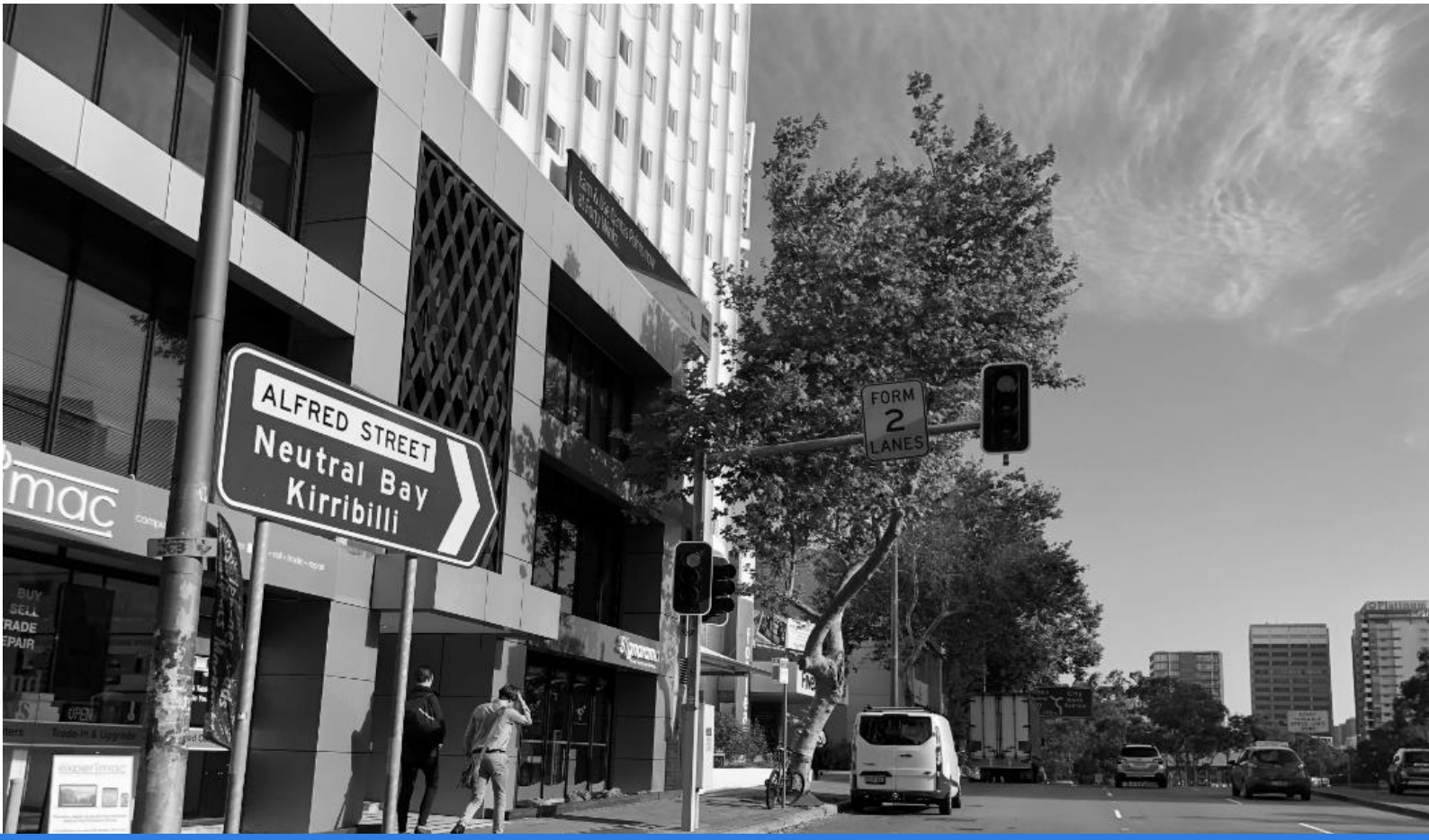

Alfred Street Precinct, North Sydney
Transport Impact Assessment

Prepared for:

Benmill Pty Ltd & JB No. 3 Pty Ltd

21 March 2019

The Transport Planning Partnership

Alfred Street Precinct, North Sydney
Transport Impact Assessment

Client: Benmill Pty Ltd & JB No. 3 Pty Ltd

Version: Final

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TTPP Reference: 18387

Quality Record

Version	Date	Prepared by	Reviewed by	Approved by	Signature
Final	21/03/19	Kenta Lam	Jessica Szeto	Ken Hollyoak	

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APPENDICES

1 Introduction

The Transport Planning Partnership (TTPP) has been commissioned by Benmill Pty Ltd & JB No. 3 Pty Ltd to prepare this transport impact assessment report to accompany the revised planning proposal to North Sydney Municipal Council (Council) for the entire Alfred Street Precinct.

The proposal seeks approval to rezone the entire Alfred Street Precinct site from B3 Commercial Core to B4 Mixed-Use zoning and to increase the building height and floor space ratio (FSR) provisions for the Bayer Building. The proposal includes four separate mixed-use developments, across the following four key sites:

- Site A – 283 Alfred Street
- Site B – 275 Alfred Street
- Site C – 271-273 Alfred Street
- Site D – 263-269 Alfred Street & 4 Little Alfred Street.

1.1 Background

On 3 September 2015, a planning proposal for 275 Alfred Street, North Sydney (the 'Bayer Building'), was submitted to Council. On 15 February 2016, Council resolved that "*any changes to the planning controls for the precinct be considered holistically and involve all landowners in the context of a comprehensive strategic planning study for the locality which includes planning for defined public benefits for any additional residential density.*"

Subsequent to this, Benmill (the landowners of the Bayer Building) has been commissioned to prepare a revised planning proposal for the entire Alfred Street Precinct. This report has been prepared to assess the holistic cumulative traffic and parking implications associated with the entire Alfred Street Precinct planning proposal.

1.2 Report Structure

The remainder of the report is set out as follows:

- Chapter 2 discusses the existing conditions including a description of the subject site
- Chapter 3 provides a brief overview of the proposed development
- Chapter 4 assesses the proposed on-site parking provision and internal layout
- Chapter 5 examines the traffic generation of the proposed development
- Chapter 6 presents the summary and conclusion of the assessment.

2 Existing Conditions

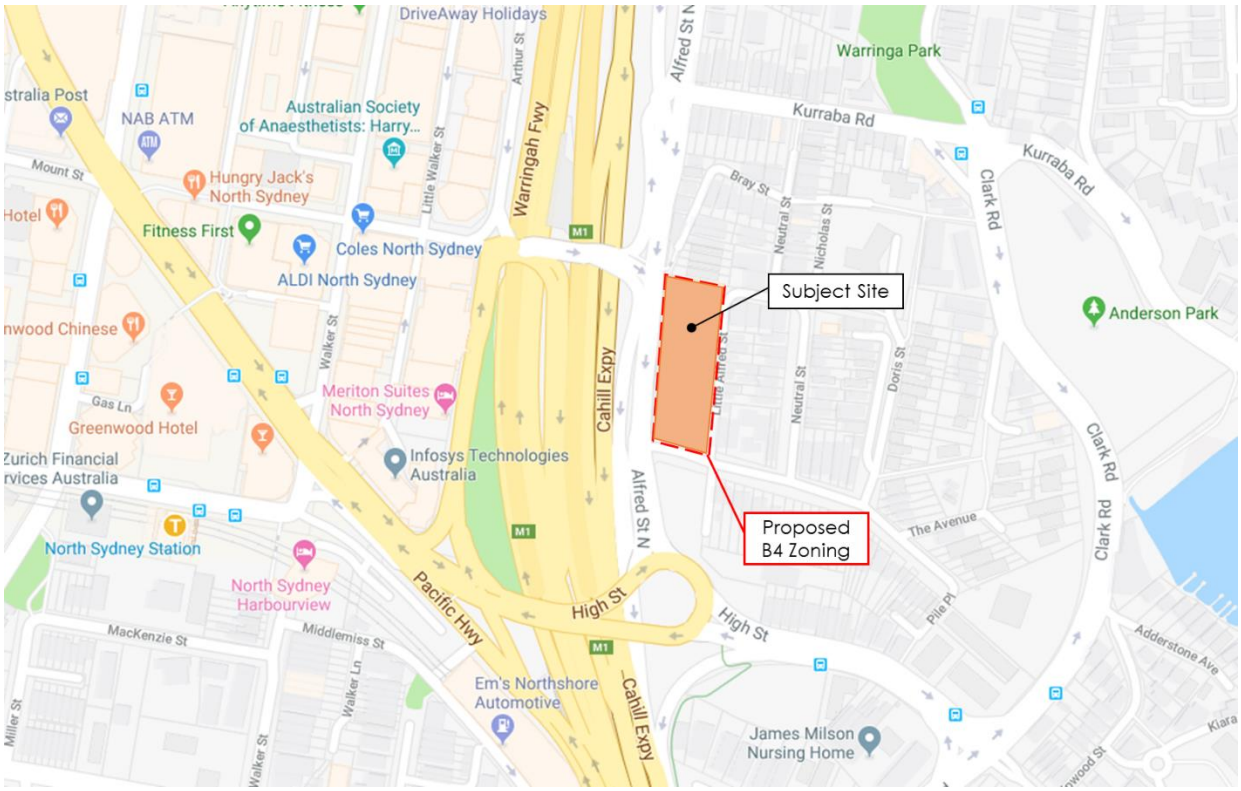
2.1 Site Description

The Alfred Street Precinct (the 'site') is generally bound by Little Alfred Street, Alfred Street North and Whaling Road along the east, west and south boundaries of the site respectively. The site falls within the local government area of North Sydney Municipal Council. The site is separated from the North Sydney CBD by the Warringah Expressway to the west.

At present, the site is currently occupied by some 33 residential flat dwellings at 263-269 Alfred Street North and 4 Little Alfred Street and three commercial office buildings at 271-273, 275 and 283 Alfred Street North, including the existing 17-storey Bayer Building.

The site location and its surrounds are shown in Figure 2.1.

Figure 2.1: Site Locality



Basemap Source: Google Maps Australia

Land uses surrounding the site primarily comprises low-medium density residential dwellings and public recreational parks to the north, east and south and the North Sydney CBD to the west. In addition, the North Sydney Railway Station is conveniently located about 400m south-west of the site, which is an approximate eight-minute walk to the station.

It should also be noted that the site is within close proximity to the future Victoria Cross Metro station which is expected to commence operations in 2024. The Victoria Cross Metro Station seeks to provide services every 4 minutes during peak hours with a travel time of 9 minutes to Central Station. The station is located some 700m north-west of the site beneath Miller Street between McLaren Street and Berry Street.

2.2 Abutting Road Network

The site is surrounded by a network of local roads, including Alfred Street North, Little Alfred Street and Whaling Road to the east, west and south boundaries of the site respectively. A brief description of these roads is provided below.

2.2.1 Alfred Street North

Within the immediate vicinity of the site, Alfred Street North is configured as a three-lane one-way southbound local road between Mount Street and Whaling Road and travels along the western boundary of the site. The inner lane on Alfred Street North becomes a dedicated left-turn lane into Whaling Road. The road continues south onto High Street to provide good linkages to the wider arterial road network, including Pacific Highway and Warringah Freeway/Bradfield Highway.

In addition to this, a kerbside car parking lane is provided on the east side of the road. A loading zone is provided along the frontage of the site, which operates between 8:30am to 6:00pm, Monday to Friday and caters for approx. 6-7 commercial vehicles. There is also one hour restricted kerbside parallel parking between 8:30am to 5:30pm, Monday to Friday, as well as dedicated motorcycle parking for about four motorcycles and a mail zone along Alfred Street North towards Whaling Road.

The road is shown in Figure 2.2 and Figure 2.3.

Figure 2.2: Alfred Street North (looking south)

Figure 2.3: Alfred Street North (looking north)

2.2.2 Little Alfred Street

Little Alfred Street is an undivided two-way local road extending along the eastern boundary of the site. The road carriageway is approximately 5.8m wide with parking along the western side of the road. Parking is restricted with one-hour parking restrictions between 8:30am to 6:00pm, Monday to Friday with resident permit holders excepted.

The road provides connectivity to/from Ormiston Avenue and Neutral Street via a two-way loop road onto Whaling Road and predominately services commercial traffic to/from the properties fronting Alfred Street North. The road also services residential traffic to properties to the north on Neutral Street and Bray Street and to the east on Ormiston Avenue and Neutral Street. The road is shown in Figure 2.4.

Figure 2.4: Little Alfred Street (looking north from Whaling Road)

2.2.3 Whaling Road

Within the immediate vicinity of the site, Whaling Road is an undivided two-way local road adjoining with Alfred Street North and Little Alfred Street in an east-west alignment. The road is configured with a road carriageway width of approximately 12.0m with two-hour kerbside parallel parking provided on both sides between 8:30am to 6:00pm, Monday to Friday with resident permit holders excepted. A posted speed limit of 50km/h is applicable.

The road predominately services residential traffic and commercial traffic associated from the site and functions as the only connection to the wider arterial network for surrounding properties via Alfred Street North. At the intersection with Alfred Street North, traffic is restricted to left-out only restrictions onto Alfred Street North, whereby traffic would continue onto High Street to travel onto Pacific Highway or the Warringah Freeway/Bradfield Highway.

The road is shown in Figure 2.5.

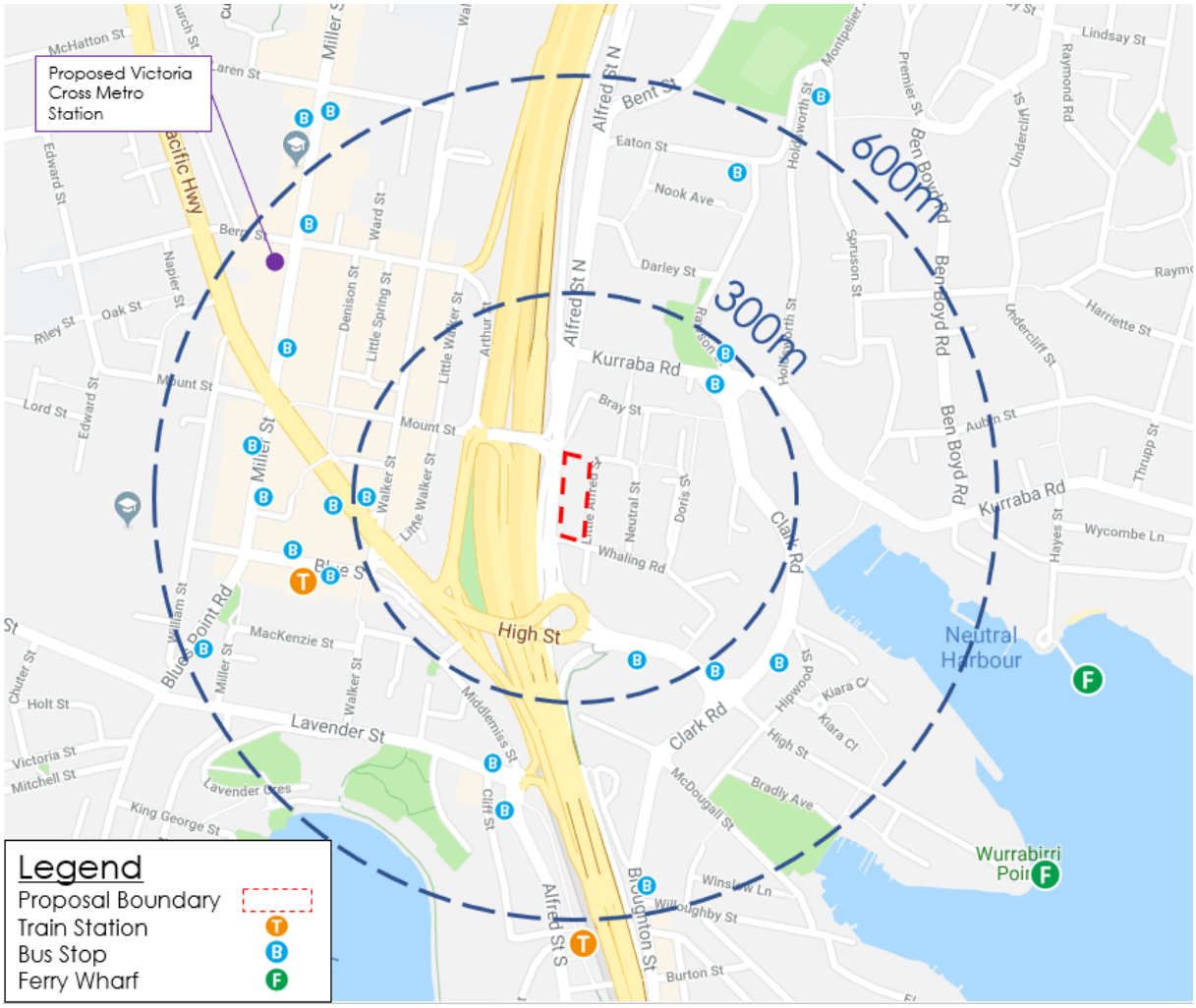
Figure 2.5: Whaling Road (looking west onto Alfred Street North)

2.3 Public Transport Facilities

High frequency public transport services are available at the North Sydney bus interchange and North Sydney Railway Station located approximately 400m west of the site. North Sydney Station provides frequent train services to Chatswood and Sydney CBD via the T1 North Shore Line. In addition to this, multiple bus services are accessible at the North Sydney bus interchange to various northern suburbs such as Cherrybrook, Epping, Ryde and Manly.

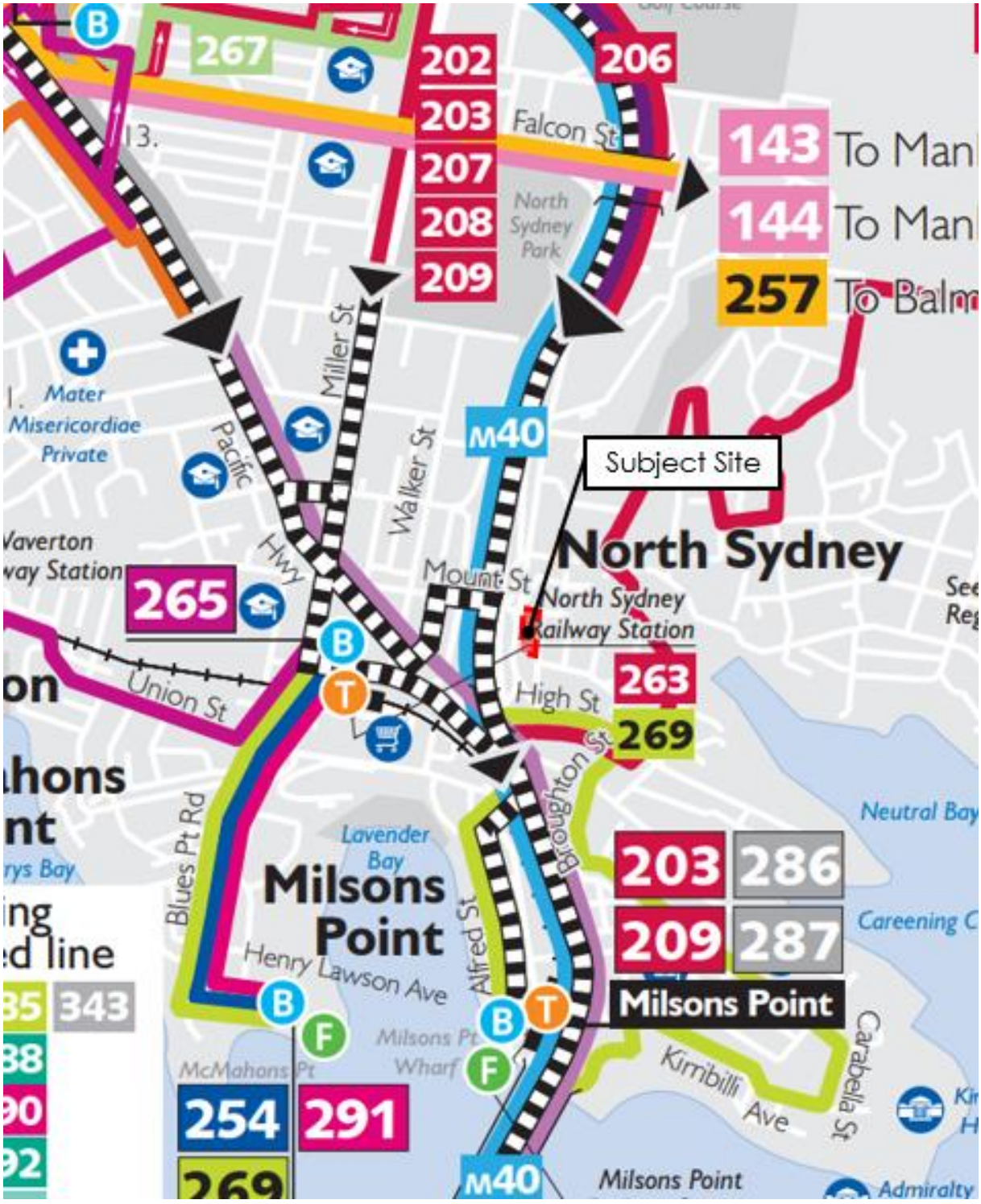
Figure 2.6 below shows the site proximity to existing public transport facilities, with a map of the existing facilities provided in Figure 2.7. It is also noted that the Neutral Bay wharf is located an approximate 15-minute walk from the site and that the location of the Victoria Cross Metro Station is indicative.

Figure 2.6: Site Proximity to Public Transport



Basemap Source: Google Maps Australia

Figure 2.7: Public Transport Map



Basemap Source: State Transit North Shore & West (accessed 30/01/19)

A summary of information on the public transport services in the site proximity is presented in Table 2.1.

Table 2.1: Public Transport Services

Service	Route	Route Description	Weekday Frequency	
			Peak	Off-peak
Rail	T1 North Shore Line	Berowra to City via Gordon	3-5 minutes	5-10 minutes
Bus	E50	Manly to Milsons Point	10-15 minutes	20-30 minutes
	E54	Mona Vale to Milsons Point	7-8 minutes	30-minutes
	M20	Botany to Gore Hill	8-10 minutes	15-minutes
	168	North Balgowah to Milsons Point	Limited Service	20-minutes
	173	Narraweena to Milsons Point	Limited Service	30-minutes
	209	East Lindfield to Milsons Point via North Sydney	15-20 minutes	Limited Service
	227	Mosman Junction to Milsons Point	15-minutes	30-minutes
	228	Clifton Gardens to Milsons Point	Limited Services	Limited Services
	229	Milsons Point to Beauty Point via Balmoral Heights	30-minutes	30-minutes
	230	Mosman Wharf to Milsons Point via North Sydney	5-15 minutes	30-minutes
	254	Riverview to McMahons Point	15-20 minutes	Hourly
	263	Crows Nest to City Bridge Street	16-20 minutes	40-minutes
	265	Lane Cove to North Sydney via Greenwich	30-minutes	Hourly
	269	McMahons Point to Milsons Point via North Sydney	Hourly	Hourly
	286	Denistone East to Milsons Point via St Leonards	30-minutes	Limited Services
	287	Ryde to Milsons Point via St Leonards	20-30 minutes	Limited Services
	291	Epping to McMahons Point	20-30 minutes	Hourly
	612X	Kellyville to Milsons Point	5-10 minutes	30-minutes
	622	Dural to Milsons Point via Cherrybrook	Limited Service	30-minutes
	653	West Pennant Hills to Milsons Point	Limited Service	30-minutes

Source: Transport for NSW (accessed 10/01/19)

2.4 Pedestrian and Cycle Infrastructure

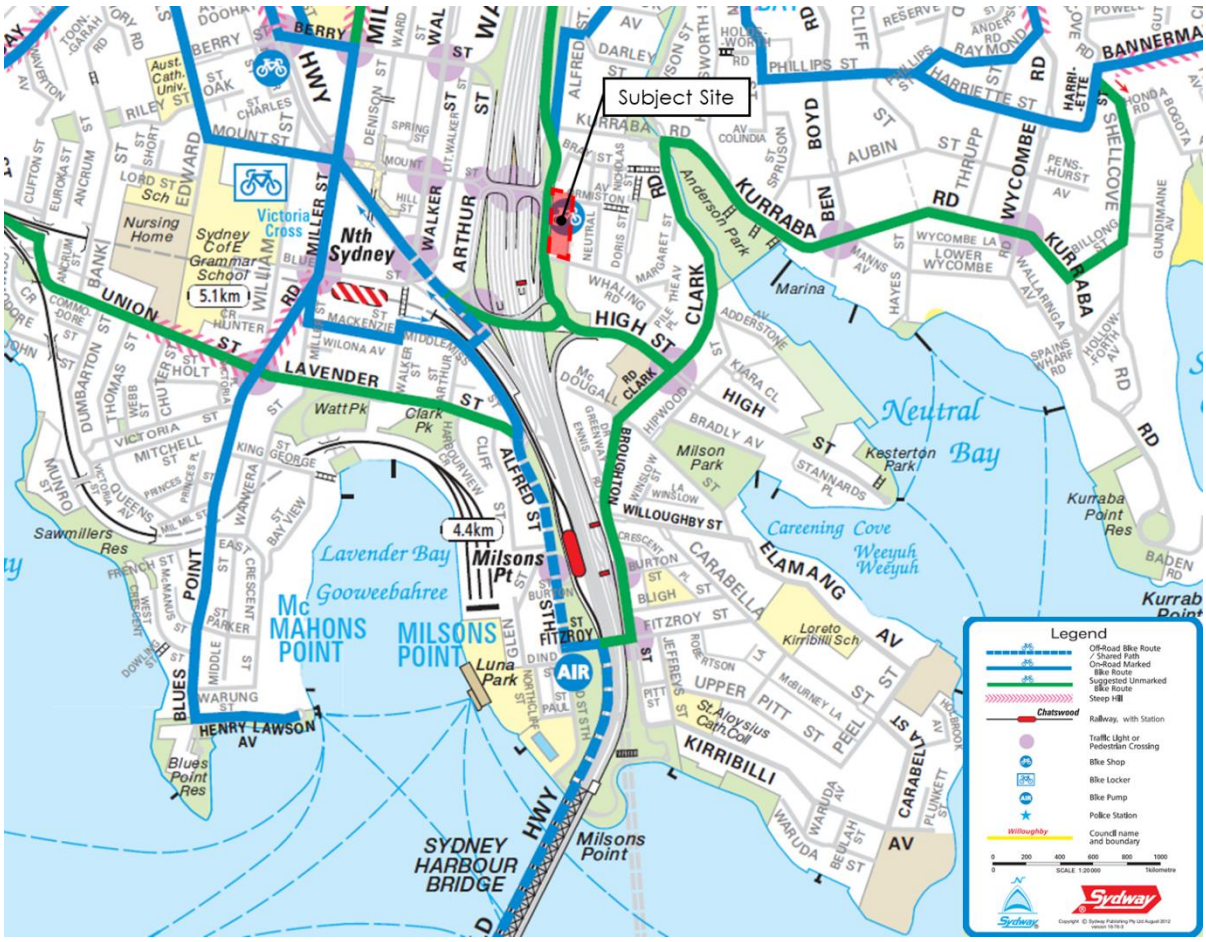
Well-established pedestrian facilities are provided within the vicinity of the site. Sealed footpaths are present on both sides of surrounding local roads. The exception to this is on Alfred Street North, where a sealed footpath is only provided on the east side of the road.

Pedestrian connectivity to the North Sydney CBD is available via the pedestrian footpath on the northern side of Alfred Street North-Mount Street overpass. Signalised and non-signalised pedestrian crossings at the Alfred Street North-Mount Street intersection offer safe accessibility to the overpass.

In addition to this, suggested unmarked cycle routes are present in the vicinity of the site along Alfred Street North and High Street. These routes provide linkages to on and off-road cycle paths, which provide good connectivity to nearby major town centres such as the North Sydney and Sydney CBD.

A map of existing cycle routes in the surrounding area is shown in Figure 2.8.

Figure 2.8: Surrounding Cycle Routes



Source: North Sydney Cycling Map

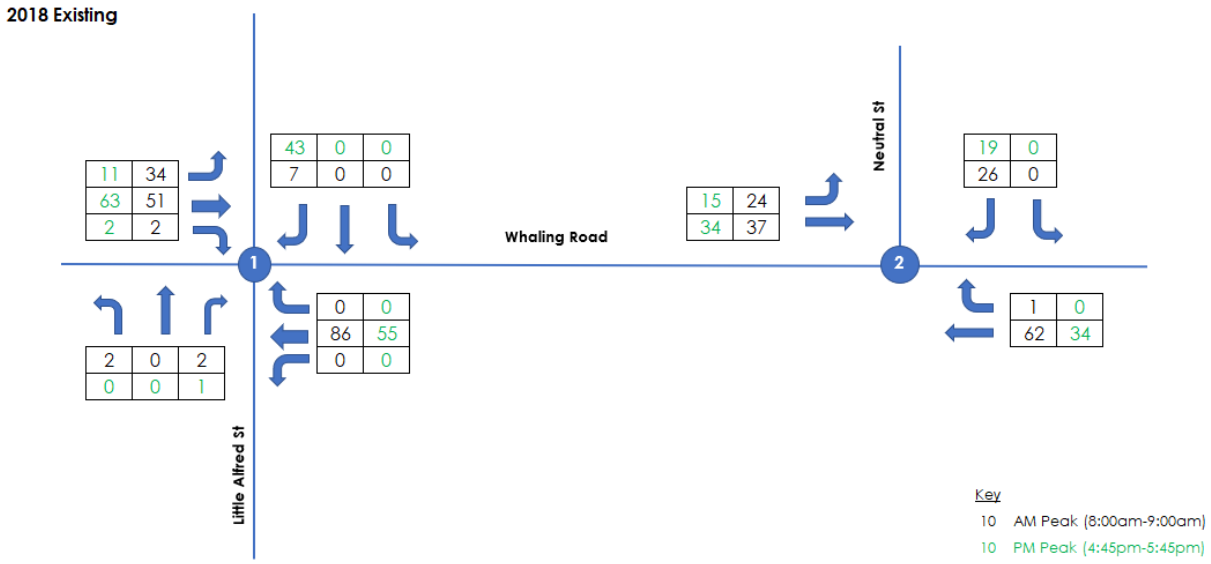
2.5 Traffic Volumes

TTPP commissioned traffic surveys on Thursday, 22 November 2018 between 7:30am and 9:30am and between 4:00pm and 6:00pm at the following intersections:

- Little Alfred Street-Whaling Road
- Neutral Street-Whaling Road.

Based on the traffic surveys, the network peak hour times were recorded between 8:00am and 9:00am (AM Peak) and between 4:45pm and 5:45pm (PM Peak). A summary of the network peak hour traffic volumes at the above nominated intersections is shown in Figure 2.9.

Figure 2.9: Existing Network Peak Hour Traffic Volumes



Based on site observations, the majority of traffic associated with the site travelled via Little Alfred Street to access the car parking areas to the rear of the site, rather than travelling via Neutral Street. It should also be noted that sufficient traffic gaps were generally observed on Alfred Street North due to the presence of the traffic signals at Alfred Street North and Mount Street. However, the existing 'Keep Clear' pavement marking on Alfred Street North also helped facilitate traffic movements from Alfred Street North into Whaling Road when southbound queues extended beyond Whaling Road.

The existing intersection performance at the above nominated intersections are further discussed in Section 5.

3 Proposed Development

3.1 Development Description

The proposed development accompanies a planning proposal seeking approval to rezone the site from B3 Commercial Core to B4 Mixed-Use zoning and increase the building height and FSR provisions.

At this stage, the proposed development is still evolving, and as such the apartment number and mix together with the non-residential floor areas are still being investigated. However, for traffic analytical purposes, the indicative development yields for the entire Alfred Street Precinct are as follows:

- 156 residential units (approx.)
- 1,200m^2 of retail floor space, comprising various low scale retail tenancies ranging from 30m^2 to 285m^2
- 8,927m^2 of commercial/office floor space.

The planning proposal has split the land rezoning site into four separate sites (Sites A, B, C and D) with different indicative yields, as shown in Table 3.1.

Table 3.1: Proposed Development Yields

Land Use	Indicative Development Yields (no. of units/GFA)			
	Site A	Site B	Site C	Site D
Residential	1,370m^2 GFA	7,370m^2 GFA	1,683m^2 GFA	4,076m^2 GFA
Studio	4	21	4	9
1 Bedroom	6	28	6	12
2-Bedroom	2	26	4	16
3-Bedroom	4	8	3	3
Sub-Total	**16**	**83**	**17**	**40**
Commercial/Retail				
Retail	342m^2 GFA	124 m^2 GFA	200m^2 GFA	534m^2 GFA
Commercial	933m^2 GFA	4,141m^2 GFA	1,275m^2 GFA	2,578m^2 GFA
Sub-Total	**1,275m^2 GFA**	**4,265m^2 GFA**	**1,475m^2 GFA**	**3,112m^2 GFA**

Whilst the above development yields are indicative only, it is not expected that the ultimate development mix would vary significantly from the above. Additionally, following the

approval of the planning proposal, separate development applications for the proposed sites would be submitted to Council for approval.

3.2 Proposed Pedestrian and Vehicle Access Arrangements

It is proposed to provide a through pedestrian site link between Alfred Street and Little Alfred Street. In addition to this, the main pedestrian access for each site will be provided from Alfred Street North. In terms of vehicle access, separate vehicle access points are proposed on Little Alfred Street to service the respective basement car parking and loading dock areas for each site. This is not dissimilar to existing vehicle access arrangements to/from the site.

The proposed indicative vehicle access locations are shown in Figure 3.1.

Figure 3.1: Proposed Indicative Vehicle Access Locations

Basemap Source: Grimshaw Architects

It is however proposed to amalgamate two existing vehicle accesses to/from Site D into one vehicle access to provide access to the basement car parking area. Further to this, access to the Site C basement car parking area is proposed to be provided via a car lift system due to the existing building constraints, i.e. available building footprint and car parking required for the site. The concept architectural layout plans are provided in Appendix A.

3.3 Loading Facilities

Based on the existing building constraints and topography surrounding the site, at this stage, it is proposed to provide on-site loading areas for Sites A and B and indented on-street kerbside loading areas for Sites C and D. These loading areas are expected to predominately cater for waste collection vehicles and occasional deliveries.

It is however expected that the existing loading zone on Alfred Street North would continue to service the site due to its proximity to the main road (where trucks travel to/from) in order to minimise truck movements along Little Alfred Street and Whaling Road.

4 Parking Assessment

4.1 Car Parking Requirement

4.1.1 North Sydney Development Control Plan

The parking assessment for this development has been assessed against Part B Section 10 (Car Parking and Transport) of the North Sydney Development Control Plan 2013 (DCP2013) and the North Sydney Local Environmental Plan 2013 (LEP2013).

It is noted that the DCP2013 stipulates a maximum car parking provision for the proposed development, to minimise the reliance on private car usage. A summary of the maximum allowable DCP2013 car parking provision for the site is provided in Table 4.1.

Table 4.1: Car Parking Requirement (DCP2013)

Unit Type	Indicative Development Yields (no. of units/GFA)				Maximum DCP2013 Car Parking Rate	Maximum Allowable DCP2013 Parking Provision			
	Site A	Site B	Site C	Site D		Site A	Site B	Site C	Site D
Residential									
Studio	4	21	4	9	0.5 car space per unit	2	10	2	4
1 Bedroom	6	28	6	12	0.5 car space per unit	3	14	3	6
2-Bedroom	2	26	4	16	1 car space per unit	2	26	4	16
3-Bedroom	4	8	3	3	1 car space per unit	4	8	3	3
Sub-Total	**16**	**83**	**17**	**40**		**11**	**58**	**12**	**29**
Commercial/Retail									
Retail	342m²	124 m²	200m²	534m²	1 space per 400m² GFA	0	0	0	1
Commercial	933m²	4,141m²	1,275m²	2,578m²	1 space per 400m² GFA	2	10	3	6
Sub-Total	**1,275m²**	**4,265m²**	**1,475m²**	**3,112m²**		**2**	**10**	**3**	**7**
Total						**13**	**68**	**15**	**36**

Table 4.1 indicates that each site would be permitted to provide a maximum of 13, 68, 15 and 36 car parking spaces for Sites A, B, C and D respectively, under the maximum parking rates stipulated in the DCP2013.

It is proposed to comply with the car parking requirements as set out in the DCP2013, however given the site's proximity to transport infrastructure, there may be an opportunity to

reduce car parking rates. In addition to this, appropriate allocation of accessible car parking spaces would be provided in accordance with DCP2013/Building Code of Australia parking requirements.

The car park and associated elements are proposed to be designed in accordance with the design requirements set out in the relevant Australian Standards for car parking facilities.

4.1.2 State Environmental Planning Policy No. 65 (SEPP 65)

In addition, it is noted that SEPP 65 states that a development application cannot be refused on car parking grounds "*if the car parking for the building will be equal to, or greater than, the recommended minimum amount of car parking specified in Part 3J of the Apartment Design Guide*".

More specifically, Part 3J of the Apartment Design Guide (ADG) states:

> *"For development...on sites that are within 800 metres of a railway station…the minimum car parking requirement for residents and visitors is set out in the Guide to Traffic Generating Developments, or the car parking requirement prescribed by the relevant council, whichever is less".*

It is noted that the subject site is located approximately 800m walking distance from North Sydney Railway Station. In this regard, a parking assessment adopting the parking requirements set out in the *Guide to Traffic Generating Developments* is presented in Table 4.2. It is noted that the parking requirements referred by the ADG relates to residential use only. As such, Table 4.2 continues to adopt DCP parking rates for non-residential uses.

Table 4.2: Development Parking Requirements - ADG Requirements

Unit Type	Indicative Development Yields (no. of units/GFA)				ADG Car Parking Rate	Minimum Parking Spaces			
	Site A	Site B	Site C	Site D		Site A	Site B	Site C	Site D
Residential									
Studio	4	21	4	9	0.4 car spaces per unit	2	8	2	4
1 Bedroom	6	28	6	12	0.4 car spaces per unit	2	11	2	5
2-Bedroom	2	26	4	16	0.7 car spaces per unit	1	18	3	11
3-Bedroom	4	8	3	3	1.2 car spaces per unit	5	10	4	4
Sub-Total	**16**	**83**	**17**	**40**		**10**	**37**	**11**	**24**

As such, the minimum residential parking requirements set out by the ADG are 10, 37, 11 and 24 spaces for sites A, B, C & D respectively. It proposed to comply with the minimum requirements of the ADG and maximum requirements of the DCP.

4.2 Bicycle Parking Requirement

The DCP2013 requires bicycle parking provision for occupants, visitors and customers of the proposed residential and commercial components of the development. It is noted that DCP2013 stipulates a minimum bicycle parking provision to encourage the use of bicycles as an environmentally beneficial form of transport and an alternative to the use of private motor vehicles. The bicycle parking assessment for the site is provided in Table 4.3.

Table 4.3: Bicycle Parking Requirement (DCP2013)

Unit Type	Indicative Development Yields (no. of units/GFA)				Minimum Bicycle Parking Rate	Minimum Parking Requirements			
	Site A	Site B	Site C	Site D		Site A	Site B	Site C	Site D
Residential									
Tenants	16	83	17	40	1 space per unit	16	83	17	40
Visitors					1 space per 10 units	2	9	2	4
Sub-Total						**18**	**92**	**19**	**44**
Commercial/Retail									
Tenants	**1,275m²**	**4,265m²**	**1,475m²**	**3,112m²**	1 space per 150m² GFA	9	29	10	21
Visitor/Customers					1 space per 400m² GFA	4	11	4	8
Sub-Total						**13**	**40**	**14**	**29**
Total						**31**	**132**	**33**	**73**

Based on Table 4.3, Sites A, B, C and D would require a total minimum of 31, 132, 33 and 73 bicycle parking spaces respectively. Additionally, the DCP2013 specifies Class 1 or 2 secure bicycle parking facilities are to be provided for tenants of the proposed dwelling and Class 3 facilities for visitors in accordance with AS2890.3. It is proposed to comply with these parking and design requirements.

4.3 Motorcycle Parking Requirement

The DCP2013 stipulates that a maximum motorcycle parking rate of 1 space per 10 car parking spaces for mixed use developments in a B4 Mixed-Use zoning. Using this metric, the motorcycle parking requirement for each site is summarised in Table 4.4.

Table 4.4: Motorcycle Parking Requirement (DCP2013)

Sites	Maximum DCP2013 Car Parking Spaces	Maximum DCP2013 Motorcycle Parking Spaces
Site A	13	1
Site B	68	6
Site C	15	1
Site D	36	3

It is proposed to satisfy the above parking requirements. The proposed motorcycle parking spaces are proposed to be designed in accordance with AS2890.1, with minimum dimensions of a 1.2m wide by 2.5m long parking space.

5 Traffic Assessment

Roads and Maritime Services (Roads and Maritime) provides traffic generation rates for different land uses in their Guide to Traffic Generating Developments (Guide), and in their technical direction TDT 2013/4a containing revised rates from the recent surveys conducted by Roads and Maritime.

These traffic generation rates have been used for the purposes of estimating the anticipated traffic impact of the proposed development, as well as understanding the existing traffic generation of the site. Subsequently, the net additional development traffic associated with the proposed development can be determined to appropriately assess the net traffic impacts relating to this planning proposal.

5.1 Existing Traffic Generation

As indicated previously, the existing site is currently occupied by some 33 residential flat dwellings at 263-269 Alfred Street North and 4 Little Alfred Street and three commercial office buildings at 271-273, 275 and 283 Alfred Street North. It is understood that the existing commercial office buildings permit an allowable maximum floor space of some 14,200m^2 GFA.

The TDT2013/04a stipulates traffic generation rates for residential flat dwellings and commercial office blocks as follows:

- Residential Flat Dwellings
  - 0.19 trips per dwelling per hour in the AM peak hour
  - 0.15 trips per dwelling per hour in the PM peak hour
- Commercial Office Blocks
  - 1.6 trips per 100m^2 gross floor area per hour in the AM peak hour
  - 1.2 trips per 100m^2 gross floor area per hour in the PM peak hour

Using the above metrics, a summary of the potential existing traffic generation of the site is presented in Table 5.1.

Table 5.1: Existing Traffic Generation Potential of the Site

Land Use	No. of Dwellings / GFA	Vehicle Trips per hour	
		AM Peak	PM Peak
Residential	33 units	6 trips	5 trips
Commercial/Office	14,200m^2	227 trips	170 trips
Total		**233 trips**	**175 trips**

Table 5.1 indicates that the current site could generate in the order of 233 and 175 trips in the AM and PM peak respectively.

5.2 Future Traffic Generation

Using the same trip rates for the proposed land uses as noted above, a summary of the traffic generation potential arising from the proposed development of the site is provided in Table 5.2. It is noted that the proposed retail use is expected to serve as an ancillary purpose such that patronage to these retail uses would primarily be generated by walk-in trips from local residents and workers in the area.

The retail uses would not be a destination for retail customers. Therefore, the proposed retail uses are not expected to generate any vehicle trips. However, for the purpose of estimating the traffic generation profile of the retail use, the Roads and Maritime suggested trip rate for commercial uses has been adopted. This approach is considered conservative.

Table 5.2: Proposed Development Traffic Generation Potential

Land Use	No. of Dwellings / GFA		
		AM Peak	PM Peak
Site A			
High density residential	16 units	3 trips	2 trips
Commercial/Retail	1,275m^2	20 trips	15 trips
Sub-Total		**23 trips**	**17 trips**
Site B			
High density residential	83 units	16 trips	12 trips
Commercial/Retail	4,265m^2	68 trips	51 trips
Sub-Total		**84 trips**	**63 trips**
Site C			
High density residential	17 units	3 trips	3 trips
Commercial/Retail	1,475m^2	24 trips	18 trips
Sub-Total		**27 trips**	**21 trips**
Site D			
High density residential	40 units	8 trips	6 trips
Commercial/Retail	3,112m^2	50 trips	37 trips

Land Use	No. of Dwellings / GFA		
		AM Peak	PM Peak
Sub-Total		**57 trips**	**43 trips**
Total (Site A + B + C + D)		**192 trips**	**145 trips**

Table 5.2 indicates that by adopting traffic rates, the proposal precinct is theoretically anticipated to generate some 192 and 145 two-way trips in the AM and PM peak hours respectively.

5.3 Net Traffic Generation

The net change in traffic generation between the existing potential and future land uses of the subject site are summarised in Table 5.3.

Table 5.3: Net Changes in Traffic Generation

Traffic Generation	AM Peak	PM Peak
Existing Traffic Generation	233	175
Future Traffic Generation	192	145
Net Change	**-41**	**-30**

Table 5.3 indicates that the proposed development could in theory result in a net reduction in traffic when compared to the existing potential traffic generation of the site. This is a result of the proposed development significantly reducing the commercial floor area onsite compared to existing conditions, which typically generate a higher rate of traffic than high density residential.

For the purpose of this traffic assessment, the existing development potential of the site has been excluded as part of this traffic assessment in order to provide a more rigorous traffic assessment, i.e. assuming the proposal would generate an additional 192 trips (AM) and 145 trips (PM) onto the surrounding road network. In reality, the proposal is expected to generate less than this as the existing site is currently occupied and therefore, already generates some traffic on the road network.

5.4 Traffic Distribution

The directional distribution and assignment of traffic generated by the proposed sites are based on the following assumptions:

- residential trips: 20% inbound / 80% outbound movements (AM Peak); 80% inbound / 20% outbound movements (PM Peak)

- commercial/retail trips: 80% inbound / 20% outbound movements (AM Peak); 20% inbound / 80% outbound movements (PM Peak)
- all vehicle access points within the precinct will be via Little Alfred Street
- all inbound and outbound traffic would approach/depart the site from Alfred Street North
- 90% of traffic generated by the proposed sites will use Little Alfred Street-Whaling Road intersection
- 10% of traffic generated by the proposed sites will use Neutral Street-Whaling Road intersection.

In addition, annual background traffic growth was not considered as part of the traffic modelling analysis as the existing land uses east of the site are low density residential dwellings, which are not expected to be rezoned to significant land uses in the future. Therefore, the main future traffic generator in the area is expected to be from the Alfred Precinct site, which has been accounted for in our assessment.

5.5 Traffic Modelling Scenarios

The following modelling scenarios have been undertaken to provide an analysis of the potential traffic impact of the proposed development on the surrounding road network:

- **Scenario 1 (S1): Existing Base Case** – This scenario includes the current performance of the road network using the surveyed traffic flows shown in Figure 2.9
- **Scenario 2 (S2): Proposed Development Case** – this scenario includes the S1 traffic and the development traffic associated with the proposed development sites as outlined in Table 5.2.

5.6 Traffic Volumes

The 2018 existing base case traffic and anticipated development traffic in the AM and PM peak hours are presented in Figure 5.1 and Figure 5.2 respectively. The numbers shown in green are the additional traffic associated with the rezoned precinct and the number shown in black are the existing surveyed volumes.

As indicated previously, the traffic generated by the existing buildings within the site are included in the traffic modelling as a conservative measure to assess the traffic implications arising from the proposal.

Figure 5.1: S2 Traffic Volumes (AM Peak)

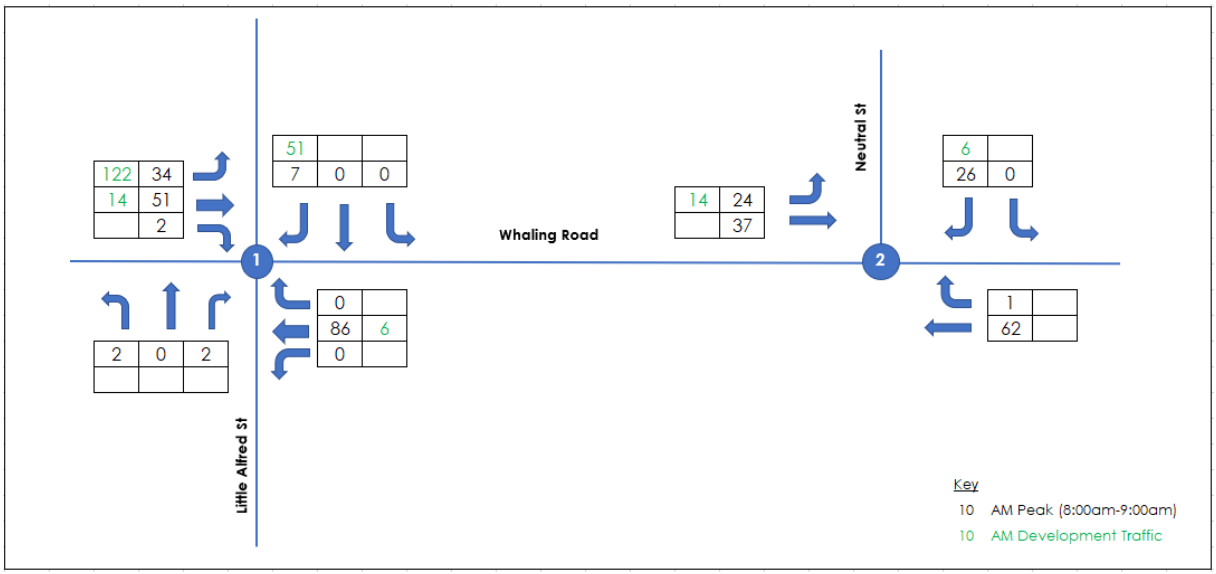
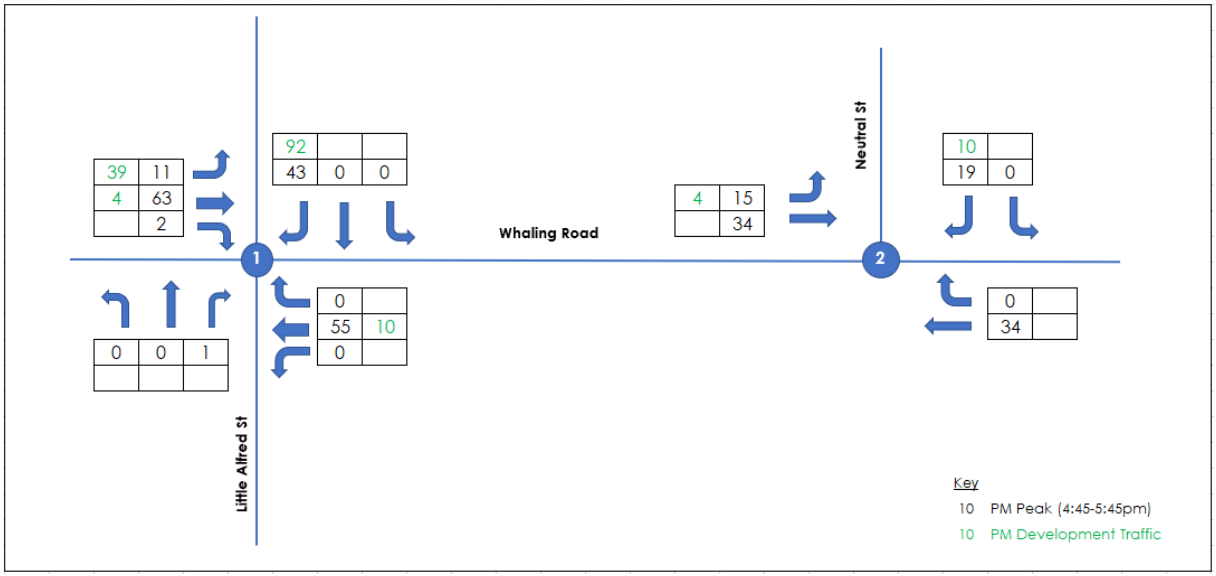


Figure 5.2: S2 Traffic Volumes (PM Peak)



5.7 Intersection Capacity Assessment

The traffic effects of the proposal on the surrounding intersections have been assessed using SIDRA INTERSECTION 8.0, a computer based traffic modelling package which assesses intersection performance under prevailing traffic conditions.

The SIDRA modelling software was used for the following intersections:

- Little Alfred Street-Whaling Road
- Neutral Street-Whaling Road

It is noted that the proposed development traffic is not expected to adversely impact on the existing Alfred Street North-Whaling Road intersection as sufficient traffic gaps are provided on Alfred Street North due to the presence of the traffic signals at Mount Street and Alfred Street North and existing geometry of the road – i.e. one way southbound on Alfred Street North such that left-turn and right-turn movements into Whaling Road can easily be accommodated on the road. Therefore, the Alfred Street North-Whaling Road intersection has been excluded as part of this intersection capacity assessment.

Intersection configurations were sourced from aerial imagery and the traffic conditions were calibrated to the conditions observed during the traffic surveys.

The SIDRA modelling determines the intersection capacity based on the level of service (LoS). LoS is a basic performance parameter used to describe the operation of an intersection. Levels of service indicators range from A (indicating good intersection operation) to F (indicating over-saturated conditions with long delays and queues).

At priority controlled (give-way and stop controlled) and roundabout intersection, the LoS is based on the modelled delay (seconds per vehicle) for the most delayed movement (refer to Table 5.4).

Table 5.4: Level of Service for Intersection Operation

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

Souce: Roads and Maritime Guide to Traffic Generating Developments, 2002

Based on the traffic volumes in Sections 2.5 and 5.6, a summary of the SIDRA network modelling results for each scenario is presented in Table 5.5. The full movement summaries are provided in Appendix B.

Table 5.5: Intersection Operation Results

Scenario	Intersection	AM Peak			PM Peak		
		95th Percentile Queue (m)	Ave. Delay (sec/veh)	Level of Service (LoS)	95th Percentile Queue (m)	Ave. Delay (sec/veh)	Level of Service (LoS)
S1 Existing Base Case (No Dev)	Little Alfred St-Whaling Rd	0	6	A	1	6	A
	Neutral St-Whaling Rd	1	6	A	1	6	A
S2 Proposed Development Case (With Dev)	Little Alfred St-Whaling Rd	2	7	A	4	6	A
	Neutral St-Whaling Rd	1	6	A	1	6	A

Based on Table 5.5, the additional traffic from the proposal would increase the average delay of the right turn movement from Little Alfred Street (north leg) to Whaling Road (west leg) from 6 to 7 seconds in the AM peak. The intersection, however, would continue to operate at LoS A during peak periods with the proposed development traffic.

As such, the proposal is not expected to result in any noticeable traffic impacts on the surrounding road network and therefore, no mitigation measures are required as the proposed development traffic can be satisfactorily accommodated on the existing road network.

6 Conclusion

This report accompanies a planning proposal seeking approval to rezone the Alfred Street precinct from B3 Business Core to B4 Mixed-Use and increase the FSR and height. The planning proposal relates to four separate mixed-use buildings at 263-275 Alfred Street North and 283 Alfred Street North, North Sydney.

The salient findings of this report are presented below.

- The planning proposal has split the land rezoning site into four separate sites (Sites A, B, C and D) with different indicative yields.
- Separate vehicular access to each site would be provided from Little Alfred Street.
- The maximum car parking spaces required for each site in accordance with North Sydney DCP2013 are as follows:
  - Site A is required to provide a maximum of 13 car parking spaces including 11 residential tenant parking spaces and 2 commercial/retail parking spaces.
  - Site B is required to provide a maximum of 68 car parking spaces including 58 residential tenant parking spaces and 10 commercial/retail parking spaces.
  - Site C is required to provide a maximum of 15 car parking spaces including 12 residential tenant parking spaces and 3 commercial/retail parking spaces.
  - Site D is required to provide a maximum of 36 car parking spaces including 29 residential tenant parking spaces and 7 commercial/retail parking spaces.
- A minimum of 31, 132, 33 and 73 bicycle parking spaces are to be provided in Sites A, B, C and D respectively in accordance with North Sydney DCP2013.
- A maximum of 1, 8, 1 and 3 motorcycle parking spaces are to be provided in Sites A, B, C and D respectively in accordance with North Sydney DCP2013.
- Based on the existing site controls, the existing site potential is estimated to be able to generate some 233vph (AM) and 175vph (PM).
- The proposal has been estimated to generate 192vph (AM) and 145vph (PM).
- The full development traffic has been assessed with no deductions of the existing site traffic to ensure a more rigorous traffic assessment for the purpose of the planning proposal.
- The traffic modelling results indicate there would be a minor increase in average delays and queues to the Little Alfred Street-Whaling Road and Neutral Street-Whaling Road intersections as a result of the proposed development. However, the modelled intersections would continue to operate well at LoS A during both peak periods.

As such, the proposal is not expected to result in any significant traffic impacts on the surrounding road network and therefore, is considered acceptable from a traffic perspective.

Appendix A

Concept Layout Plans

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NORTH

SCALE

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LEVEL B2

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Author	**Checker**	**Approver**

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LOWER GROUND

DRAWN	CHECKED	AUTHORISED
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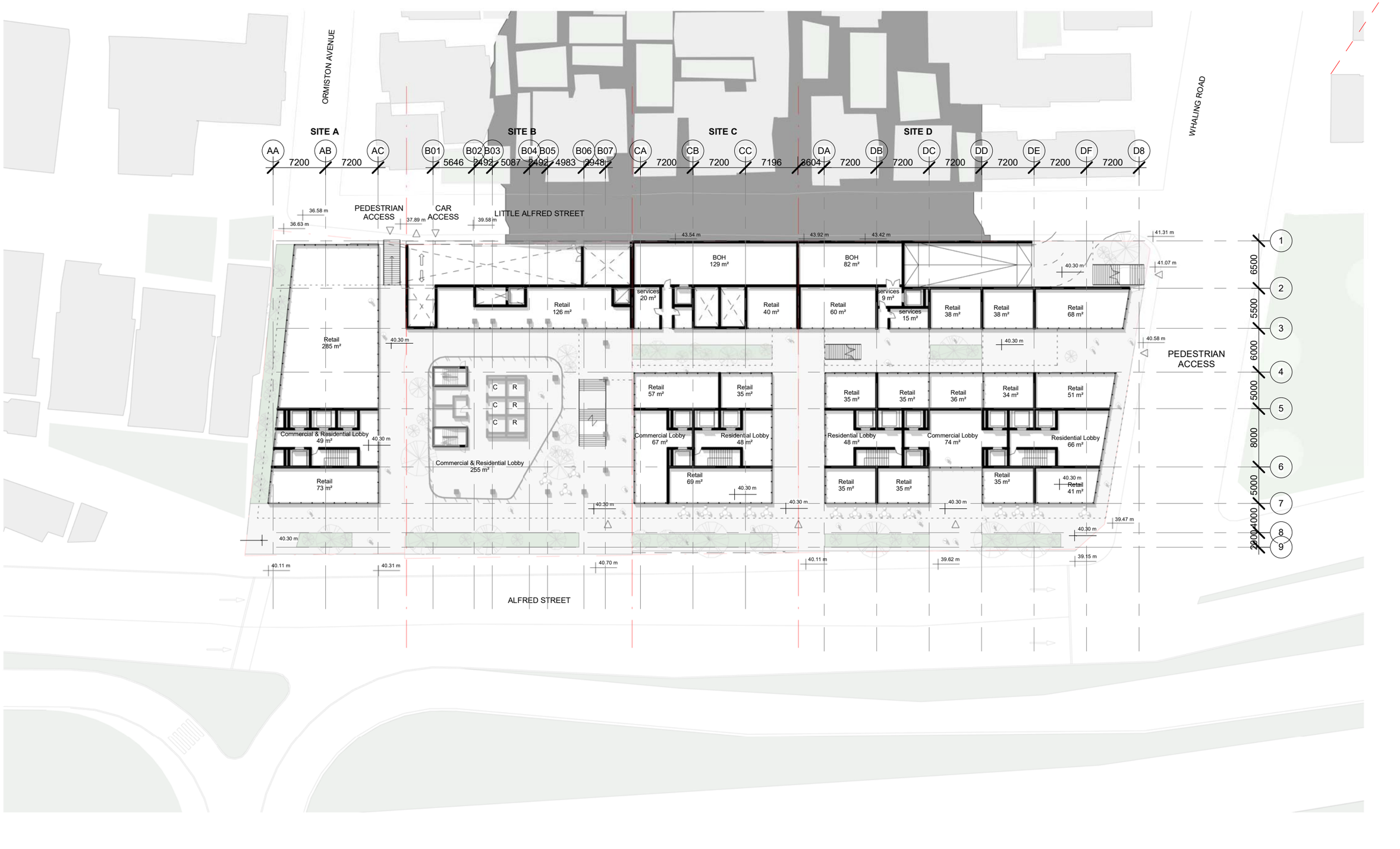

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GROUND FLOOR - PODIUM RETAIL

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Appendix B

SIDRA Results

MOVEMENT SUMMARY

Site: 101v [2018 Existing - AM Peak - Whaling Road/Little Alfred Street]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Little Alfred Street												
1	L2	2	0.0	0.004	5.8	LOS A	0.0	0.1	0.20	0.54	0.20	53.3
2	T1	1	0.0	0.004	4.8	LOS A	0.0	0.1	0.20	0.54	0.20	53.4
3	R2	2	0.0	0.004	6.1	LOS A	0.0	0.1	0.20	0.54	0.20	52.7
Approach		5	0.0	0.004	5.7	LOS A	0.0	0.1	0.20	0.54	0.20	53.1
East: Whaling Road												
4	L2	1	0.0	0.048	5.7	LOS A	0.0	0.1	0.01	0.01	0.01	58.2
5	T1	91	1.0	0.048	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	59.8
6	R2	1	0.0	0.048	5.7	LOS A	0.0	0.1	0.01	0.01	0.01	57.6
Approach		93	1.0	0.048	0.1	NA	0.0	0.1	0.01	0.01	0.01	59.8
North: Little Alfred Street												
7	L2	1	0.0	0.009	5.7	LOS A	0.0	0.2	0.21	0.56	0.21	53.2
8	T1	1	0.0	0.009	4.7	LOS A	0.0	0.2	0.21	0.56	0.21	53.3
9	R2	7	0.0	0.009	6.2	LOS A	0.0	0.2	0.21	0.56	0.21	52.6
Approach		9	0.0	0.009	6.0	LOS A	0.0	0.2	0.21	0.56	0.21	52.8
West: Whaling Road												
10	L2	36	0.0	0.048	5.6	LOS A	0.0	0.1	0.01	0.24	0.01	56.2
11	T1	54	1.0	0.048	0.0	LOS A	0.0	0.1	0.01	0.24	0.01	57.8
12	R2	2	0.0	0.048	5.7	LOS A	0.0	0.1	0.01	0.24	0.01	55.7
Approach		92	0.6	0.048	2.3	NA	0.0	0.1	0.01	0.24	0.01	57.1
All Vehicles		199	0.7	0.048	1.6	NA	0.0	0.2	0.02	0.16	0.02	58.0

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

MOVEMENT SUMMARY

Site: 101 [2018 Existing - AM Peak - Whaling Road/Neutral Street]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Whaling Road												
5	T1	65	1.0	0.033	0.0	LOS A	0.0	0.0	0.01	0.01	0.01	59.9
6	R2	1	0.0	0.033	5.7	LOS A	0.0	0.0	0.01	0.01	0.01	57.9
Approach		66	1.0	0.033	0.1	NA	0.0	0.0	0.01	0.01	0.01	59.9
North: Neutral Street												
7	L2	1	0.0	0.024	5.6	LOS A	0.1	0.5	0.18	0.56	0.18	53.1
9	R2	27	0.0	0.024	5.9	LOS A	0.1	0.5	0.18	0.56	0.18	52.8
Approach		28	0.0	0.024	5.9	LOS A	0.1	0.5	0.18	0.56	0.18	52.8
West: Whaling Road												
10	L2	25	0.0	0.033	5.5	LOS A	0.0	0.0	0.00	0.23	0.00	56.4
11	T1	39	1.0	0.033	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	57.9
Approach		64	0.6	0.033	2.2	NA	0.0	0.0	0.00	0.23	0.00	57.3
All Vehicles		159	0.7	0.033	2.0	NA	0.1	0.5	0.03	0.20	0.03	57.5

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

MOVEMENT SUMMARY

Site: 101v [2018 Existing - PM Peak - Whaling Road/Little Alfred Street]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Little Alfred Street												
1	L2	1	0.0	0.003	5.7	LOS A	0.0	0.1	0.17	0.53	0.17	53.5
2	T1	1	0.0	0.003	4.6	LOS A	0.0	0.1	0.17	0.53	0.17	53.7
3	R2	1	0.0	0.003	6.0	LOS A	0.0	0.1	0.17	0.53	0.17	53.0
Approach		3	0.0	0.003	5.4	LOS A	0.0	0.1	0.17	0.53	0.17	53.4
East: Whaling Road												
4	L2	1	0.0	0.031	5.7	LOS A	0.0	0.1	0.01	0.02	0.01	58.1
5	T1	58	1.0	0.031	0.0	LOS A	0.0	0.1	0.01	0.02	0.01	59.8
6	R2	1	0.0	0.031	5.7	LOS A	0.0	0.1	0.01	0.02	0.01	57.5
Approach		60	1.0	0.031	0.2	NA	0.0	0.1	0.01	0.02	0.01	59.7
North: Little Alfred Street												
7	L2	1	0.0	0.048	5.7	LOS A	0.2	1.1	0.23	0.58	0.23	53.1
8	T1	1	0.0	0.048	4.6	LOS A	0.2	1.1	0.23	0.58	0.23	53.2
9	R2	45	0.0	0.048	6.1	LOS A	0.2	1.1	0.23	0.58	0.23	52.5
Approach		47	0.0	0.048	6.0	LOS A	0.2	1.1	0.23	0.58	0.23	52.6
West: Whaling Road												
10	L2	12	0.0	0.042	5.6	LOS A	0.0	0.1	0.01	0.10	0.01	57.4
11	T1	66	1.0	0.042	0.0	LOS A	0.0	0.1	0.01	0.10	0.01	59.0
12	R2	2	0.0	0.042	5.6	LOS A	0.0	0.1	0.01	0.10	0.01	56.8
Approach		80	0.8	0.042	1.0	NA	0.0	0.1	0.01	0.10	0.01	58.7
All Vehicles		191	0.7	0.048	2.1	NA	0.2	1.1	0.07	0.20	0.07	57.3

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

MOVEMENT SUMMARY

Site: 101 [2018 Existing - PM Peak - Whaling Road/Neutral Street]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Whaling Road												
5	T1	36	1.0	0.018	0.0	LOS A	0.0	0.0	0.01	0.02	0.01	59.8
6	R2	1	0.0	0.018	5.6	LOS A	0.0	0.0	0.01	0.02	0.01	57.8
Approach		37	1.0	0.018	0.2	NA	0.0	0.0	0.01	0.02	0.01	59.7
North: Neutral Street												
7	L2	1	0.0	0.017	5.6	LOS A	0.1	0.4	0.14	0.56	0.14	53.2
9	R2	20	0.0	0.017	5.7	LOS A	0.1	0.4	0.14	0.56	0.14	52.9
Approach		21	0.0	0.017	5.7	LOS A	0.1	0.4	0.14	0.56	0.14	52.9
West: Whaling Road												
10	L2	16	0.0	0.026	5.5	LOS A	0.0	0.0	0.00	0.18	0.00	56.8
11	T1	36	1.0	0.026	0.0	LOS A	0.0	0.0	0.00	0.18	0.00	58.4
Approach		52	0.7	0.026	1.7	NA	0.0	0.0	0.00	0.18	0.00	57.9
All Vehicles		109	0.7	0.026	2.0	NA	0.1	0.4	0.03	0.20	0.03	57.4

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

MOVEMENT SUMMARY

Site: 101v [Dev+Existing - AM Peak - Whaling Road/Little Alfred Street]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Little Alfred Street												
1	L2	2	0.0	0.005	5.8	LOS A	0.0	0.1	0.22	0.54	0.22	53.2
2	T1	1	0.0	0.005	5.4	LOS A	0.0	0.1	0.22	0.54	0.22	53.4
3	R2	2	0.0	0.005	6.2	LOS A	0.0	0.1	0.22	0.54	0.22	52.7
Approach		5	0.0	0.005	5.9	LOS A	0.0	0.1	0.22	0.54	0.22	53.0
East: Whaling Road												
4	L2	1	0.0	0.051	5.9	LOS A	0.0	0.1	0.01	0.01	0.01	58.2
5	T1	97	1.0	0.051	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	59.8
6	R2	1	0.0	0.051	6.2	LOS A	0.0	0.1	0.01	0.01	0.01	57.6
Approach		99	1.0	0.051	0.1	NA	0.0	0.1	0.01	0.01	0.01	59.8
North: Little Alfred Street												
7	L2	1	0.0	0.072	5.7	LOS A	0.2	1.7	0.32	0.63	0.32	52.7
8	T1	1	0.0	0.072	5.2	LOS A	0.2	1.7	0.32	0.63	0.32	52.9
9	R2	61	0.0	0.072	6.7	LOS A	0.2	1.7	0.32	0.63	0.32	52.2
Approach		63	0.0	0.072	6.7	LOS A	0.2	1.7	0.32	0.63	0.32	52.2
West: Whaling Road												
10	L2	164	0.0	0.125	5.5	LOS A	0.0	0.1	0.01	0.41	0.01	54.9
11	T1	68	1.0	0.125	0.0	LOS A	0.0	0.1	0.01	0.41	0.01	56.3
12	R2	2	0.0	0.125	5.8	LOS A	0.0	0.1	0.01	0.41	0.01	54.3
Approach		235	0.3	0.125	3.9	NA	0.0	0.1	0.01	0.41	0.01	55.3
All Vehicles		402	0.4	0.125	3.5	NA	0.2	1.7	0.06	0.35	0.06	55.8

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

MOVEMENT SUMMARY

Site: 101 [Dev+Existing - AM Peak - Whaling Road/Neutral Street]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Whaling Road												
5	T1	65	1.0	0.033	0.0	LOS A	0.0	0.0	0.01	0.01	0.01	59.9
6	R2	1	0.0	0.033	5.7	LOS A	0.0	0.0	0.01	0.01	0.01	57.9
Approach		66	1.0	0.033	0.1	NA	0.0	0.0	0.01	0.01	0.01	59.9
North: Neutral Street												
7	L2	1	0.0	0.030	5.6	LOS A	0.1	0.7	0.19	0.56	0.19	53.1
9	R2	34	0.0	0.030	5.9	LOS A	0.1	0.7	0.19	0.56	0.19	52.8
Approach		35	0.0	0.030	5.9	LOS A	0.1	0.7	0.19	0.56	0.19	52.8
West: Whaling Road												
10	L2	40	0.0	0.040	5.5	LOS A	0.0	0.0	0.00	0.30	0.00	55.8
11	T1	39	1.0	0.040	0.0	LOS A	0.0	0.0	0.00	0.30	0.00	57.3
Approach		79	0.5	0.040	2.8	NA	0.0	0.0	0.00	0.30	0.00	56.6
All Vehicles		180	0.6	0.040	2.4	NA	0.1	0.7	0.04	0.24	0.04	56.9

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

MOVEMENT SUMMARY

Site: 101v [Dev+Existing - PM Peak - Whaling Road/Little Alfred Street]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Little Alfred Street												
1	L2	1	0.0	0.003	5.7	LOS A	0.0	0.1	0.19	0.53	0.19	53.4
2	T1	1	0.0	0.003	4.8	LOS A	0.0	0.1	0.19	0.53	0.19	53.6
3	R2	1	0.0	0.003	6.1	LOS A	0.0	0.1	0.19	0.53	0.19	52.9
Approach		3	0.0	0.003	5.5	LOS A	0.0	0.1	0.19	0.53	0.19	53.3
East: Whaling Road												
4	L2	1	0.0	0.037	5.7	LOS A	0.0	0.1	0.01	0.02	0.01	58.2
5	T1	68	1.0	0.037	0.0	LOS A	0.0	0.1	0.01	0.02	0.01	59.8
6	R2	1	0.0	0.037	5.8	LOS A	0.0	0.1	0.01	0.02	0.01	57.5
Approach		71	1.0	0.037	0.2	NA	0.0	0.1	0.01	0.02	0.01	59.7
North: Little Alfred Street												
7	L2	1	0.0	0.151	5.8	LOS A	0.5	3.8	0.28	0.61	0.28	52.9
8	T1	1	0.0	0.151	4.9	LOS A	0.5	3.8	0.28	0.61	0.28	53.0
9	R2	142	0.0	0.151	6.4	LOS A	0.5	3.8	0.28	0.61	0.28	52.4
Approach		144	0.0	0.151	6.3	LOS A	0.5	3.8	0.28	0.61	0.28	52.4
West: Whaling Road												
10	L2	53	0.0	0.066	5.6	LOS A	0.0	0.1	0.01	0.26	0.01	56.1
11	T1	71	1.0	0.066	0.0	LOS A	0.0	0.1	0.01	0.26	0.01	57.7
12	R2	2	0.0	0.066	5.7	LOS A	0.0	0.1	0.01	0.26	0.01	55.6
Approach		125	0.6	0.066	2.4	NA	0.0	0.1	0.01	0.26	0.01	57.0
All Vehicles		343	0.4	0.151	3.6	NA	0.5	3.8	0.13	0.36	0.13	55.4

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

MOVEMENT SUMMARY

Site: 101 [Dev+Existing - PM Peak - Whaling Road/Neutral Street]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Whaling Road												
5	T1	36	1.0	0.018	0.0	LOS A	0.0	0.0	0.01	0.02	0.01	59.8
6	R2	1	0.0	0.018	5.6	LOS A	0.0	0.0	0.01	0.02	0.01	57.8
Approach		37	1.0	0.018	0.2	NA	0.0	0.0	0.01	0.02	0.01	59.7
North: Neutral Street												
7	L2	1	0.0	0.026	5.6	LOS A	0.1	0.6	0.15	0.56	0.15	53.2
9	R2	31	0.0	0.026	5.8	LOS A	0.1	0.6	0.15	0.56	0.15	52.9
Approach		32	0.0	0.026	5.8	LOS A	0.1	0.6	0.15	0.56	0.15	52.9
West: Whaling Road												
10	L2	20	0.0	0.028	5.5	LOS A	0.0	0.0	0.00	0.21	0.00	56.6
11	T1	36	1.0	0.028	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	58.1
Approach		56	0.6	0.028	2.0	NA	0.0	0.0	0.00	0.21	0.00	57.5
All Vehicles		124	0.6	0.028	2.4	NA	0.1	0.6	0.04	0.24	0.04	56.9

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

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