2.9: Bus public transport operated by Sydney Buses in the vicinity of the site



(Sourced from Sydney Buses: http://www.sydneybuses.info/routes/Region_guide_West-2015.pdf)

Figure 2.10: Bus public transport operated by Forest Coach Lines in the vicinity of the site



(Sourced from Forest Coach Lines: http://www.forestcoachlines.com.au/timetables/networkmap_13.pdf

Table 2.4: Bus Public Transport Provision

Service	Route #	Route Description	Distance to Nearest Stop	Frequency On/Off Peak
Bus	136	Chatswood to Manly	20m	15 mins peak 30-45 mins off-peak
Bus	137	Chatswood to Frenchs Forest	20m	One peak service daily
Bus	257	Chatswood to Balmoral Beach	20m	20 mins peak 30 mins off-peak
Bus	267	Chatswood to Crows Nest	120m	30 mins peak Hourly off-peak
Bus	275	Chatswood to Castlecrag	20m	Four inter-peak services at two hour intervals
Bus	343	Chatswood to Kingsford	20m	7-10 mins peak 10-30 mins off-peak
Bus	L60	Chatswood to Mona Vale (limited stop service)	20m	3-4 peak services daily
Bus	M40	Chatswood to Bondi Junction	20m	8-10 mins peak 15-20 mins off-peak

Table 2.5: Rail Public Transport Provision

Service	Route #	Route Description	Frequency On/Off Peak
Train	T1 – North Shore & Northern Line	Berowra or Hornsby to City	3-5 mins peak 10-15 mins off-peak
Train	T1 – Northern Line	Hornsby and Epping to City	15-20 mins peak 15-30 mins off-peak
Train	T1 – Western Line	Emu Plains or Richmond to City	3-5 mins peak 15-20 mins off-peak
Train	Central Coast & Newcastle Line	Newcastle to Central	15 min peak only

2.6 Pedestrian Infrastructure

Pedestrian paths in the vicinity of the site are located as follows:

- Victoria Avenue (both sides) - 2m wide footpath (approx.), providing access to the broader Chatswood shopping precinct, Westfield Chatswood, Mandarin Centre and the Chatswood Transport Interchange
- Malvern Avenue (both sides) – 1.5m wide (approx.) footpath (south side) and 2m (approx.) shared pedestrian and bicycle path, providing access to Beauchamp Park and to the dedicated on-street cycling paths linking with the Chatswood Transport Interchange to the west.
- Archer Street (both sides) – 2.5m (approx.) wide path
- Havilah Street (both sides) – 2m (approx.) wide footpath

Safe crossing points in vicinity of the site include the following pedestrian crossings:

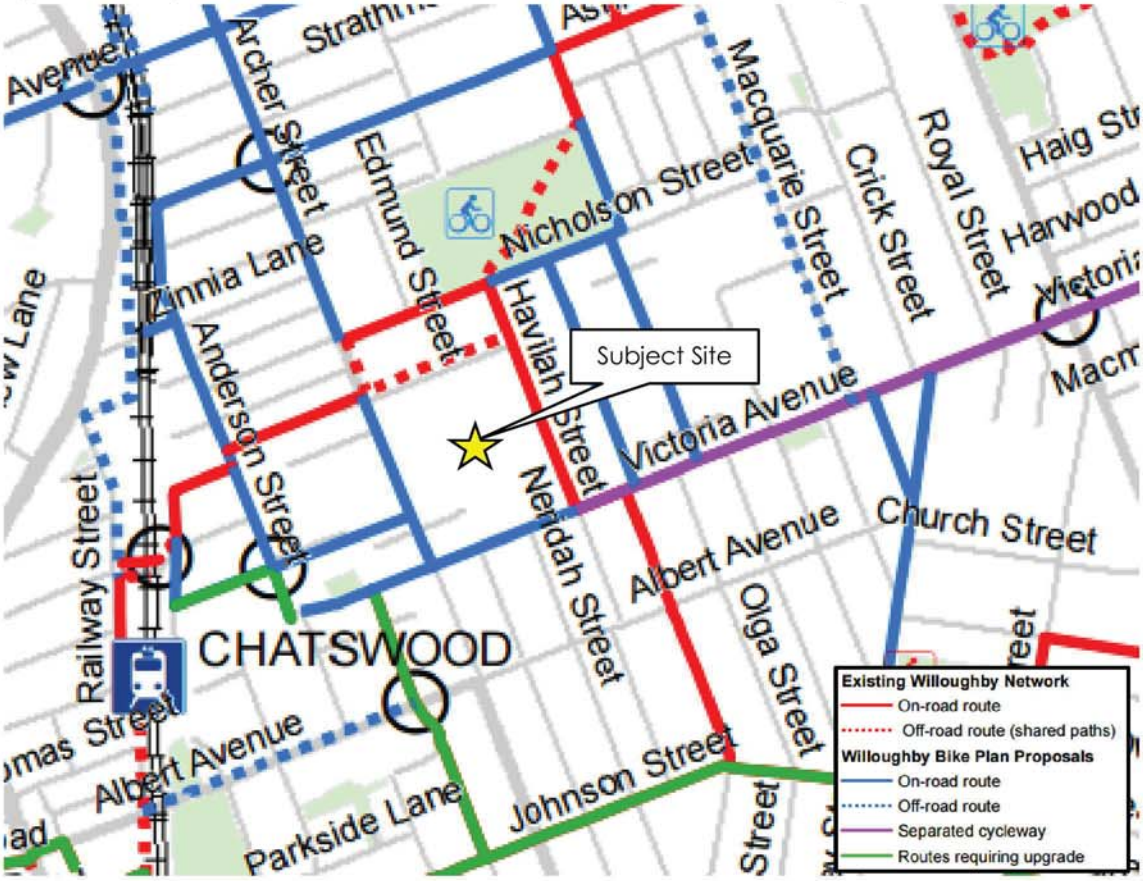
- All legs of the Archer Street / Malvern Avenue / Wattle Lane signalised intersection
- All legs of the Archer Street / Ferguson Lane signalised intersection
- All legs of the Archer Street / Victoria Avenue signalised intersection
- All legs of the Archer Street / Mills Lane signalised intersection
- All legs of the Victoria Avenue / Neridah Street / southern car park access signalised intersection
- Pedestrian crossings across the Archer Street car park ramp, Malvern Avenue car park entrance and the slip lane of the Victoria Avenue car park access
- Pedestrian crossings across Kirk Street on the west side of Archer Street and Mills Lane on the east side of Archer Street.

2.7 Cycle Infrastructure

A 1.5m wide (approx.) dedicated on-street cycle lane is located along Wattle Lane and connects to the shared 2m wide pedestrian and bicycle footpath along Malvern Avenue, linking the north of the site to the Chatswood Transport Interchange. The off-street path also extends north from the site through Beauchamp Park.

In addition to the existing bicycle paths, the Willoughby City Council has outlined a number of proposed on-road, off-road and separated bicycle routes adjacent to the site, including routes to the north along Archer Street and east-west along Victoria Avenue, as shown in Figure 2.11 below.

Figure 2.11: Proposed bicycle network under the Willoughby Bike Plan (2006)



(Sourced from Willoughby City Council Bike Plan: http://www.willoughby.nsw.gov.au/community/Traffic---Transport/Cycling/)

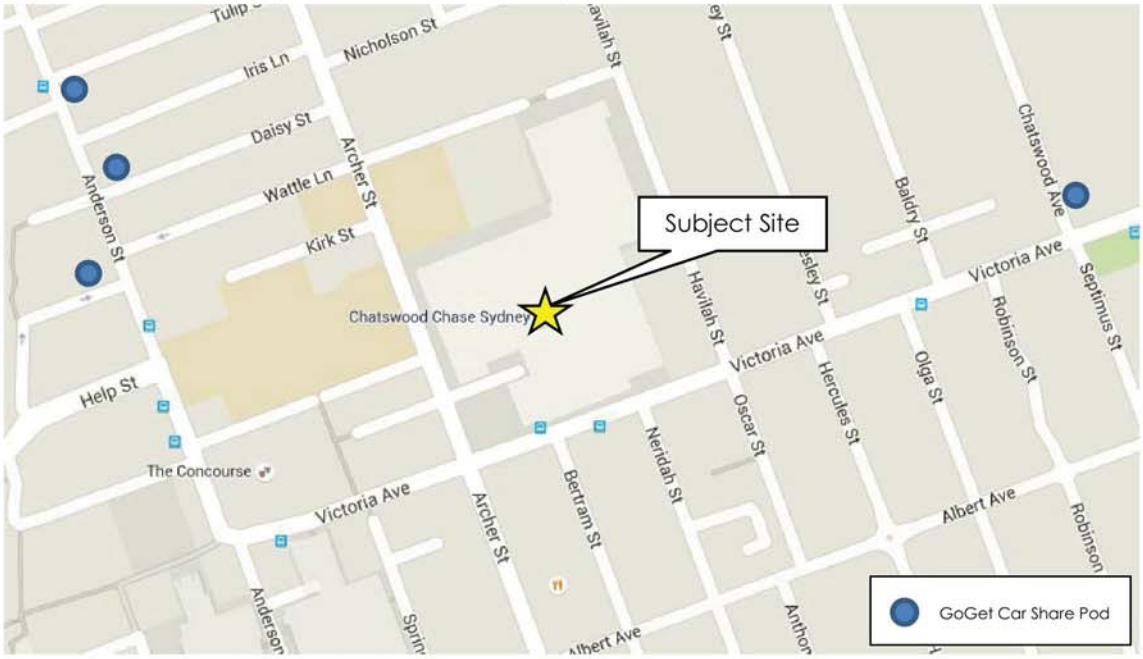
Excellent end-of-trip facilities are available in the vicinity of the site, including:

- A secure bicycle parking cage on level B1 of the Chatswood Chase car park, as well as provision of bicycle racks for additional bicycle parking.
- Free public shower and toilet facilities on level B1 of the complex.
- Provision of approximately 11 bicycle hoops located at the Havilah Street walkway, to the east of the site
- Provision of a small number of bicycle hoops located near the Archer Street entrance, to the west of the site.

2.8 Local Car Sharing Initiatives

A GoGet car sharing pod is located approximately 400m to the east of the site, near the intersection of Chatswood Avenue and Victoria Avenue. There are also three pods approximately 500m to the west of the site, located on Anderson Street, Daisy Street and McIntosh Street, as shown in Figure 2.12 below.

Figure 2.12: Car sharing pod locations in the vicinity of the site



(Sourced from Google Maps & GoGet)

2.9 Council Transport Study

In June 2012, Council commissioned a traffic study assessing a range of options to discourage through movements in the Chatswood CBD precinct and improve access to car parks and alternate transport modes. A Northern Bypass was considered amongst a number of other options, extending from Boundary Street along Archer Street, Malvern Avenue and Havilah Street and linking with the south of the Chatswood CBD via Oscar Street or Hercules Street, as shown in Figure 2.13 below.

A second Northern Bypass option was also considered, in which Anderson Street and Wattle Lane were utilised to funnel traffic to Malvern Avenue and south via Havilah Street, facilitating the bypass movement for both southbound and eastbound traffic.

In June 2014, Council recommended preparing concept plans for the Northern Bypass, which was identified by the Transport, Access & Environment Committee as a longer term proposal. It is noted that both options require that Malvern Avenue be reopened to through traffic movements.

Figure 2.13: Proposed Willoughby Council Bypass Route

3. Development Proposal

3.1 Land Uses

Preliminary investigations indicate that the Planning Proposal will seek to facilitate a future development that would expand the Centre from 58,650sq.m to 75,650sq.m, an increase of 17,000sq.m.

3.2 Vehicle Access

It is not proposed to provide any additional vehicle access points to service the expanded Centre, but rather rely on the existing vehicle access points identified in Figure 3.1.

Figure 3.1: Existing Vehicle Access to Chatswood Chase

3.3 Car Parking

The quantum of additional future car parking is not yet known, however, it is envisaged that car parking will continue to be provided generally in accordance with the existing car parking rate.

The suitability of the car parking provision and layout is discussed in Section 4 of this report.

4. Car Parking

4.1 Car Parking Requirements

The car parking provision requirements for different development types are set out in Willoughby DCP 2006. A review of the car parking requirement rates and the floor area schedule results in a DCP parking requirement for the proposed development as summarised in Table 4.1.

Table 4.1: DCP 2006 Car Parking Requirements

Description	Use	Size	Statutory Parking Rate	Statutory Parking Requirement
Shopping Centre	Shop	17,000sq.m	1 space / 25sq.m NFA	680 spaces
Total				**680 spaces**

Table 4.1 indicates that the proposed expansion is required to provide 680 additional car parking spaces.

4.2 Empirical Assessment of Car Parking Demand

Car parking for the site is currently provided at a rate of approximately 4.26 spaces per 100sq.m (= 2500 spaces / 58,650sq.m).

Reference to the RMS Guide to Traffic Generating Developments (2002) indicates a recommended car parking rate of 4.1 spaces per 100sq.m for shopping centres greater than 30,000sq.m. The current car parking provision thus exceeds the RMS rate.

It is anticipated that the future car parking provision will be provided at a rate in the order of 4 spaces per 100sq.m, consistent with the DCP requirement. This would result in an overall parking provision of 3,180 spaces, at a rate of 4.20 spaces per 100sq.m. Thus the overall post development car parking rate would still exceed the RMS rate.