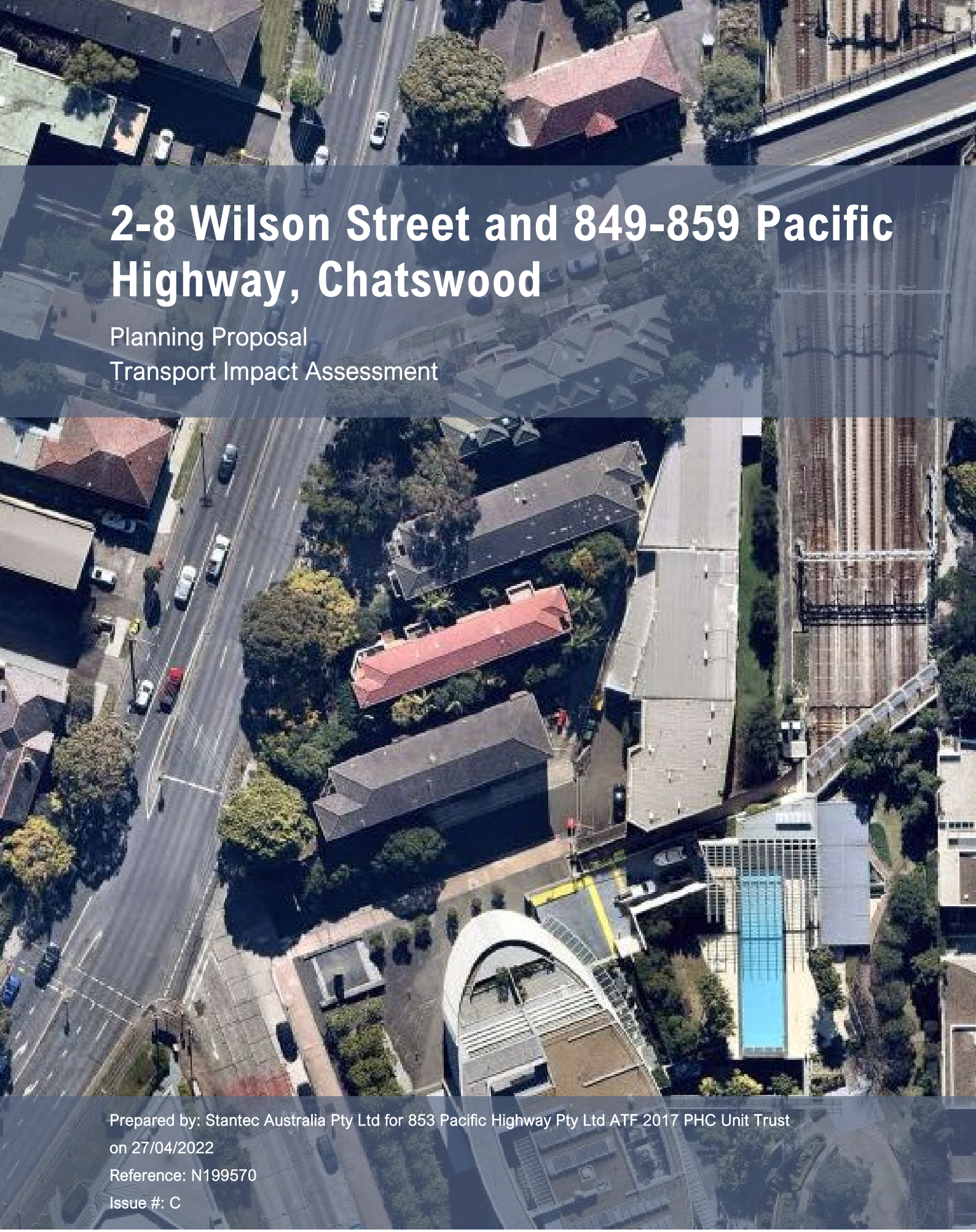

2-8 Wilson Street and 849-859 Pacific Highway, Chatswood

Planning Proposal
Transport Impact Assessment

Prepared by: Stantec Australia Pty Ltd for 853 Pacific Highway Pty Ltd ATF 2017 PHC Unit Trust
on 27/04/2022
Reference: N199570
Issue #: C

GTAconsultants now Stantec

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	29/09/2021	Final	Mackenzie Brinums	Rhys Hazell	Rhys Hazell	Rhys Hazell
B	19/10/2021	Updated to reflect revised scheme	Mackenzie Brinums	Rhys Hazell	Rhys Hazell	Rhys Hazell
C	27/04/2022	Updated to reflect revised scheme	Mackenzie Brinums	Rhys Hazell	Rhys Hazell	

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1. INTRODUCTION

01

1.1. Background & Proposal

A Planning Proposal is to be lodged with Willoughby City Council (Council) for a proposed mixed-use development on land at 2-8 Wilson Street and 849-859 Pacific Highway in Chatswood. The proposal incorporates 247 apartments and 4,294 square metres Gross Floor Area (GFA) of commercial office space. The development comprises of a 27-storey building with commercial space on the ground floor and level 1 and residential apartments above.

853 Pacific Highway Pty Ltd ATF 2017 PHC Unit Trust engaged GTA, now Stantec to provide a transport impact assessment as part of the Planning Proposal.

1.2. Purpose of this Report

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

- existing traffic and parking conditions surrounding the site
- suitability of the proposed parking in terms of supply (quantum) and layout
- service vehicle requirements
- pedestrian and bicycle requirements
- the traffic generating characteristics of the planning proposal
- suitability of the proposed access arrangements for the site
- the transport impact of the development proposal 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 Development Control Plan (WDCP)
- Willoughby Local Environmental Plan (LEP) 2012
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2018
- Australian Standard/New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- plans for the planning proposal prepared by PBD Architects dated October 2021
- Willoughby City Council, Chatswood CBD Planning and Urban Design Strategy to 2036, dated September 2020
- other documents and data as referenced in this report.

2. STRATEGIC CONTEXT

02

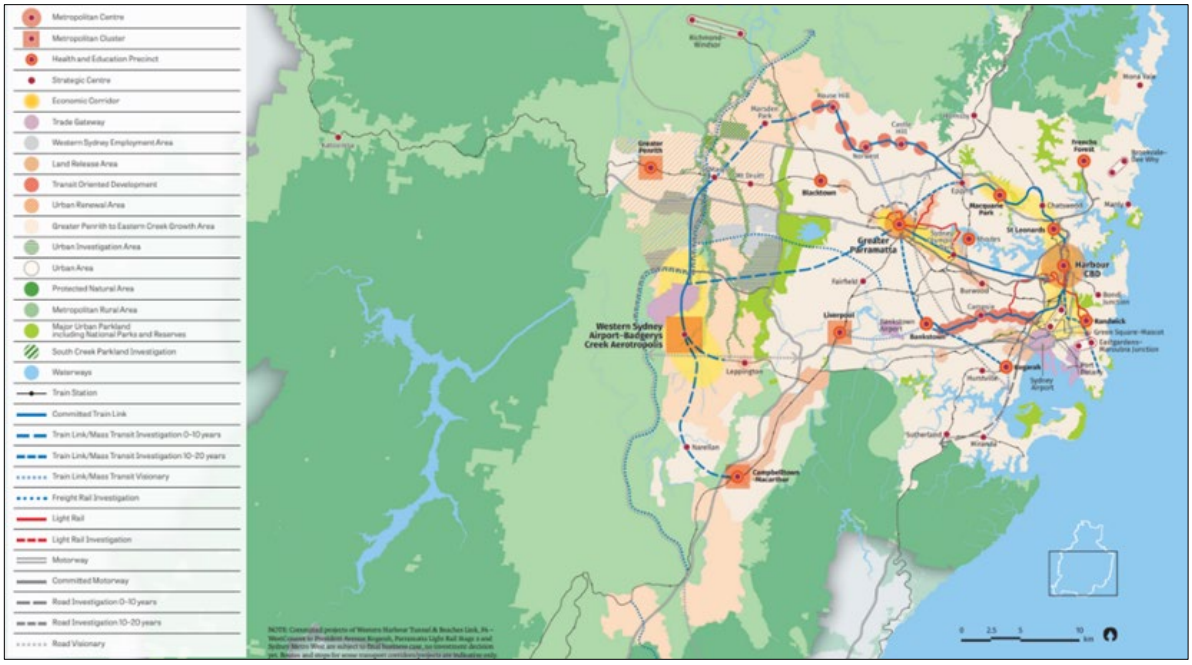
2.1. The Greater Sydney Region Plan 2018

The Greater Sydney Commission (GSC) is an independent organisation that leads metropolitan planning for Greater Sydney. It has prepared the Greater Sydney Region Plan which outlines how Greater Sydney will manage growth and guide infrastructure delivery. The plan has been prepared in conjunction with the NSW Government's Future Transport 2056 Strategy and informs Infrastructure NSW's State Infrastructure Strategy.

The GSC's vision is to create three connected cities; a Western Parkland City west of the M7, a Central River City with Greater Parramatta at its heart and an Eastern Harbour City. By integrating land use, transport links and infrastructure across the three cities, more people will have access within 30-minutes to jobs, schools, hospitals and services.

The Greater Sydney Region Plan is a 20-year plan with a 40-year vision and has four key focuses; infrastructure and collaboration, liveability, productivity and sustainability. The vision of the three cities from The Greater Sydney Structure Plan 2056 is shown in Figure 2.1.

Figure 2.1: Greater Sydney Structure Plan 2056 – The Three Cities



Source: Greater Sydney Commission

2.2. North District Plan

The North District covers Hornsby, Hunter's Hill, Ku-ring-gai, Lane Cove, Mosman, North Sydney, Northern Beaches, Ryde and Willoughby local government areas.

This North District Plan is a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision for Greater Sydney. It is a guide for implementing the Greater Sydney Region Plan, A Metropolis of Three Cities, at a district level and is a bridge between regional and local planning.

The District Plan informs local strategic planning statements and local environmental plans, the assessment of planning proposals as well as community strategic plans and policies. The District Plan also assists councils to plan for and support growth and change, and align their local planning strategies to place-based outcomes.

The vision of the North District will be achieved by:

- Supporting jobs growth in strategic centres.
- Sustaining local centres to provide jobs, services and amenity.
- Providing fast and efficient transport connections to achieve a 30-minute city.
- Creating and renewing great places while protecting heritage and local character and improving places for people.
- Improving walking and safe cycling ways.
- Enhancing the quality and improving access to open space.

2.3. Future Transport 2056

Future Transport 2056 provides a 40-year strategy for how transport will be planned, amended and forecasted within NSW, both regional and metropolitan, for the expected 12 million residents. Future Transport 2056 follows from the 2012 Long Term Transport Master Plan which listed over 700 transport projects, the majority of which are completed or in progress. It also ties in with Greater Sydney Region Plan and the subsequent district plans to support the three cities metropolis vision.

Future Transport 2056 is supported by two key documents, Greater Sydney Services and Infrastructure Plan and Regional NSW Services and Infrastructure Plan, which provide guidance and planning for these areas.

From a metropolitan view, Future Transport 2056 and associated plans include the 30-minute city where jobs and services are within 30 minutes of residents with Greater Sydney. Strategic transport corridors to move people and goods are outlined between metropolitan and strategic centres, clusters and surrounds. The Movement and Place framework is also emphasised to support liveability, productivity and sustainability.

2.4. Chatswood CBD Planning and Urban Design Strategy to 2036

The Chatswood CBD Strategy aims to establish a strong framework to guide future private and public development as the CBD continues to grow over the next 20 years. It aims to provide capacity for future growth, achieve exceptional design and realise a distinctive, resilient and vibrant CBD. The Strategy will inform changes to Willoughby LEP and DCP.

A draft Strategy was endorsed by Council for community and stakeholder engagement between January and March 2017. Following exhibition and consideration of feedback Council initially endorsed the Strategy on 26 June 2017. Subsequently, the NSW Department of Planning, Industry and Environment (DPIE) granted partial endorsement of the Strategy on 9 August 2019 and identified additional information and studies required in order for Council's adopted position to be accepted by the DPIE. The recommendations from these studies were included in the updated Chatswood Planning and Urban Design Strategy 2036 (September 2020) noted at the Council Meeting of 14 September 2020.

The Strategy aims to achieve:

- A reinvigorated commercial core area and economically buoyant CBD, to provide for future employment.
- A sustainable balance between commercial, retail, residential, education, cultural and other uses to ensure on-going vibrancy.
- A compact, walkable CBD.
- A city form and scale to accommodate future growth and change.
- A CBD of exceptional urban design, easy pedestrian linkages and good public domain, where local character and heritage are embraced, and the greening of the centre is achieved.
- Simplified controls for the LEP and DCP in relation to the CBD.

Key to the site, the strategy has developed the following principles to achieve the desired outcome for the broader Chatswood CBD:

1. Promoting office growth - The office market in Chatswood will continue to improve and it is vital that the centre accommodates this.
2. Providing great public places - Key new spaces and links as well as improvements to existing will provide a variety of high quality, interesting spaces for Chatswood into the future.
3. Addressing transport issues - A balanced approach is required to address future transport needs to ensure sustainable outcomes for Chatswood.

The Strategy aims to reinforce the commercial core by restricting further residential development in the centre and rezoning the outskirts of the CBD for mixed-use development to encourage residential development adjacent to the commercial core. Figure 2.2 and Figure 2.3 indicate the development is within the addition area of the core boundary and is identified to be rezoned B4 Mixed Use.

Figure 2.2: Core boundary

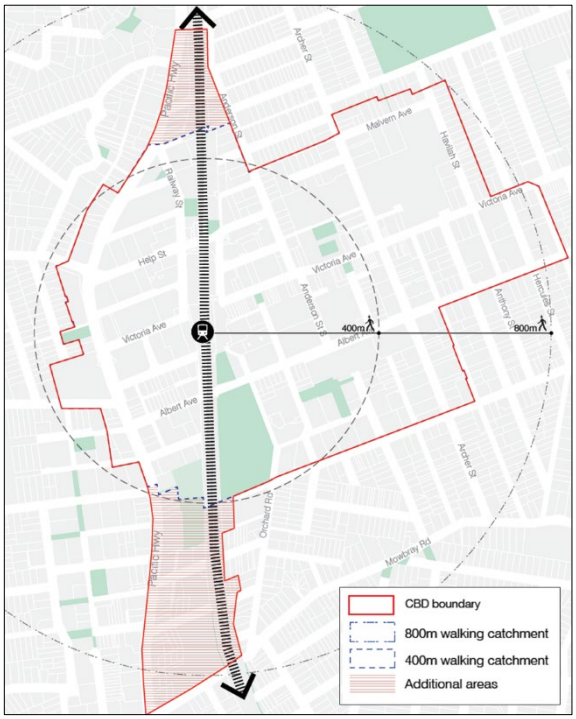
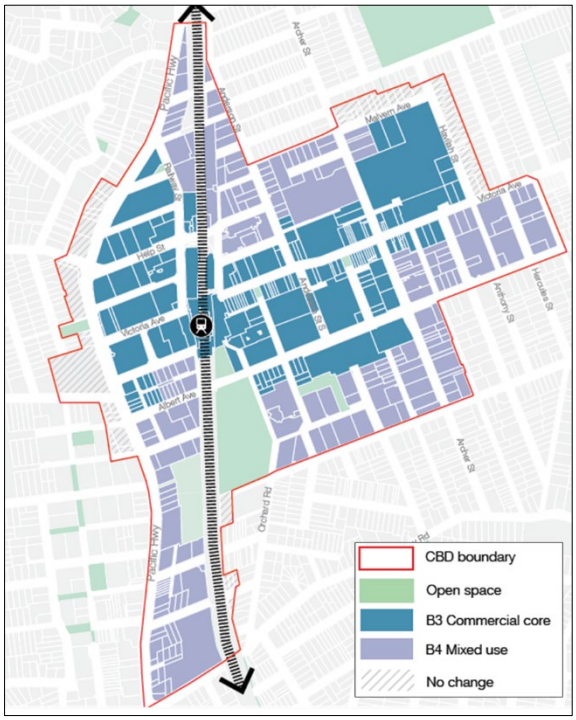


Figure 2.3: Proposed rezoning



The strategy also makes recommendations in terms of maximum height limits and FSR to achieve the vision for Chatswood CBD. Figure 2.4 and Figure 2.5 indicate that the site has a recommended maximum height limit up to 90 metres and a maximum FSR 6:1.

Figure 2.4: Recommended maximum height limits

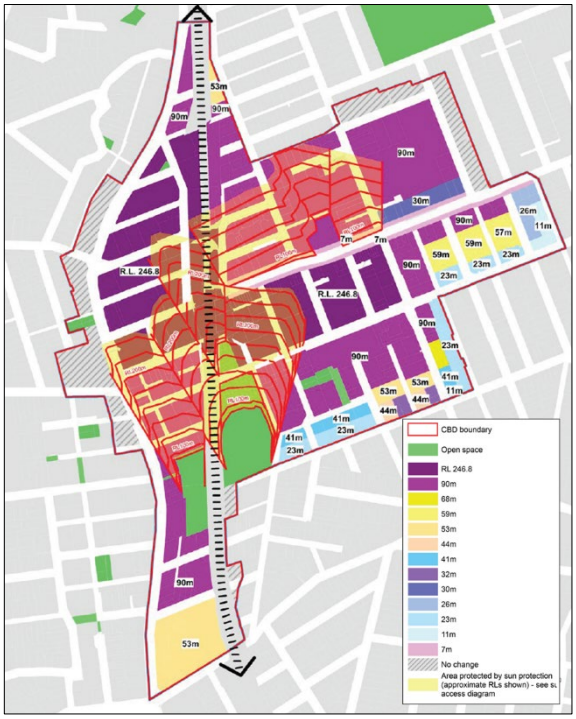
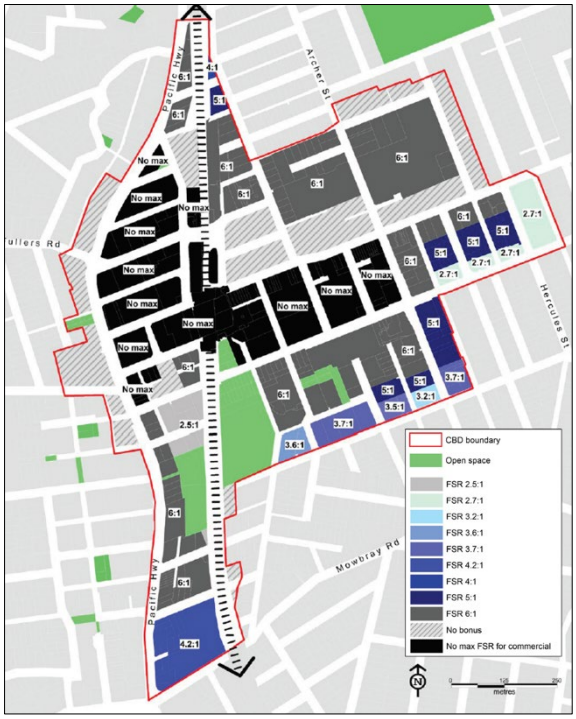


Figure 2.5: Recommended maximum FSR



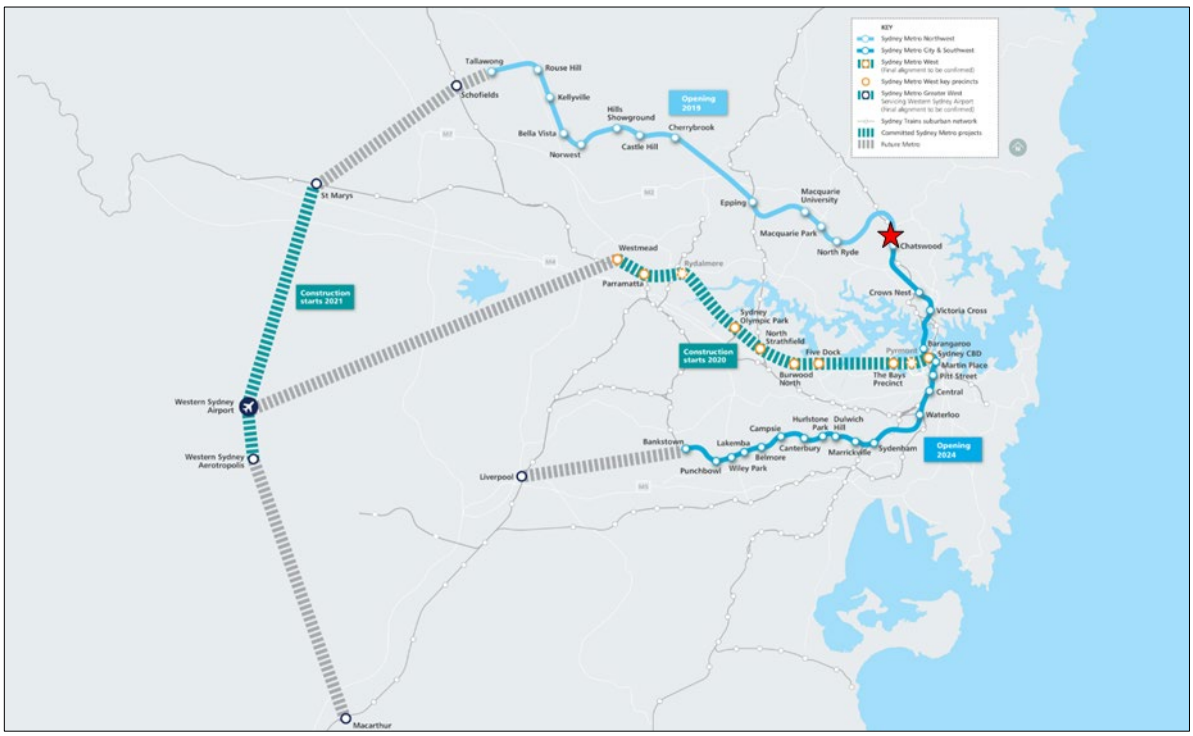
The Strategy also stresses the importance of Travel Demand Management for the future of Chatswood CBD. This would be done to modify travel decisions so that more desirable transport, social, economic and/ or environmental objectives can be achieved, and the adverse impacts of travel can be reduced. The purpose of travel demand management is to reduce the total amount of travel, minimise the need to expand road systems, reduce the incidents of vehicle crashes, prevent further congestion, reduce air pollution, conserve scarce resources and increase the share of non-car based transport.

2.5. Sydney Metro Northwest

A trigger for further growth in Chatswood has been the introduction of Sydney Metro, Australia's biggest public transport project that will operate as a standalone railway covering more than 66 kilometres with 31 new metro stations in its initial stages. Sydney Metro Northwest is the first stage of the project linking Schofields and Chatswood via Norwest, Castle Hill and Epping with services having commenced in May 2019. Sydney Metro will improve travel time, reliability and reduce costs compared with bus and private car travel to key employment areas including Macquarie Park, Chatswood, North Sydney and Sydney CBD.

Sydney Metro has and will continue to greatly expand to improve the 30-minute coverage for Chatswood with commuters travelling as far west as Schofields by public transport. The 30-minute coverage will also be expanded for areas to the north and south of the metro line including towards Hornsby and Rhodes via The Northern heavy rail line. The existing and future metro lines are shown in Figure 2.6.

Figure 2.6: Existing and future Sydney Metro



Source: https://www.sydneymetro.info

3. EXISTING CONDITIONS

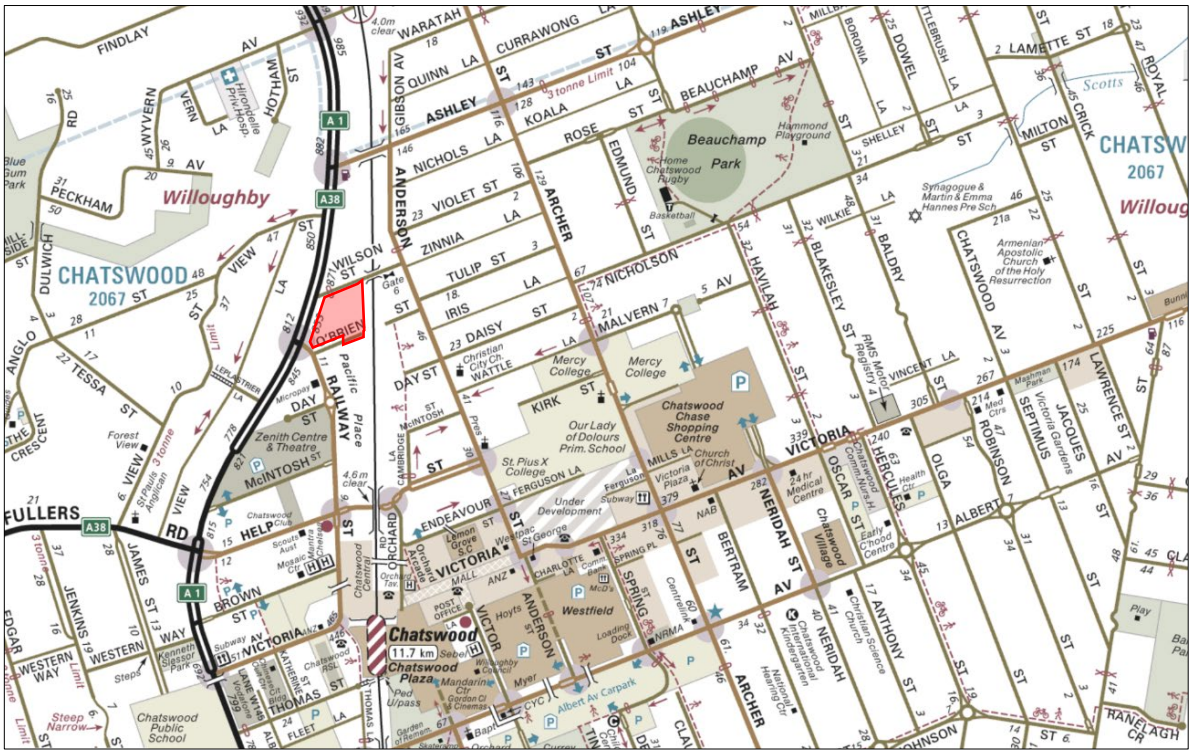
03

3.1. Location

The site is at 2 Wilson Street and 849-859 Pacific Highway, Chatswood with frontages of approximately 70 metres to Pacific Highway, 50 metres to Wilson Street and 45 metres to O'Brien Street. It has a land use classification as R4 – High Density Residential and comprises four separate residential buildings with five accesses spread across Wilson Street, Pacific Highway and O'Brien Street. The surrounding properties mostly include a mix of residential towers, commercial buildings and low and medium residential dwellings surrounding Chatswood CBD.

The location of the site and its surrounding environs is shown in Figure 3.1, with the LEP land use map shown in Figure 3.2.

Figure 3.1: Subject site and its environs



Base image source: Sydway

Figure 3.2: Land use map

Base image source: Willoughby LEP 2012

3.2. Transport Network

3.2.1. Road Hierarchy

Roads are classified according to the functions they perform. The main purpose of defining a road's functional class is to provide a basis for establishing the policies which guide the management of the road according to their intended service or qualities.

In terms of functional road classification, State roads are strategically important as they form the primary network used for the movement of people and goods between regions, and throughout the State. Transport for NSW (TfNSW) is responsible for funding, prioritising and carrying out works on State roads. State roads generally include roads classified as freeways, state highways, and main roads under the Roads Act 1993, and the regulation to manage the road system is stated in the Australian Road Rules, most recently amended on 19 March 2018.

TfNSW defines four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility, to high accessibility and low mobility. These road classes are:

Arterial Roads – Controlled by TfNSW, typically no limit in flow and designed to carry vehicles long distance between regional centres.

Sub-Arterial Roads – Managed by either Council or TfNSW under a joint agreement. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through traffic between specific areas in a sub region or provide connectivity from arterial road routes (regional links).

Collector Roads – Provide connectivity between local sites and the sub-arterial road network, and typically carry between 2,000 and 10,000 vehicles per day.

Local Roads – Provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

3.2.2. Surrounding Road Network

Pacific Highway

The Pacific Highway is a State arterial road, functioning as the key north-south road between North Sydney and Hornsby. It is generally configured with two to three lanes in each direction near the site and set within an 18-metre-wide carriageway. The Pacific Highway has a posted speed limit of 60km/h.

Kerbside parking is generally not permitted on either side of the road in the vicinity of the site, with clearway restrictions between 6:00am and 7:00pm on weekdays and between 9:00am and 6:00pm on weekends.

Pacific Highway is shown in Figure 3.3 and Figure 3.4.

Figure 3.3: Pacific Highway (looking north)

Figure 3.4: Pacific Highway (looking south)

Railway Street

Railway Street is a local road facilitating access to commercial and residential properties on the western side of Chatswood CBD. It is aligned in a north-south direction with one traffic lane and one parking lane in each direction set within an approximate 13-metre-wide carriageway near the site. Restricted parking is permitted on both sides of the road. Railway Street has a posted speed limit of 40km/h.

Wilson Street

Wilson Street is a local road providing local area access and traverses the railway line north of the site. It is aligned in an east-west direction set within an approximate 12-metre-wide carriageway near the site. Parking is permitted on both sides of the road, with 1P parking restrictions in place between 8:30am and 6:00pm weekdays, and 8:30am and 4:00pm Saturdays. Wilson Street has a posted speed limit of 40km/h.

O'Brien Street

O'Brien Street is a short cul-de-sac providing property access west of the railway line, including the subject site. It is a two-way road aligned in an east-west direction within an approximate seven-metre-wide carriageway with parking not permitted on either. O'Brien Street has a posted speed limit of 40km/h.

3.2.3. Surrounding Road Network and Access

The site is adjacent to the Pacific Highway allowing vehicles to conveniently access the site via the arterial road network and generally without the need to traverse Chatswood CBD. Given the proximity of O'Brien Street to the Pacific Highway/ Railway Street intersection, O'Brien Street generally operates as a left-in/ left-out street, although no formal restrictions are in place. In peak periods, the area experiences some congestion including along the Pacific Highway, with extensive queuing particularly present in the right turn lane from the Pacific Highway to Fullers Road which provides connection to North Ryde, Macquarie Park and M2. The Railway Street/ Help Street intersection generally operates well in peak periods. There are also some constraints at the Pacific Highway intersections during weekday PM peaks.

Considering the existing configuration and operation of the surrounding road network particularly during road network peak periods, it is estimated that most vehicles approaching the site would use the Pacific Highway and Railway Street. Those exiting to the south/ west would tend to use Railway Street and Help Street, while those exiting to the north would likely turn left from O'Brien Street and use the Railway Street roundabout at Day Street to exit the area.

3.3. Traffic Volumes

Given ongoing global events related to COVID-19, it is acknowledged that current traffic conditions may still not be considered 'normal' and as such traffic surveys completed at this time may not be considered representative of typical conditions.

In this regard, GTA has obtained historical SCATS detector data from TfNSW for Thursday 7 November 2019 to better understand typical traffic volumes through the Pacific Highway/ Railway Street signalised intersection. Traffic surveys were also completed on Thursday 18 June 2020 in the AM and PM peak periods at the intersection to compare current and historical data.

The peak hours were found to occur between 7:00am and 8:00am and between 4:45pm and 5:45pm. A comparison of the traffic survey data confirms that the 2020 traffic volumes were generally lower than that captured in the 2019 SCATS data, and as such the relevant turning movements and through movement on Railway Street at Day Street as captured in the traffic surveys have been increased accordingly. The relevant multiplier factors are shown in Figure 3.5 and Figure 3.6.

Figure 3.5: AM traffic survey multiplier factors to pre COVID-19 levels

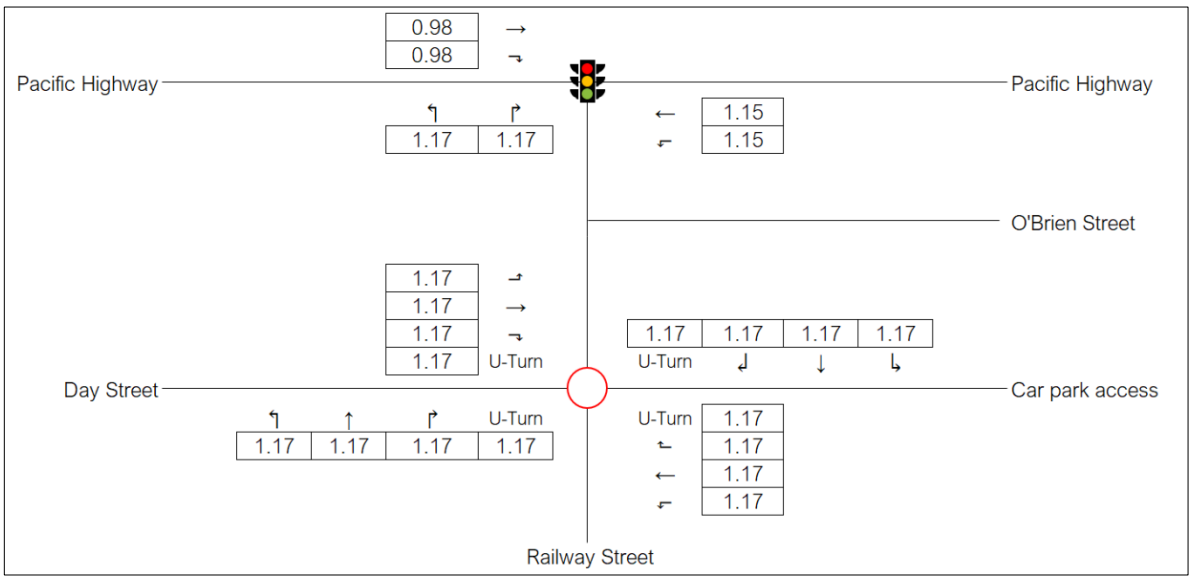


Figure 3.6: PM traffic survey multiplier factors to pre COVID-19 levels

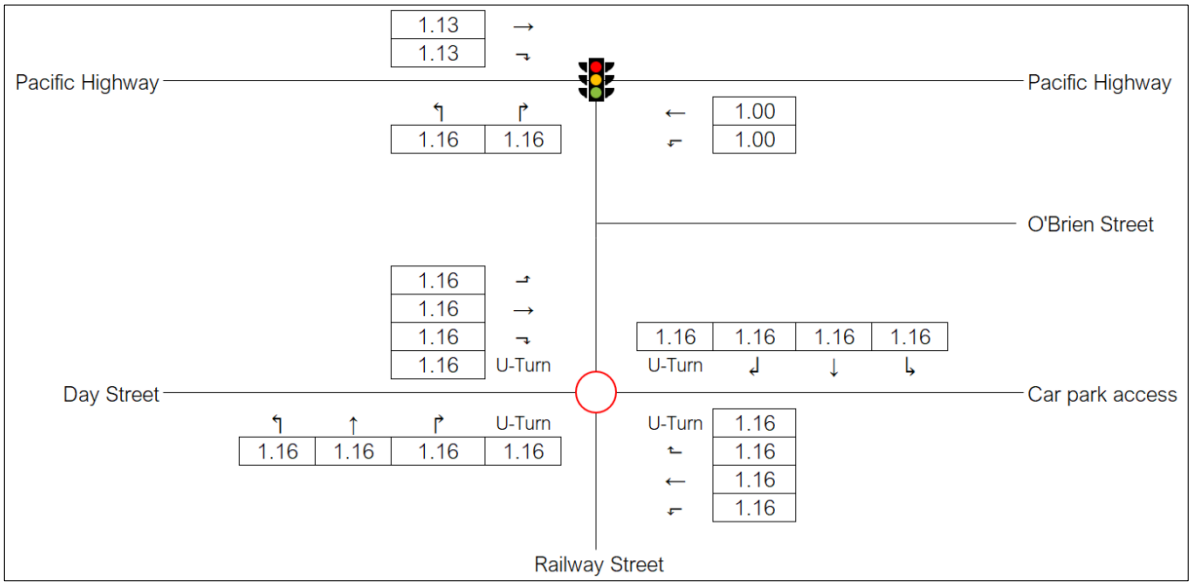


Figure 3.7 and Figure 3.8 set out the estimated weekday AM and PM peak hour traffic volumes at the key intersections near the site following application of the pre COVID-19 mutiplier factors.

Figure 3.7: Existing AM peak hour traffic volumes

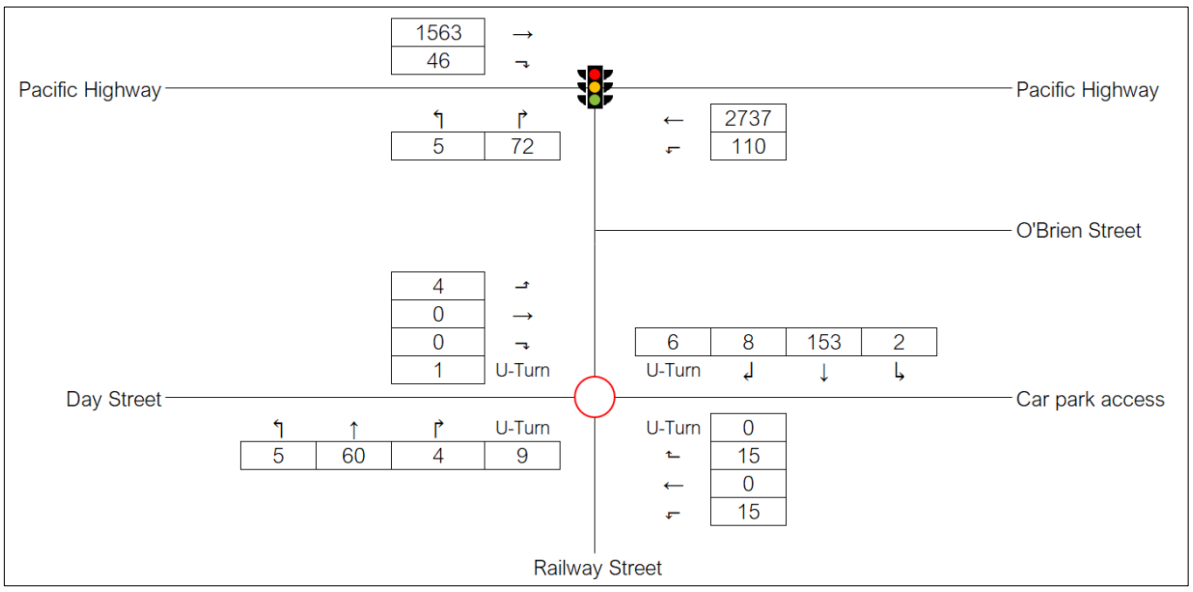
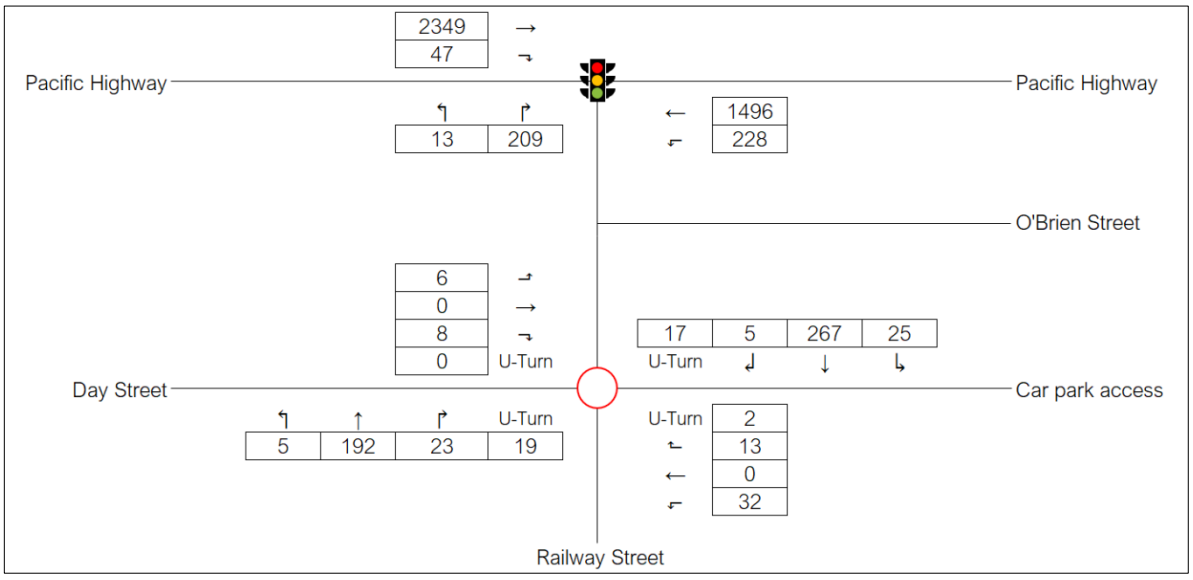


Figure 3.8: Existing PM peak hour traffic volumes



3.4. Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA INTERSECTION[1] (SIDRA), a computer-based modelling package which calculates intersection performance.

[1] Program used under license from Akcelik & Associates Pty Ltd.

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

Table 3.1 shows the criteria that SIDRA adopts in assessing the level of service.

Table 3.1: SIDRA 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

Table 3.2 presents a summary of the existing operation of the intersection, with full results presented in Appendix B of this report. Traffic models were set up as a network in SIDRA, with models calibrated based on historical SCATS data provided by TfNSW and queues observed on-site.

Table 3.2: Existing intersection operation

Intersection	Peak	Leg	Degree of saturation (DOS)	Average delay (sec)	Average queue (m)	Level of service (LOS)
Pacific Highway/ Railway Street	AM	South	0.16	65	12	E
		Northeast	0.89	17	296	B
		Southwest	0.64	8	131	A
		Overall	**0.89**	**14**	**296**	**A**
	PM	South	0.50	70	36	E
		Northeast	0.49	7	83	A
		Southwest	0.92	13	322	A
		Overall	**0.92**	**14**	**322**	**A**
Railway Street/ Day Street	AM	South	0.06	8	1	A
		East	0.03	8	1	A
		North	0.13	7	2	A
		West	0.01	8	1	A
	PM	South	0.19	8	3	A
		East	0.05	9	1	A

Intersection	Peak	Leg	Degree of saturation (DOS)	Average delay (sec)	Average queue (m)	Level of service (LOS)
		North	0.26	7	4	A
		West	0.02	9	1	A

Table 3.2 indicates that the key intersections currently operate well with the average delay over both intersections resulting in a level of service A in both peak hours. This is due to most signal green time at the Pacific Highway/ Railway Street intersection being allocated to highway traffic rather than Railway Street. This is also a result of the Pacific Highway traffic signals through Chatswood operating as a network. As such, Railway Street experiences some queuing and delay in peak periods, as is common for minor streets that intersect with arterial roads and is generally considered acceptable. The modelling results also confirm queuing on the Pacific Highway in the peak direction, consistent with site observations.

3.5. Public Transport

The site is serviced by a range of well-established and frequent public transport services. Chatswood Railway Station and the bus interchange is about 600 metres to the south and within an eight-minute walk. It is serviced by the Northern, North Shore and Western Lines and the intercity Central Coast and Newcastle Line and provides high frequency services to most of the Sydney Trains network, including Sydney CBD and North Sydney. Sydney Metro Northwest services also start and end at Chatswood.

Chatswood Interchange functions as one of the main bus interchanges in the northern suburbs of Sydney with at least 20 separate bus routes serviced by State Transit and Transdev, servicing key destinations including Sydney CBD, Manly, Lane Cove, Bondi Junction and Macquarie Park.

Chatswood will also form a major node as part of the expanding Sydney Metro with further expansion to the existing services which currently link Chatswood with Schofields via four-minute turn up and go services. Services will extend south to North Sydney, Sydney CBD and through to Bankstown as part of Metro Stage 2 which is currently under construction.

3.6. Walking and Cycling Infrastructure

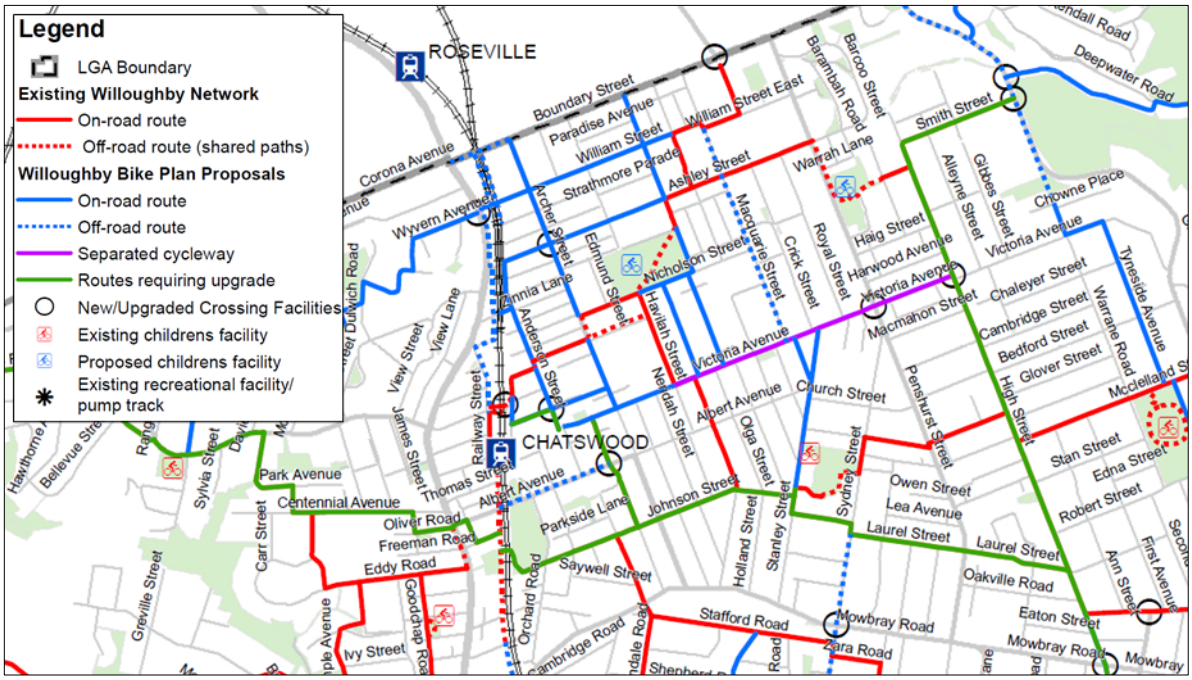
Railway Street, O'Brien Street, Wilson Street and the Pacific Highway generally provide a good level of pedestrian amenity, with provision for wide footpaths on Railway Street and the southern side of O'Brien Street close to the site, consistent with pedestrian amenity throughout the commercial core. Footpaths are also provided on both sides of the road on Wilson Street and the Pacific Highway. Pedestrian crossing points are provided at surrounding signalised intersections to improve convenience and safety for pedestrians, especially between Chatswood Interchange and the commercial core.

The site is relatively well serviced by surrounding cycling infrastructure. O'Brien Street and Railway Street have been marked as potential roads to be upgraded with an off-road cycle path likely in the form of a shared path. This would allow for connection to Frank Channon Walk to the south adjacent to the railway line, which connects with the broader cycling network through Willoughby and other surrounding suburbs. In the interim, the existing low speed environment characteristics of Railway

Street are considered suitable for moderately experienced cyclists to connect with the existing surrounding cycling infrastructure network.

The existing and proposed cycling network from the Willoughby Bike Plan is shown in Figure 3.9.

Figure 3.9: Surrounding cycling network

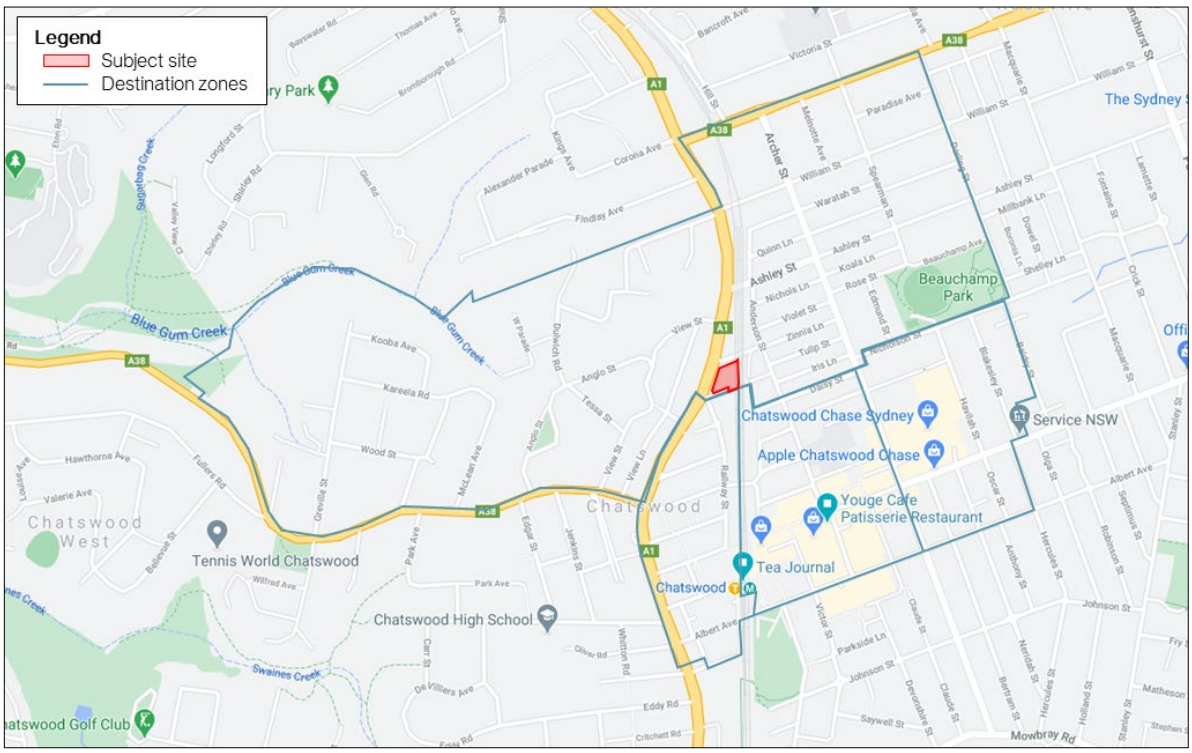


Source: www.willoughby.nsw.gov.au/your-neighbourhood, accessed October 2020

3.7. Existing Travel Behaviour

Journey to Work data has been sourced from the Australian Bureau of Statistics 2016 census and provides an indication of existing travel patterns from the local area. Figure 3.10 details the catchment of the census data analysed which corresponds to the Australian Bureau of Statistics 2016 Destination Zones (DZN).

Figure 3.10: 2016 destination zones



Base image source: Google Maps

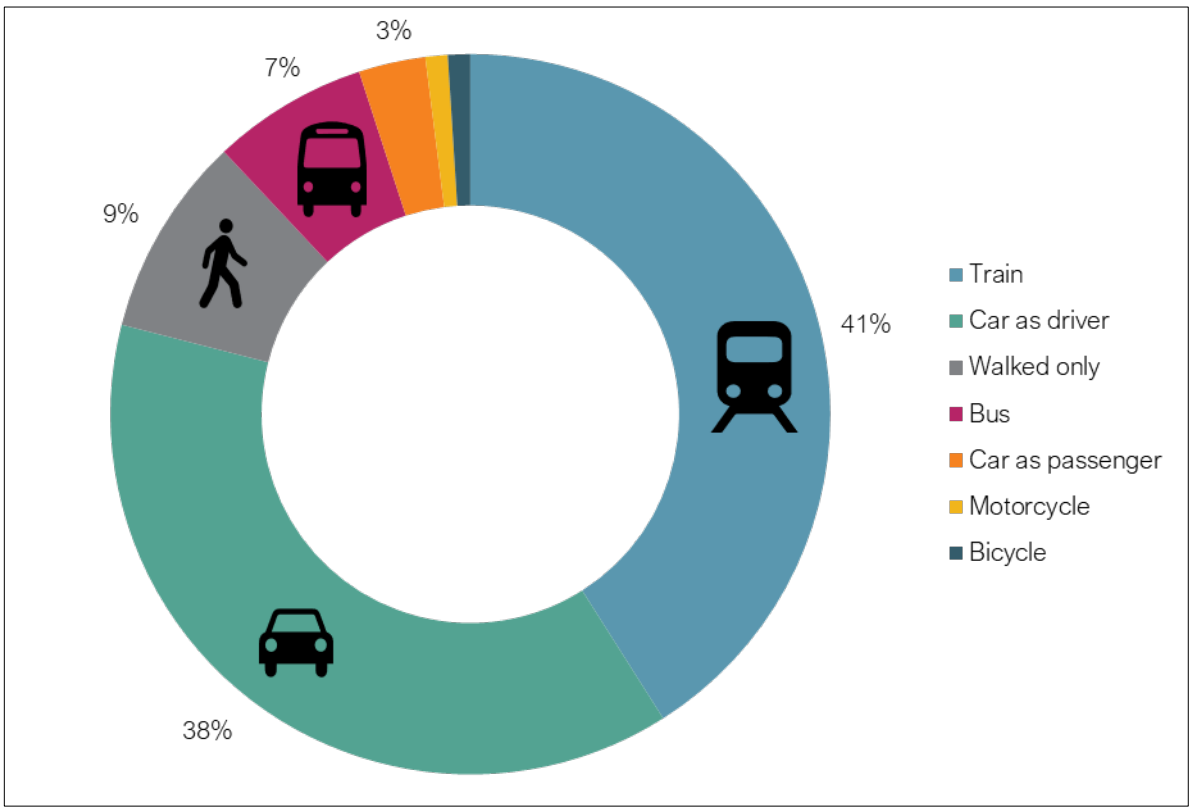
Table 3.3 and Figure 3.10 provide a summary of the existing modes of travel to work for the surrounding area. The results indicate that train travel and driving are the most common transport modes. Bus travel and active travel also feature.

Table 3.3: Existing primary mode of travel

Mode of Travel	Mode Share [1]
Train	41%
Car as driver	38%
Walked only	9%
Bus	7%
Car as passenger	3%
Motorcycle	1%
Bicycle	1%
Total	**100%**

[1] Does not include residents who worked at home or did not go to work.

Figure 3.11: Existing travel mode share

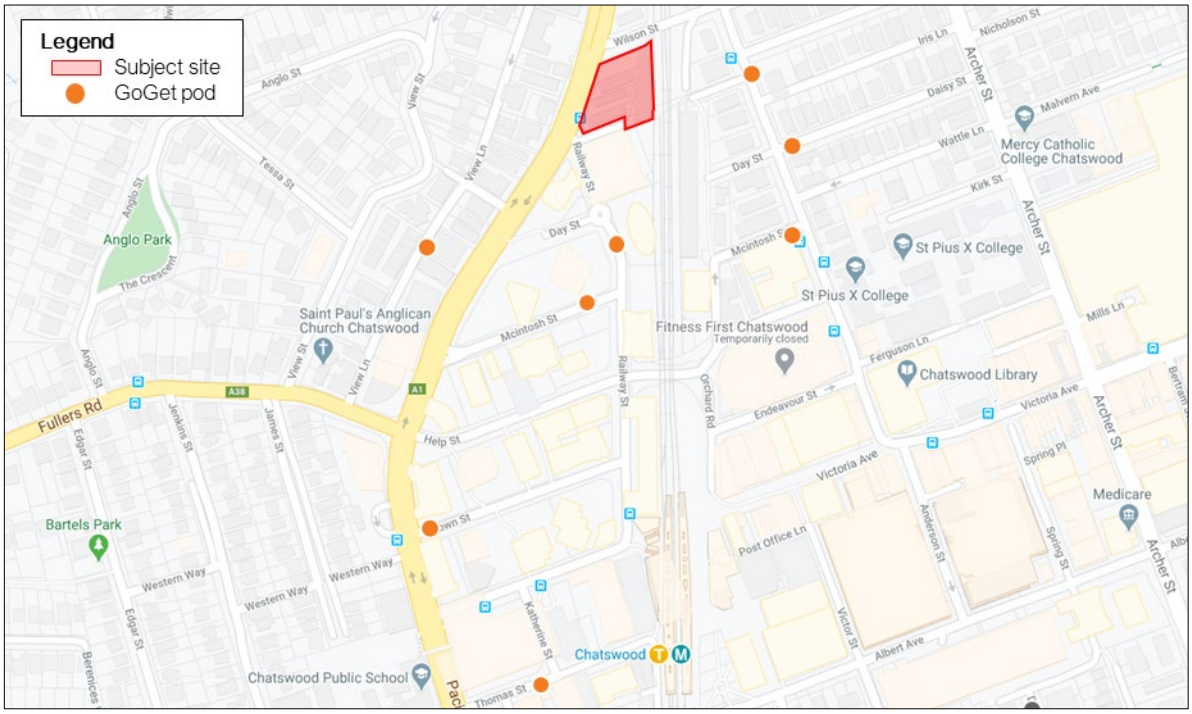


3.8. Local Car Share Initiatives

GoGet (along with other car share schemes) has become increasingly common throughout Sydney and is now recognised as a viable transport option for drivers throughout Sydney. They are now a well-utilised service especially in the inner suburbs due to limited parking availability and the expense involved in parking close to keys CBDs. GoGet offer a viable alternative to the private car for trips where distances are short and are likely to be used by future workers and residents in the proposed development.

GoGet car share pods located close to the site are shown in Figure 3.12, with the closest pods on Railway Street, Anderson Street, Mcintosh Street, as well as many in the Zenith Centre. These pods primarily serve the surround employment catchment area and encourage use for a variety of purposes.

Figure 3.12: Surrounding GoGet pod locations

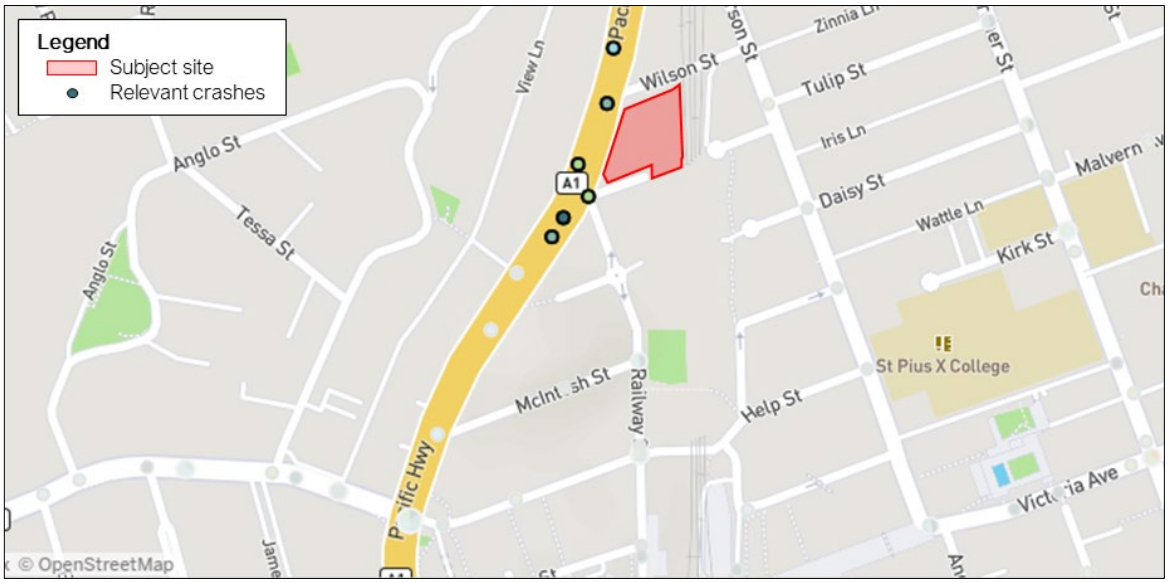


Base image source: GoGet, accessed October 2020

3.9. Crash History

An analysis the most recent five-year period of available crash data between 2014 and 2018 has been undertaken based on crash data obtained from the TfNSW Centre for Road Safety for the roads surrounding the site. The locations and severity of the crash data for the five-year period is shown in Figure 3.13.

Figure 3.13: TfNSW Centre for Road Safety historical crash data



Base image source: TfNSW Centre for Road Safety

A total of six crashes were recorded on the Pacific Highway close to Railway Street and Wilson Street, including two non-casualty (tow-away) crashes, two moderate injury crashes, one minor injury and one serious injury crash.

The above crashes are considered typical for high speed urban environments and considering the low frequency of crashes in the study area, the available crash data near the site does not indicate that there is an existing road safety issue in the area.

4. PLANNING PROPOSAL

04

4.1. Overview

The Planning Proposal includes a 27-storey mixed-use development comprising 247 apartments and 4,294 square metres GFA of commercial space. A summary of the floor areas is shown in Table 4.1.

Table 4.1: Development schedule

Use	Description	Size/ no. of apartments
Residential	1 bedroom	66 apartments
	2 bedrooms	113 apartments
	3 bedrooms	68 apartments
	Total	**247 apartments**
Commercial		4,294m^2 GFA

The indicative ground floor layout is shown in Figure 4.1.

Figure 4.1: Ground floor layout

Source: PBD Architects, Ground Floor Plan, Drawing Number PP100 dated April 2022

The proposal includes a single access driveway on O'Brien Street in the south-east corner of the site to facilitate basement car park and loading dock access. A total of 260 basement parking spaces are proposed over four basement levels. The loading dock on Basement 1 will service vehicles up to 8.8

metre medium rigid vehicles (MRVs), with adequate area to be provided to facilitate forward entry and exit. Pedestrian access to the commercial lobby is proposed via the Pacific Highway and public domain, with the two residential lobbies accessed via O'Brien Street or Wilson Street. A dedicated active travel link is also proposed between Wilson Street and O'Brien Street adjacent to the rail line. This connection is consistent with that identified in the Willoughby Bike Plan, as shown in Figure 3.9.

Overall, the site access arrangements and loading facilities are considered acceptable and able to accommodate the traffic demands of the proposal.

5. PARKING ASSESSMENT

05

5.1. Car Parking

The car parking requirements for different development types are set out in Willoughby Development Control Plan 2006 (WDCP). The subject site is within the Railway Precinct as it is within 600 metres of Chatswood Station, as shown in Figure 5.1.

Figure 5.1: Chatswood Railway Precinct map

Base image source: WDCP Attachment 7, accessed 30 April 2020

Part C.4 of WDCP specifies the off-street parking rates within the Railway Precinct with Table 5.1 specifying those applicable to the Planning Proposal.

Table 5.1: WDCP car parking requirements

Use	Description	Apartments/ floor area	WDCP Parking Rate	Parking Requirement
Residential	1 bedroom	66	1 space/ apartment	66
	2 bedrooms	113	1 space/ apartment	113
	3 bedrooms	68	1.25 spaces/ apartment	85
	Visitor	-	1 space/ 4 apartments	61
			Sub-total	**325**
Commercial		4,294m^2 GFA 4,085m^2 NLA	1 space/ 110m^2 NLA	38
			Total	**363**

Table 5.1 indicates the Planning Proposal is required to provide 363 spaces, including 325 spaces for the residential uses and 38 spaces for commercial use. It is understood that Council has a desire to

reduce the current parking rates for residential uses to be in line with the residential parking rates outlined in TfNSW Guide to Traffic Generating Developments 2002. The recommended minimum parking rates for high density residential apartments in a Metropolitan Regional (CBD) Centre as outlined in the Guide 2002 is summarised below:

- 0.4 spaces per one-bedroom apartment
- 0.7 spaces per two-bedroom apartment
- 1.20 spaces per three-bedroom apartment
- 1 space per 7 apartments (visitor parking).

Based on these rates, the residential component of the proposal would generate a parking requirement of 187 residential spaces and 35 visitor spaces.

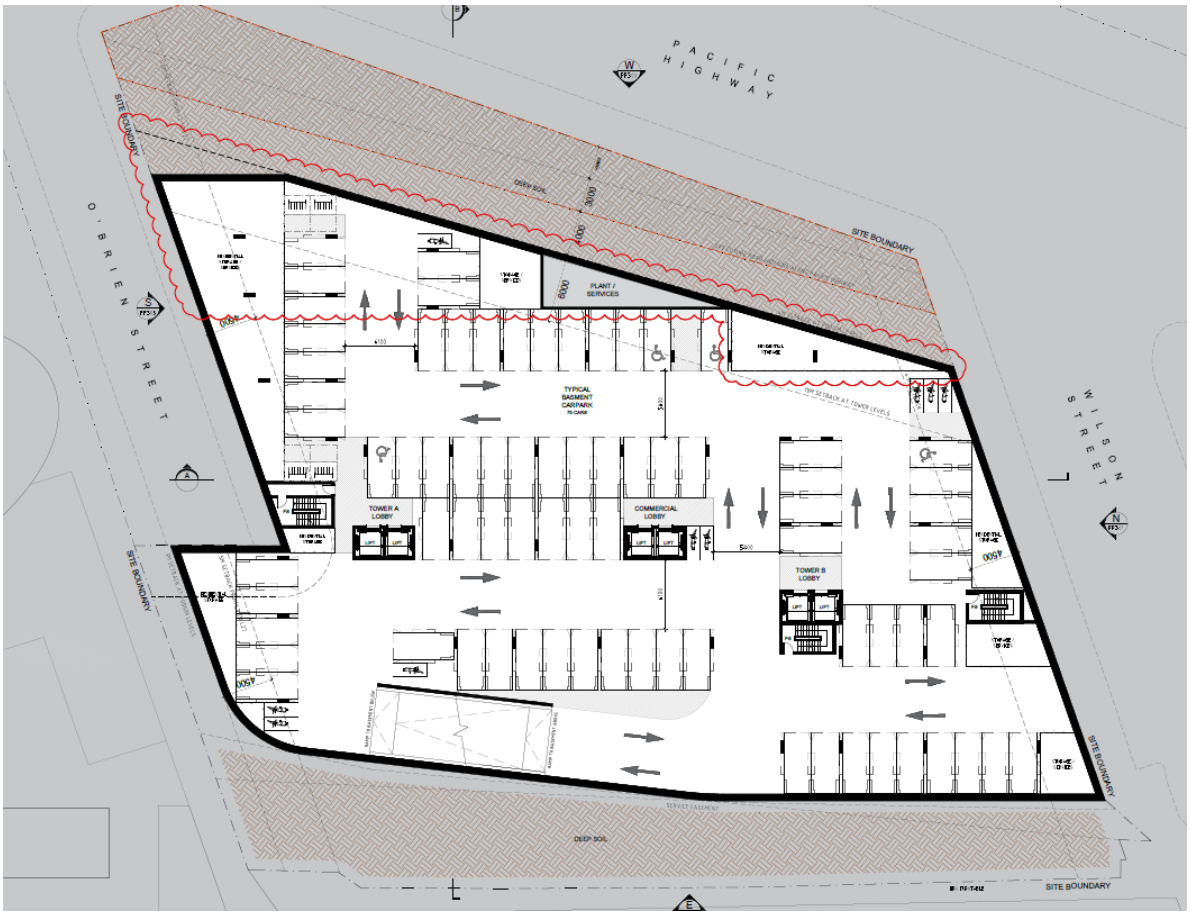
A total of 260 parking spaces are proposed including 187 spaces for residents, 35 for visitors and 38 for the commercial uses. This meets the Guide 2002 requirements for the residential component and the WDCP requirements for the commercial component.

In addition, all adaptable dwellings are required to be provided with an accessible parking space, while accessible parking for the commercial uses should be provided at a rate of one space per 100 standard car parking spaces. Based on the proposed 38 commercial spaces, this equates to one accessible space being required. The allocation of accessible parking will be detailed further in the Development Application stage.

As discussed, the car park will be accessed via a single driveway on O'Brien Street, with the proposal presenting a significant improvement from existing access arrangements by consolidating the five existing access driveways down to one while also greatly reducing the width of the O'Brien Street driveways. The Pacific Highway and Wilson Street driveways would also be removed.

A high-level review of the car park layouts against the requirements of the Australian Standard for Off Street Car Parking (AS/NZS2890.1:2004 and AS/NZS2890.6:2009) has been completed. Overall, the site access arrangements and car park layout (and vertical circulation) are expected to operate well. Pedestrian only areas are generally provided adjacent to stairwells with adequate sightlines to ensure appropriate use. The car park will be designed as a Class 1A facility in accordance with AS/NZS2890.1:2004 with a minimum 2.4 metre wide and 5.4 metre long parking spaces, and 5.8 metre wide aisles. The layout of the basement will be further developed as part of the Development Application stage to ensure compliance with the above mentioned standards. A typical basement parking level is shown in Figure 5.2.

Figure 5.2: Typical basement car park layout



Source: PBD Architects, Typical Basement Plan, Drawing Number PP098 dated April 2022

5.2. Motorcycle Parking

Motorcycle parking should be provided at a rate of one space per 25 car spaces. Based on the proposed 38 commercial car spaces, this results in the need for two motorcycle spaces.

The motorcycle provision will be detailed further at the Development Application stage. Motorcycle spaces are required to have use of an area measuring 1.2 metres by 3 metres, in accordance with WDCP.

5.3. Bicycle Parking

The bicycle parking requirements for different development types are set out in WDCP. A review of the bicycle parking rates and the floor area schedule results in a parking requirement for the planning proposal as summarised in Table 5.2.

Table 5.2: WDCP bicycle parking requirements

Use	Description	Size	Bicycle Parking Rate	Bicycle Parking Requirement
Residential	Resident	247 apartments	1 space/10 apts	25
	Visitor		1 space/12 apts	20
Commercial	Staff	4,294m² GFA 4,085m² NLA	1 space/1,500m² NLA	3
	Visitor		1 space/2,500m² NLA	2
			Total	**50**

Based on the above, the proposed development is required to provide 50 bicycle parking spaces, with 28 spaces for use by residents and staff and 22 spaces for visitors.

Resident and staff spaces should be in the form of lockers or racks in a secure location such as the basement car park, while visitor spaces are to form part of the public domain and easily accessible to encourage use. Dedicated showers and lockers should be provided for the commercial uses and located close to secure bicycle parking facilities.

5.4. Loading Facilities

WDCP requires all loading for commercial buildings and residential buildings with more than 12 apartments to be on-site.

The average residential apartment turnover rate is approximately 0.5 per cent of all apartments in any given week. Conservatively assuming a rate of 0.7 per cent to account for seasonal variations and considering the proposed 247 apartments, there would be an average of around two apartments moving in or out in any given week. Waste collection for the residential apartments is likely to be one to two vehicles per week.

It is also generally accepted that 10 per cent of residents' purchase groceries via a home delivery service each week. For 247 apartments, this equates to about 25 apartments generating one home delivery per week, representing an average of around three to four apartments receiving a home delivery service per day.

Demand associated with e-commerce activity (mostly online shopping and food delivery services) also feature and while they tend to be irregular are estimated to number about five deliveries per day. Such activity is mostly by cars, vans and utes and in the case of food delivery services, motorbike and bicycle. In this regard, use of visitor parking for such short-term deliveries is also common with actual on-site demand anticipated to be less than three per day (assuming 30 per cent of deliveries are by bicycle and hence not requiring basement or loading dock access).

For commercial tenancies, deliveries are typically by smaller service vehicles (including cars, vans, utes etc.) except for tenancy turnover periods (move-in/ move-out activity) and delivery of large items. Deliveries are typically couriers, postal and day-to-day commercial business-related activity. All are generally infrequent. Based on the proposed 4,294 square metres of commercial GFA, it is expected waste collection may be in the order of one to two trucks per day.

With consideration to the above, the development could generate in the order of five service vehicles per day that require access to the loading dock. With most service vehicles likely to be short-stay (around 20 minutes) and removalist trucks longer stays (around two hours), the loading dock could

accommodate about 20 service vehicles per day (based on an average 30-minute stay). Based on this, the single loading bay would be able to readily accommodate such low demand.

Other deliveries are by small vehicles, with opportunity for short-stay parking to be implemented along the northern side of O'Brien Street (in the location of the existing wide driveway crossover) to facilitate some of the additional demand of five to seven vehicles (or motorbikes/ bicycles) per day.

The proposed loading dock would accommodate access by vehicles up to 8.8-metre-long MRVs. This is an appropriately sized vehicle for removalist trucks and waste contractor vehicles. Council has also advised that this is an appropriate design vehicle for the site.

A booking system would manage demand across the day to ensure no more than one vehicle requires access at any time with no queuing of service vehicles to occur on O'Brien Street.

6. TRAFFIC IMPACT ASSESSMENT

06

6.1. Traffic Generation

6.1.1. Existing Uses

The site is currently occupied by four residential blocks consisting of 37 apartments. In estimating the traffic generation of the existing uses, reference has been made to the rates in the TfNSW Guide to Traffic Generating Developments 2002 (TfNSW Guide 2002) and Updated Surveys Technical Direction (TDT 2013/ 04a). The TDT 2013/04a recommends a rate of 0.19 and 0.15 trips per dwelling the weekday AM and PM peak hours respectively for high density residential dwellings. Considering this, it is estimated that the site currently generates six or seven vehicle trips in any peak hour. It has conservatively been assumed that the existing uses on 8 Wilson Street would generate minimal traffic in the weekday peak periods.

6.1.2. Proposed Uses

The same traffic generation rates have been applied to the proposed residential apartments. With respect to the commercial uses and given the relatively low parking provision on account of the site being on the periphery of Chatswood CBD, traffic generation is best linked to parking supply rather than GFA with TDT 2013/ 04a again referenced.

A summary of the traffic generation for the proposed development is provided in Table 6.1.

Table 6.1: Proposed development traffic generation estimates

Use	Size	Traffic generation rate		Traffic generation estimate	
		AM peak hour	PM peak hour	AM peak hour	PM peak hour
High density residential apartments	247 apartments	0.19 trips per dwelling	0.15 trips per dwelling	47	37
Commercial	4,294m^2 GFA 38 spaces	0.49 trips per space	0.33 trips per space	19	13
			Total	**66**	**50**

Table 6.1 indicates that the proposed development could generate between 50 and 66 vehicle trips in any peak hour. Accounting for existing site generated traffic, the proposed development would result in a net increase in traffic of between 44 and 59 vehicle trips in any peak hour.

6.2. Traffic Distribution

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

- configuration of the arterial road network in the immediate vicinity of the site
- existing operation of intersections providing access between the local and arterial road network
- distribution of households in the vicinity of the site
- likely distribution of employee residences in relation to the site
- configuration of access points to the site.

Having consideration to the above, it is estimated that most of the traffic generated by the proposal would travel to/ from the north and south along the Pacific Highway, with a smaller proportion travelling to/ from the west via Fullers Road (to connect with M2) and the east (through Chatswood).

As discussed, given the proximity of O'Brien Street to the Pacific Highway/ Railway Street intersection, O'Brien Street effectively operates as a left-in/ left-out street, although no formal restrictions are in place. In peak periods, the area experiences some level of congestion including along the Pacific Highway, with extensive queuing particularly present in the right turn lane from the Pacific Highway to Fullers Road which provides connection to North Ryde, Macquarie Park and M2.

Considering the existing configuration and operation of the surrounding road network particularly during road network peak periods, it is estimated that most vehicles approaching the site would use the Pacific Highway and Railway Street. Those exiting to the south/ west would tend to use Railway Street and Help Street, while those exiting to the north would likely exit left out of O'Brien Street and perform a U-turn to use the Railway Street/ Help Street intersection.

Figure 6.1 and Figure 6.2 set out the anticipated post development traffic volumes at the key survey intersections in the weekday AM and PM peak hours.

Figure 6.1: Future AM peak hour traffic with development traffic

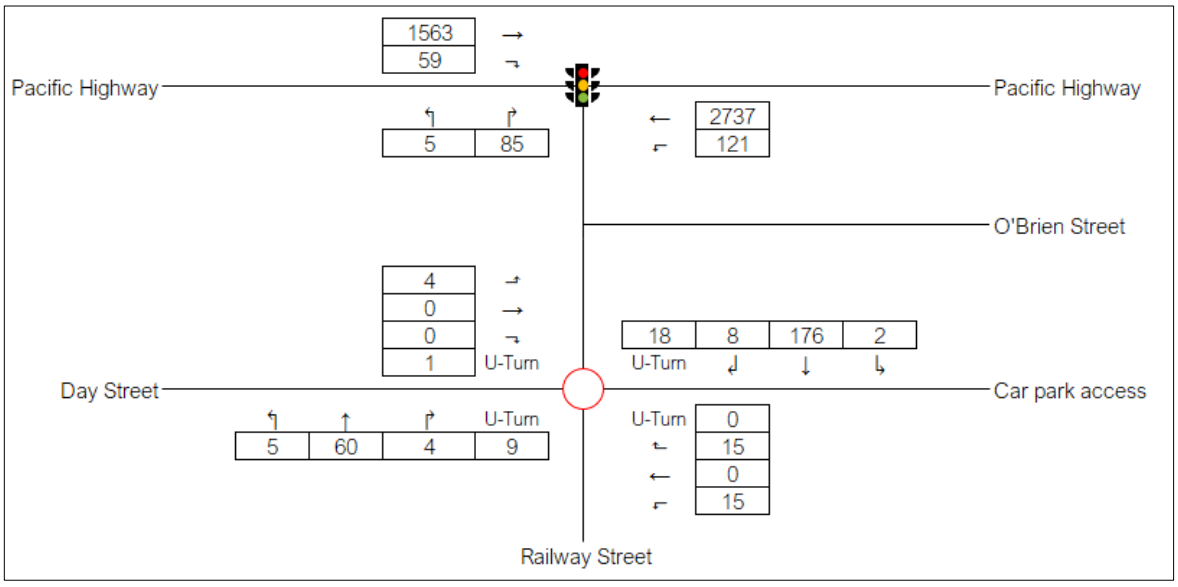
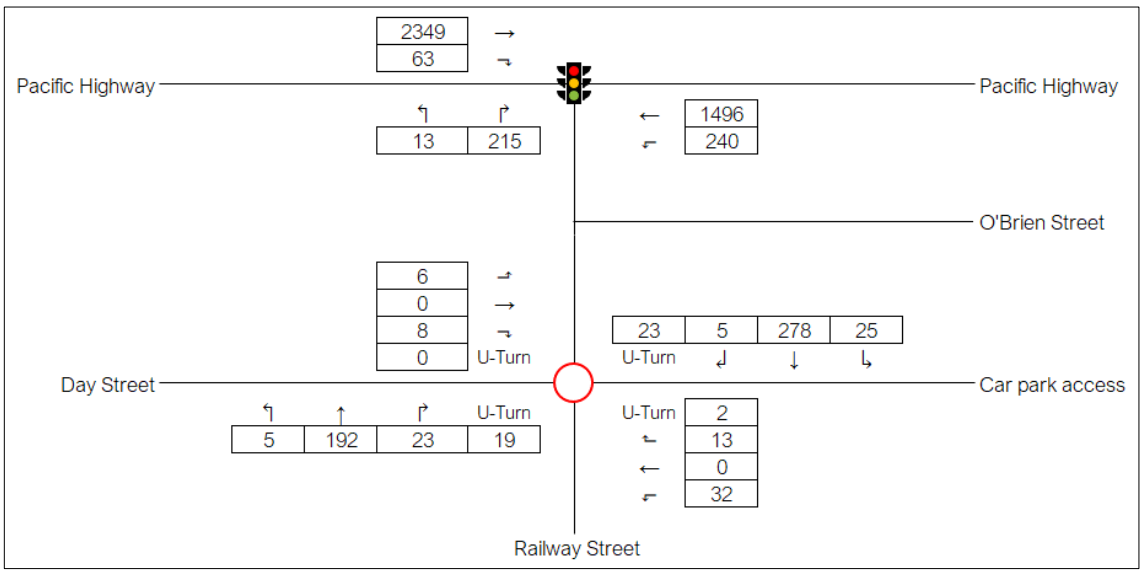


Figure 6.2: Future PM peak hour traffic with development traffic



6.3. Traffic Impact

The study intersections have been assessed in SIDRA to include the additional traffic generated by the proposed development with a summary of the anticipated intersection operation included in Table 6.2.

Table 6.2: Post development intersection operation

Intersection	Peak	Leg	Degree of saturation (DOS)	Average delay (sec)	Average queue (m)	Level of service (LOS)
Pacific Highway/ Railway Street	AM	South	0.20	65	14	E
		Northeast	0.90	18	310	B
		Southwest	0.65	9	133	A
		Overall	**0.90**	**16**	**310**	**B**
	PM	South	0.51	70	37	E
		Northeast	0.49	7	83	A
		Southwest	0.95	26	424	B
		Overall	**0.95**	**20**	**424**	**B**
Railway Street/ Day Street	AM	South	0.07	8	1	A
		East	0.03	9	1	A
		North	0.16	7	2	A
		West	0.01	8	1	A
	PM	South	0.20	8	3	A
		East	0.05	9	1	A
		North	0.27	7	4	A
		West	0.02	9	1	A

Table 6.2 demonstrates that the key intersections are expected to operate satisfactorily when the additional traffic is added, with minor increases to average delay and queues at both intersections. The operation of the Pacific Highway/ Railway Street intersection could reduce slightly (from LOS A to LOS B) however this is mostly due to only a minor increase in delay, with the existing intersection already operating close to LOS B.

Traffic generated by the proposal could also have a minor impact on other key intersections in and around Chatswood CBD. This includes the Pacific Highway/ Victoria Avenue intersection where a slight increase in right turns (in the order of 10 in any peak hour) could eventuate.

While it is noted that there is an existing level of congestion throughout and around Chatswood CBD (as is common in key centres across Sydney), the above traffic assessment confirms that the potential net increase of between 59 and 44 trips in any peak hour is not expected to have a material impact on the surrounding road network. This particularly reflects the site location adjacent to the Pacific Highway which would allow for efficient access and limited impacts on Chatswood CBD generally.

Based on the above, the additional traffic generated by the proposal is expected to have a minor impact on the surrounding road network and can be supported from a traffic and transport perspective.

A green travel plan could be implemented during occupation of the building to promote the use of modes of transport other than private car which are more sustainable and environmentally friendly for residents, staff and visitors. This could result in a lower traffic generation for the site and therefore a reduced impact on the surrounding road network compared to the estimates outlined above. Details of a green travel plan for the site will be provided as part of the future Development Application stage and/or prior to occupation.

7. CONCLUSION

08

CONCLUSION

Based on the analysis and discussions presented within this report, the following conclusions are made:

1. A Planning Proposal is to be lodged for the site at 2-8 Wilson Street and 849-859 Pacific Highway, Chatswood for a mixed-use development comprising of 247 apartments and 4,294 square metres GFA of commercial space across 27 storeys.
2. The proposal generates a parking requirement of around 260 on-site car parking spaces, including 222 spaces for the residential uses based on Guide 2002 parking rates and 38 spaces for the commercial space based on WDCP parking rates.
3. The above requirement is met with the provision of 260 spaces over four basement levels.
4. The proposal would also realise a significant improvement from existing access arrangements by consolidating the five existing access driveways down to one, and greatly reducing the width of the O'Brien Street driveways.
5. The car park layout will be developed further in the Development Application stage to ensure it complies with the requirements set out in the Australian/New Zealand Standard for Off Street Car Parking (AS/NZS2890.1:2004 and AS/NZS2890.6:2009).
6. High quality end-of-trip facilities will be provided including secure bicycle parking for residents, staff and visitors to encourage a mode shift towards more sustainable travel modes. Such details would be further developed as part of any future Development Application.
7. All loading and servicing would occur on-site and within the dedicated loading area on Basement 1. The site can support access by vehicles up to 8.8 metre long medium rigid trucks, with adequate manoeuvring area to be provided to ensure all vehicles enter and exit the site in a forward direction. Council has confirmed that this is a suitable design vehicle for the site.
8. The proposal is expected to generate a net increase of 59 and 44 vehicle trips in the AM and PM peak hours, respectively.
9. It is noted that there is an existing level of traffic congestion in the area, as is common for key strategic centres across Sydney, with the anticipated increase in traffic not expected to have a material impact on the surrounding road network. This particularly reflects the site location adjacent to the Pacific Highway which would allow for efficient access and limited impacts on Chatswood CBD generally.
10. The proposal is considered in-line with the objectives of the Chatswood CBD Planning and Urban Design Strategy and can be supported from a transport perspective.

A.SIDRA RESULTS

A

USER REPORT FOR NETWORK SITE

Project: 201014sid-N199570 849-859 Pacific Highway, Chatswood **Template: Movement Summary**

Site: 1 [1 Pacific Hwy/ Railway St AM Ex] Network: 6 [AM Existing]

Site Category: -
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Railway St														
1b	L3	5	0.0	5	0.0	0.168	66.8	LOS E	1.6	11.6	0.92	0.72	0.92	14.7
3a	R1	76	5.6	76	5.6	0.168	65.1	LOS E	1.7	12.2	0.92	0.72	0.92	13.2
Approach		81	5.2	81	5.2	0.168	65.2	LOS E	1.7	12.2	0.92	0.72	0.92	13.3
NorthEast: Pacific Hwy														
24a	L1	116	1.8	116	1.8	0.887	22.6	LOS B	39.9	285.7	0.83	0.80	0.83	28.1
8	T1	2881	2.9	2881	2.9	0.887	16.2	LOS B	41.3	295.9	0.77	0.73	0.77	40.4
Approach		2997	2.8	2997	2.8	0.887	16.5	LOS B	41.3	295.9	0.77	0.73	0.77	40.1
SouthWest: Pacific Hwy														
2	T1	1645	7.8	1645	7.8	0.639	6.6	LOS A	17.5	130.7	0.43	0.40	0.43	50.2
32b	R3	48	30.4	48	30.4	0.471	65.4	LOS E	2.2	19.8	0.99	0.83	0.99	13.7
Approach		1694	8.5	1694	8.5	0.639	8.3	LOS A	17.5	130.7	0.44	0.41	0.44	48.1
All Vehicles		4772	4.9	4772	4.9	0.887	14.4	LOS A	41.3	295.9	0.66	0.62	0.66	41.8

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

Site Category: -
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Railway St														
1	L2	5	0.0	5	0.0	0.066	3.3	LOS A	0.1	0.8	0.10	0.40	0.10	30.2
2	T1	63	6.7	63	6.7	0.066	2.5	LOS A	0.1	0.8	0.10	0.40	0.10	32.2
3	R2	4	0.0	4	0.0	0.066	7.9	LOS A	0.1	0.8	0.10	0.40	0.10	25.9
3u	U	9	0.0	9	0.0	0.066	6.9	LOS A	0.1	0.8	0.10	0.40	0.10	38.7
Approach		82	5.1	82	5.1	0.066	3.3	LOS A	0.1	0.8	0.10	0.40	0.10	32.7
East: Site access														
4	L2	16	0.0	16	0.0	0.028	2.6	LOS A	0.1	0.5	0.34	0.47	0.34	32.8
5	T1	1	0.0	1	0.0	0.028	2.8	LOS A	0.1	0.5	0.34	0.47	0.34	16.4
6	R2	16	0.0	16	0.0	0.028	6.1	LOS A	0.1	0.5	0.34	0.47	0.34	22.1
6u	U	1	0.0	1	0.0	0.028	8.4	LOS A	0.1	0.5	0.34	0.47	0.34	15.8
Approach		34	0.0	34	0.0	0.028	4.5	LOS A	0.1	0.5	0.34	0.47	0.34	28.2
North: Railway St														
7	L2	2	0.0	2	0.0	0.131	3.9	LOS A	0.3	1.9	0.07	0.31	0.07	21.3
8	T1	161	11.1	161	11.1	0.131	2.2	LOS A	0.3	1.9	0.07	0.31	0.07	37.9
9	R2	8	0.0	8	0.0	0.131	5.5	LOS A	0.3	1.9	0.07	0.31	0.07	21.1
9u	U	6	0.0	6	0.0	0.131	6.8	LOS A	0.3	1.9	0.07	0.31	0.07	29.4
Approach		178	10.1	178	10.1	0.131	2.5	LOS A	0.3	1.9	0.07	0.31	0.07	36.7
West: Day St														
10	L2	4	0.0	4	0.0	0.006	2.8	LOS A	0.0	0.1	0.24	0.46	0.24	23.6
11	T1	1	0.0	1	0.0	0.006	3.2	LOS A	0.0	0.1	0.24	0.46	0.24	18.9
12	R2	1	0.0	1	0.0	0.006	5.7	LOS A	0.0	0.1	0.24	0.46	0.24	35.9
12u	U	1	0.0	1	0.0	0.006	8.0	LOS A	0.0	0.1	0.24	0.46	0.24	23.4
Approach		7	0.0	7	0.0	0.006	4.0	LOS A	0.0	0.1	0.24	0.46	0.24	25.2
All Vehicles		301	7.3	301	7.3	0.131	3.0	LOS A	0.3	1.9	0.11	0.36	0.11	34.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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.

USER REPORT FOR NETWORK SITE

Project: 201014sid-N199570 849-859 Pacific Highway, Chatswood **Template: Movement Summary**

Site: 1 [1 Pacific Hwy/ Railway St PM Ex] Network: 7 [PM Existing]

Site Category: -
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Railway St														
1b	L3	14	0.0	14	0.0	0.496	71.1	LOS F	4.9	34.4	0.98	0.79	0.98	14.1
3a	R1	220	1.0	220	1.0	0.496	69.4	LOS E	5.1	35.8	0.98	0.79	0.98	12.7
Approach		234	0.9	234	0.9	0.496	69.5	LOS E	5.1	35.8	0.98	0.79	0.98	12.8
NorthEast: Pacific Hwy														
24a	L1	240	1.3	240	1.3	0.489	11.0	LOS A	11.1	78.9	0.38	0.47	0.38	40.4
8	T1	1575	2.5	1575	2.5	0.489	6.0	LOS A	11.5	82.5	0.37	0.37	0.37	50.3
Approach		1815	2.3	1815	2.3	0.489	6.7	LOS A	11.5	82.5	0.37	0.39	0.37	49.5
SouthWest: Pacific Hwy														
2	T1	2473	1.2	2473	1.2	0.917	13.1	LOS A	45.5	321.8	0.62	0.61	0.65	43.2
32b	R3	49	27.7	49	27.7	0.403	18.8	LOS B	1.1	9.5	0.52	0.74	0.52	30.6
Approach		2522	1.8	2522	1.8	0.917	13.2	LOS A	45.5	321.8	0.61	0.62	0.65	43.0
All Vehicles		4571	1.9	4571	1.9	0.917	13.5	LOS A	45.5	321.8	0.54	0.53	0.55	42.0

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

Site Category: -
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Railway St														
1	L2	5	0.0	5	0.0	0.191	3.3	LOS A	0.4	2.7	0.13	0.40	0.13	30.3
2	T1	202	1.0	202	1.0	0.191	2.5	LOS A	0.4	2.7	0.13	0.40	0.13	32.4
3	R2	24	0.0	24	0.0	0.191	7.9	LOS A	0.4	2.7	0.13	0.40	0.13	25.9
3u	U	20	0.0	20	0.0	0.191	7.0	LOS A	0.4	2.7	0.13	0.40	0.13	38.9
Approach		252	0.8	252	0.8	0.191	3.4	LOS A	0.4	2.7	0.13	0.40	0.13	32.2
East: Site access														
4	L2	34	0.0	34	0.0	0.047	3.5	LOS A	0.1	0.8	0.47	0.49	0.47	32.7
5	T1	1	0.0	1	0.0	0.047	3.6	LOS A	0.1	0.8	0.47	0.49	0.47	16.0
6	R2	14	0.0	14	0.0	0.047	7.0	LOS A	0.1	0.8	0.47	0.49	0.47	21.5
6u	U	2	0.0	2	0.0	0.047	9.3	LOS A	0.1	0.8	0.47	0.49	0.47	15.4
Approach		51	0.0	51	0.0	0.047	4.7	LOS A	0.1	0.8	0.47	0.49	0.47	29.7
North: Railway St														
7	L2	26	0.0	26	0.0	0.255	4.1	LOS A	0.6	4.2	0.16	0.34	0.16	20.9
8	T1	281	6.0	281	6.0	0.255	2.4	LOS A	0.6	4.2	0.16	0.34	0.16	37.3
9	R2	5	0.0	5	0.0	0.255	5.8	LOS A	0.6	4.2	0.16	0.34	0.16	20.7
9u	U	18	0.0	18	0.0	0.255	7.1	LOS A	0.6	4.2	0.16	0.34	0.16	28.3
Approach		331	5.1	331	5.1	0.255	2.8	LOS A	0.6	4.2	0.16	0.34	0.16	35.4
West: Day St														
10	L2	6	0.0	6	0.0	0.016	3.8	LOS A	0.0	0.3	0.42	0.51	0.42	20.7
11	T1	1	0.0	1	0.0	0.016	4.2	LOS A	0.0	0.3	0.42	0.51	0.42	17.8
12	R2	8	0.0	8	0.0	0.016	6.7	LOS A	0.0	0.3	0.42	0.51	0.42	33.3
12u	U	1	0.0	1	0.0	0.016	9.0	LOS A	0.0	0.3	0.42	0.51	0.42	21.6
Approach		17	0.0	17	0.0	0.016	5.6	LOS A	0.0	0.3	0.42	0.51	0.42	28.4
All Vehicles		649	2.9	649	2.9	0.255	3.3	LOS A	0.6	4.2	0.18	0.38	0.18	33.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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.

USER REPORT FOR NETWORK SITE

Project: 210426sid-N199570 849-859 Pacific Highway, Chatswood - Copy

Template: Default Site User Report

Site: 1 [1 Pacific Hwy/ Railway St AM Fut]

Network: 8 [AM Future]

Site Category: -
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Railway St														
1b	L3	5	0.0	5	0.0	0.195	67.0	LOS E	1.9	13.6	0.93	0.73	0.93	14.7
3a	R1	89	4.7	89	4.7	0.195	65.3	LOS E	1.9	14.1	0.93	0.73	0.93	13.2
Approach		95	4.4	95	4.4	0.195	65.4	LOS E	1.9	14.1	0.93	0.73	0.93	13.3
NorthEast: Pacific Hwy														
24a	L1	127	1.7	127	1.7	0.899	24.4	LOS B	41.8	299.3	0.86	0.83	0.86	26.7
8	T1	2881	2.9	2881	2.9	0.899	17.7	LOS B	43.2	309.9	0.79	0.75	0.79	39.3
Approach		3008	2.8	3008	2.8	0.899	18.0	LOS B	43.2	309.9	0.79	0.75	0.80	38.9
SouthWest: Pacific Hwy														
2	T1	1645	7.8	1645	7.8	0.645	6.6	LOS A	17.8	132.9	0.43	0.40	0.43	50.2
32b	R3	62	23.7	62	23.7	0.540	71.1	LOS F	2.9	24.7	1.00	0.87	1.12	12.8
Approach		1707	8.4	1707	8.4	0.645	9.0	LOS A	17.8	132.9	0.45	0.42	0.46	47.3
All Vehicles		4811	4.8	4811	4.8	0.899	15.7	LOS B	43.2	309.9	0.67	0.63	0.68	40.6

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

Site: 2 [2 Railway St/ Day St AM Fut]

Network: 8 [AM Future]

Site Category: -
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Railway St														
1	L2	5	0.0	5	0.0	0.068	3.3	LOS A	0.1	0.9	0.12	0.40	0.12	30.1
2	T1	63	6.7	63	6.7	0.068	2.6	LOS A	0.1	0.9	0.12	0.40	0.12	32.1
3	R2	4	0.0	4	0.0	0.068	8.0	LOS A	0.1	0.9	0.12	0.40	0.12	25.8
3u	U	9	0.0	9	0.0	0.068	7.0	LOS A	0.1	0.9	0.12	0.40	0.12	38.6
Approach		82	5.1	82	5.1	0.068	3.4	LOS A	0.1	0.9	0.12	0.40	0.12	32.5
East: Site access														
4	L2	16	0.0	16	0.0	0.029	2.8	LOS A	0.1	0.5	0.37	0.48	0.37	32.6
5	T1	1	0.0	1	0.0	0.029	3.0	LOS A	0.1	0.5	0.37	0.48	0.37	16.3
6	R2	16	0.0	16	0.0	0.029	6.3	LOS A	0.1	0.5	0.37	0.48	0.37	21.9
6u	U	1	0.0	1	0.0	0.029	8.6	LOS A	0.1	0.5	0.37	0.48	0.37	15.7
Approach		34	0.0	34	0.0	0.029	4.6	LOS A	0.1	0.5	0.37	0.48	0.37	28.0
North: Railway St														
7	L2	2	0.0	2	0.0	0.155	3.9	LOS A	0.3	2.3	0.07	0.34	0.07	21.2
8	T1	185	9.7	185	9.7	0.155	2.1	LOS A	0.3	2.3	0.07	0.34	0.07	37.5
9	R2	8	0.0	8	0.0	0.155	5.5	LOS A	0.3	2.3	0.07	0.34	0.07	20.9
9u	U	19	0.0	19	0.0	0.155	6.8	LOS A	0.3	2.3	0.07	0.34	0.07	28.8
Approach		215	8.3	215	8.3	0.155	2.7	LOS A	0.3	2.3	0.07	0.34	0.07	36.2
West: Day St														
10	L2	4	0.0	4	0.0	0.006	2.8	LOS A	0.0	0.1	0.26	0.46	0.26	23.4
11	T1	1	0.0	1	0.0	0.006	3.3	LOS A	0.0	0.1	0.26	0.46	0.26	18.8
12	R2	1	0.0	1	0.0	0.006	5.8	LOS A	0.0	0.1	0.26	0.46	0.26	35.8
12u	U	1	0.0	1	0.0	0.006	8.1	LOS A	0.0	0.1	0.26	0.46	0.26	23.4
Approach		7	0.0	7	0.0	0.006	4.1	LOS A	0.0	0.1	0.26	0.46	0.26	25.1
All Vehicles		338	6.5	338	6.5	0.155	3.1	LOS A	0.3	2.3	0.12	0.37	0.12	34.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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.

USER REPORT FOR NETWORK SITE

Project: 210426sid-N199570 849-859 Pacific Highway, Chatswood - Copy

Template: Default Site User Report

Site: 1 [1 Pacific Hwy/ Railway St PM Fut]

Network: 9 [PM Future]

Site Category: -
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Railway St														
1b	L3	14	0.0	14	0.0	0.509	71.2	LOS F	5.0	35.4	0.98	0.79	0.98	14.1
3a	R1	226	0.9	226	0.9	0.509	69.5	LOS E	5.2	36.8	0.98	0.79	0.98	12.7
Approach		240	0.9	240	0.9	0.509	69.6	LOS E	5.2	36.8	0.98	0.79	0.98	12.7
NorthEast: Pacific Hwy														
24a	L1	253	1.3	253	1.3	0.493	11.1	LOS A	11.2	79.8	0.38	0.47	0.38	40.2
8	T1	1575	2.5	1575	2.5	0.493	6.0	LOS A	11.7	83.4	0.37	0.38	0.37	50.3
Approach		1827	2.3	1827	2.3	0.493	6.7	LOS A	11.7	83.4	0.37	0.39	0.37	49.4
SouthWest: Pacific Hwy														
2	T1	2473	1.2	2473	1.2	0.950	25.7	LOS B	59.9	424.0	0.68	0.73	0.78	34.1
32b	R3	66	20.6	66	20.6	0.512	20.5	LOS B	1.7	13.9	0.60	0.76	0.60	29.2
Approach		2539	1.7	2539	1.7	0.950	25.6	LOS B	59.9	424.0	0.68	0.73	0.77	34.0
All Vehicles		4606	1.9	4606	1.9	0.950	20.4	LOS B	59.9	424.0	0.57	0.60	0.63	36.5

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

Site: 2 [2 Railway St/ Day St PM Fut]

Network: 9 [PM Future]

Site Category: -
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Railway St														
1	L2	5	0.0	5	0.0	0.198	3.4	LOS A	0.4	2.8	0.14	0.40	0.14	30.3
2	T1	202	1.0	202	1.0	0.198	2.6	LOS A	0.4	2.8	0.14	0.40	0.14	32.3
3	R2	24	0.0	24	0.0	0.198	8.0	LOS A	0.4	2.8	0.14	0.40	0.14	25.9
3u	U	20	0.0	20	0.0	0.198	7.0	LOS A	0.4	2.8	0.14	0.40	0.14	38.8
Approach		252	0.8	252	0.8	0.198	3.5	LOS A	0.4	2.8	0.14	0.40	0.14	32.1
East: Site access														
4	L2	34	0.0	34	0.0	0.048	3.6	LOS A	0.1	0.9	0.49	0.49	0.49	32.5
5	T1	1	0.0	1	0.0	0.048	3.7	LOS A	0.1	0.9	0.49	0.49	0.49	15.9
6	R2	14	0.0	14	0.0	0.048	7.1	LOS A	0.1	0.9	0.49	0.49	0.49	21.3
6u	U	2	0.0	2	0.0	0.048	9.4	LOS A	0.1	0.9	0.49	0.49	0.49	15.4
Approach		51	0.0	51	0.0	0.048	4.8	LOS A	0.1	0.9	0.49	0.49	0.49	29.5
North: Railway St														
7	L2	26	0.0	26	0.0	0.269	4.2	LOS A	0.6	4.4	0.16	0.35	0.16	20.8
8	T1	293	5.8	293	5.8	0.269	2.4	LOS A	0.6	4.4	0.16	0.35	0.16	37.1
9	R2	5	0.0	5	0.0	0.269	5.8	LOS A	0.6	4.4	0.16	0.35	0.16	20.6
9u	U	24	0.0	24	0.0	0.269	7.1	LOS A	0.6	4.4	0.16	0.35	0.16	28.1
Approach		348	4.8	348	4.8	0.269	2.9	LOS A	0.6	4.4	0.16	0.35	0.16	35.3
West: Day St														
10	L2	6	0.0	6	0.0	0.017	3.8	LOS A	0.0	0.3	0.43	0.52	0.43	20.7
11	T1	1	0.0	1	0.0	0.017	4.3	LOS A	0.0	0.3	0.43	0.52	0.43	17.8
12	R2	8	0.0	8	0.0	0.017	6.7	LOS A	0.0	0.3	0.43	0.52	0.43	33.2
12u	U	1	0.0	1	0.0	0.017	9.0	LOS A	0.0	0.3	0.43	0.52	0.43	21.6
Approach		17	0.0	17	0.0	0.017	5.6	LOS A	0.0	0.3	0.43	0.52	0.43	28.3
All Vehicles		667	2.8	667	2.8	0.269	3.3	LOS A	0.6	4.4	0.18	0.38	0.18	33.6

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

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