Appendix 14:

Transport Impact Assessment prepared by GTA January 2018

11-13 Chesham Street, St Marys
Planning Proposal
Transport Impact Assessment

Client // Penrith City Council
Office // NSW
Reference // N139510
Date // 22/01/18

11-13 Chesham Street, St Marys

Planning Proposal

Transport Impact Assessment

Issue: A 22/01/18

Client: Penrith City Council
Reference: N139510
GTA Consultants Office: NSW

Quality Record

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

1.1 Background

Penrith City Council (Council) is lodging a planning proposal to reclassify 5,758 square metre of land located at 11-13 Chesham Street, St Marys from community land R4 High Density Residential to operational land. The reclassification would allow the site to be developed, with an expected yield of approximately 100 apartments.

Council engaged GTA Consultants (GTA) in November 2017 to complete a transport impact assessment which assesses the impacts of the planning proposal.

1.2 Purpose of this Report

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

i Existing traffic and parking conditions surrounding the site
ii Parking requirements for the development
iii Service vehicle requirements
iv Pedestrian and bicycle requirements
v The traffic generating characteristics of the proposed development
vi Suitability of the proposed access arrangements for the site
vii 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 in November 2017
- Penrith City Council Development Control Plan (DCP) 2014
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Traffic and car parking surveys completed by Matrix Traffic and Transport Data in November 2017, as referenced in the context of this report
- Concept design plans for the proposed development prepared by Group GSA, dated March 2017
- Other documents and data as referenced in this report.

2. Existing Conditions

2.1 Site Location

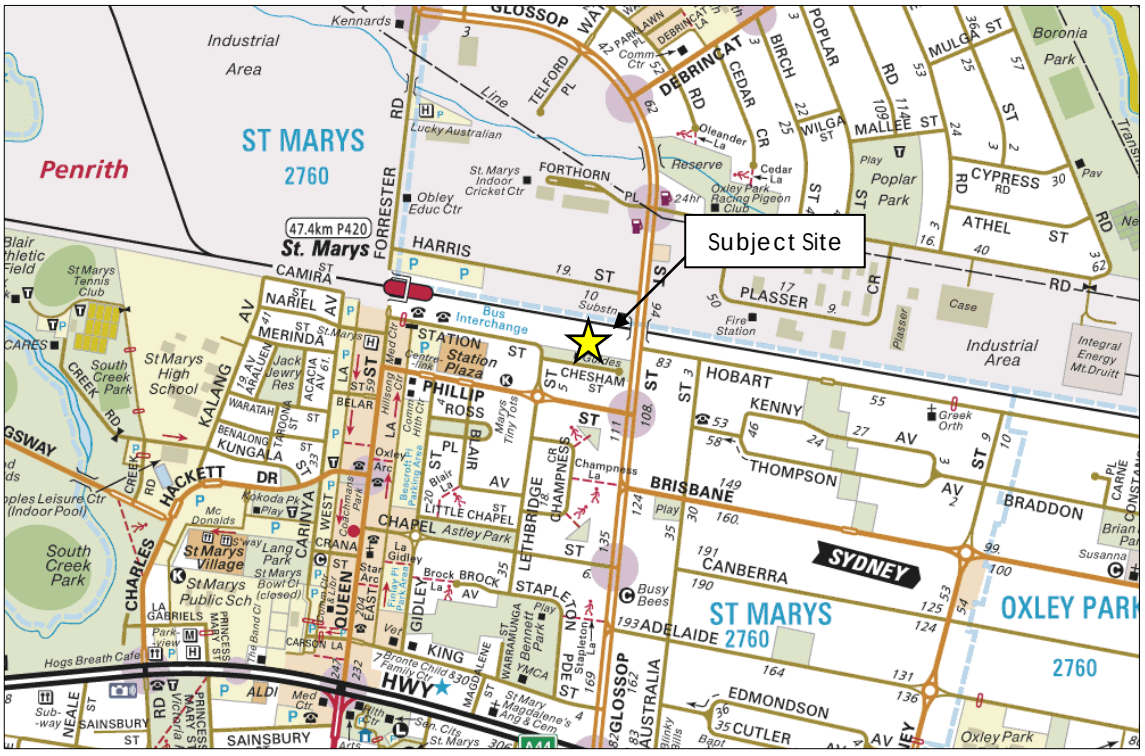
The subject site is located at 11-13 Chesham Street, St Marys (Lot 3 of DP542707 and Lot 21 of DP36191) and is currently classified as R4 High Density Residential.

The site is located approximately 350 metres east of St Marys Railway Station and less than one kilometre north of the Great Western Highway. The site is currently used as community open space. It is bounded by the railway line to the north, Glossop Street to the east, Chesham Street to the south and Lethbridge Street to the west.

Land uses surrounding the site include medium and low density residential properties, as well as the St Marys Station Plaza and other retail and community land uses located to the west of the site.

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

Figure 2.1: Subject site and its environs



Basemap source: Sydway

2.2 Road Network

2.2.1 Adjoining Roads

Glossop Street

Glossop Street is classified as a regional road and is generally aligned in the north-south direction and aligning the eastern boundary of the site. It has a 20-metre-wide separated carriageway with two lanes of traffic in each direction.

Glossop Street has a speed limit of 60 kilometres per hour with no kerbside parking permitted on either side.

Glossop Street is shown in Figure 2.2.

Figure 2.2: Glossop Street (looking south)

Chesham Street

Chesham Street is a local road aligned in an east-west direction and is located south of the site and has a cul-de-sac at its eastern end. It has a seven-metre wide, two-lane carriageway with kerbside parking permitted on both sides.

Chesham Street has a speed limit of 50 kilometres per hour and is shown in Figure 2.3 and Figure 2.4.

Figure 2.3: Chesham Street (looking east)

Figure 2.4: Chesham Street (looking west)

Lethbridge Street

Lethbridge Street is a local road aligned in a north-south direction and located west of the site. It has a nine-metre wide, two-lane carriageway with kerbside parking generally permitted on both sides. Lethbridge intersects with Station Street adjacent to the site.

Lethbridge Street has a speed limit of 50 kilometres per hour and is shown in Figure 2.5.

Figure 2.5: Lethbridge Street (looking south)

Station Street

Station Street is a local road aligned in an east-west direction located west of the site. It is a 13-metre-wide, two-lane carriageway with kerbside parking generally permitted on both sides. Station Street has a speed limit of 40 kilometres per hour and provides access to the St Marys Railway Station.

Phillip Street

Phillip Street is a local road aligned in an east-west direction located south of the site. It is a 12-metre wide, two-lane carriageway with kerbside parking permitted on both sides. Station Street has a speed limit of 50 kilometres per hour and provides a connection to Glossop Street.

2.2.2 Surrounding Intersections

The following intersections currently exist near the site:

- Chesham Street/ Lethbridge Street (priority controlled)
- Lethbridge Street/ Station Street (bend/ priority controlled)
- Lethbridge Street/ Phillip Street (roundabout)
- Glossop Street/ Phillip Street (signalised).

2.3 Traffic Volumes

The majority of the intersections located near the site are priority controlled and carry reasonably low traffic volumes, given the local road network context.

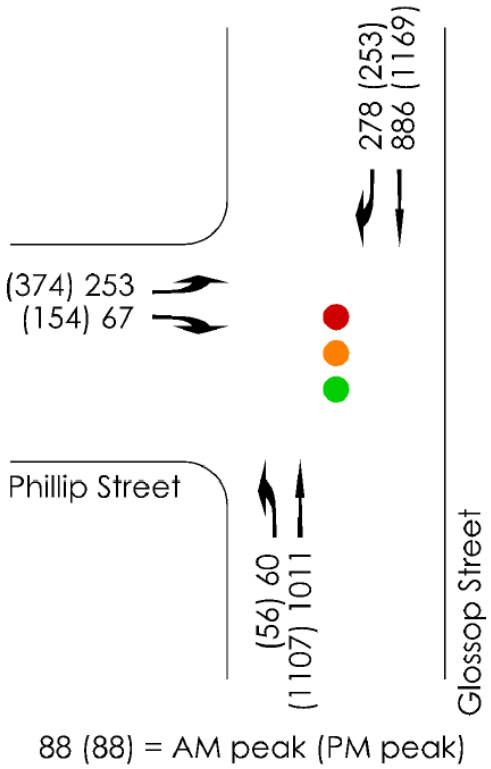
The intersection of Glossop Street/ Phillip Street is considered a key intersection within the surrounding road network, as it provides a key connection to the arterial road network including the Great Western Highway to the south and Forrester Road to the north-west.

The Glossop Street/ Phillip Street intersection is a three-leg signalised intersection and has pedestrian crossings on the west and south legs. Turning movement counts were completed at the intersection on Tuesday 9 November 2017 during the AM (6am to 9am) and PM (4pm to 6pm) peak periods.

The AM and PM peak hour traffic volumes are summarised in Figure 2.6 for the following surveyed peak hours:

- AM peak hour: 8am to 9am
- PM peak hour: 3:15pm to 4:15pm.

Figure 2.6: Existing AM/ PM peak hour traffic volumes



2.4 Intersection Operation

The operation of the Glossop Street/ Phillip Street intersection has been assessed using SIDRA Intersection[1], a computer based modelling package which calculates intersection performance.

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

Table 2.1 shows the criteria that SIDRA Intersection adopts in assessing the level of service.

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

Table 2.1: SIDRA Intersection level of service criteria

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

Table 2.2 presents a summary of the existing operation of the intersection, with full results presented in Appendix A of this report.

Table 2.2: Existing operating conditions

Intersection	Peak	Leg	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
Glossop Street/ Phillip Street	AM	South	0.55	15	132	B
		North	0.54	8	83	A
		West	0.51	38	75	C
		Overall	**0.55**	**15**	**132**	**B**
	PM	South	0.71	22	183	B
		North	0.70	12	90	A
		West	0.69	36	106	C
		Overall	**0.71**	**20**	**183**	**B**

Based on the above assessment, the intersection of Glossop Street/ Phillip Street currently operates well with spare capacity in the AM and PM peaks. However, all approaches experience some vehicle queuing during the AM and PM peak periods.

In general, the vehicle queues were observed to clear during each signal cycle, except for the right turn on the northern approach, which does not always clear during the PM peak. In this regard, it should be noted that the right turn filter on the north leg was generally not permitted during the PM peak.

2.5 Car Parking

Unrestricted kerbside parking is available on both sides of the following roads near the site:

- Chesham Street
- Lethbridge Street
- Station Street (limited to the eastern end).

At the time of the site visit, the available on-street parking was highly utilised. It is likely that the high parking demand is associated with commuters using St Marys Railway Station, with a small proportion associated with workers of local retail precinct and local residential parking.

Parking demand along Chesham Street and Station Street is shown in Figure 2.7 and Figure 2.8.

Figure 2.7: Chesham Street parking demand

Figure 2.8: Station Street parking demand

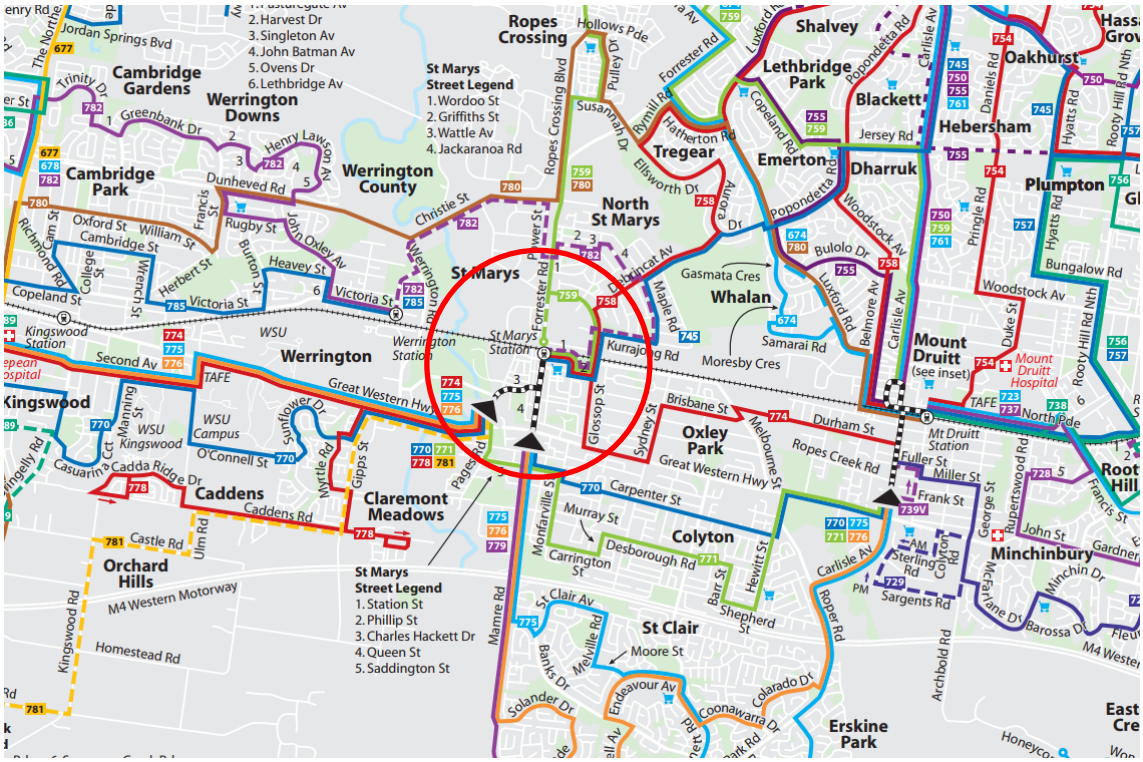
2.6 Public Transport

The site is located about 350 metres east of the St Marys Railway Station. The station services the T1 North Shore, Northern and Western Line, connecting to Blacktown, Parramatta and Sydney CBD to the east and Penrith to the west.

The subject site is also located 200 metres east of the St Marys interchange, which provides access to various bus routes, servicing a broad network, with reasonably high frequency.

The Busways network map is shown in Figure 2.9. The Interchange also accommodates route 835 linking Prairiewood to Western Sydney University in Penrith, during weekday peak periods.

Figure 2.9: Bus network map



Basemap source: http://www.busways.com.au/sites/default/files/network_maps/R1TimetableNetworkMap280517.pdf, visited 20 December 2017

A review of the public transport available near the site is summarised in Table 2.3.

Table 2.3: Public transport provision

Service	Route number	Route description
Train	T1	North Shore, Northern and Western Line
Bus	745, 758, 759, 770, 771, 774, 775, 776, 778, 779, 781, 782, S11 and 835	St Marys to Castle Hill, to Mount Druitt, to Penrith, St Marys School to Blacksmiths, St Clair to St Marys

2.7 Pedestrian Infrastructure

Footpaths are generally provided along one side or both sides of the roads near the site, providing a good level of pedestrian connectivity to key transport facilities around the site, as well as the local retail centre.

Figure 2.10 and Figure 2.11 show the footpaths along Glossop Street and Station Street, respectively. These footpaths and are generally representative of footpaths along other roads across the local area.

Figure 2.10: Glossop Street footpath (west side)

Figure 2.11: Station Street footpath (south side)

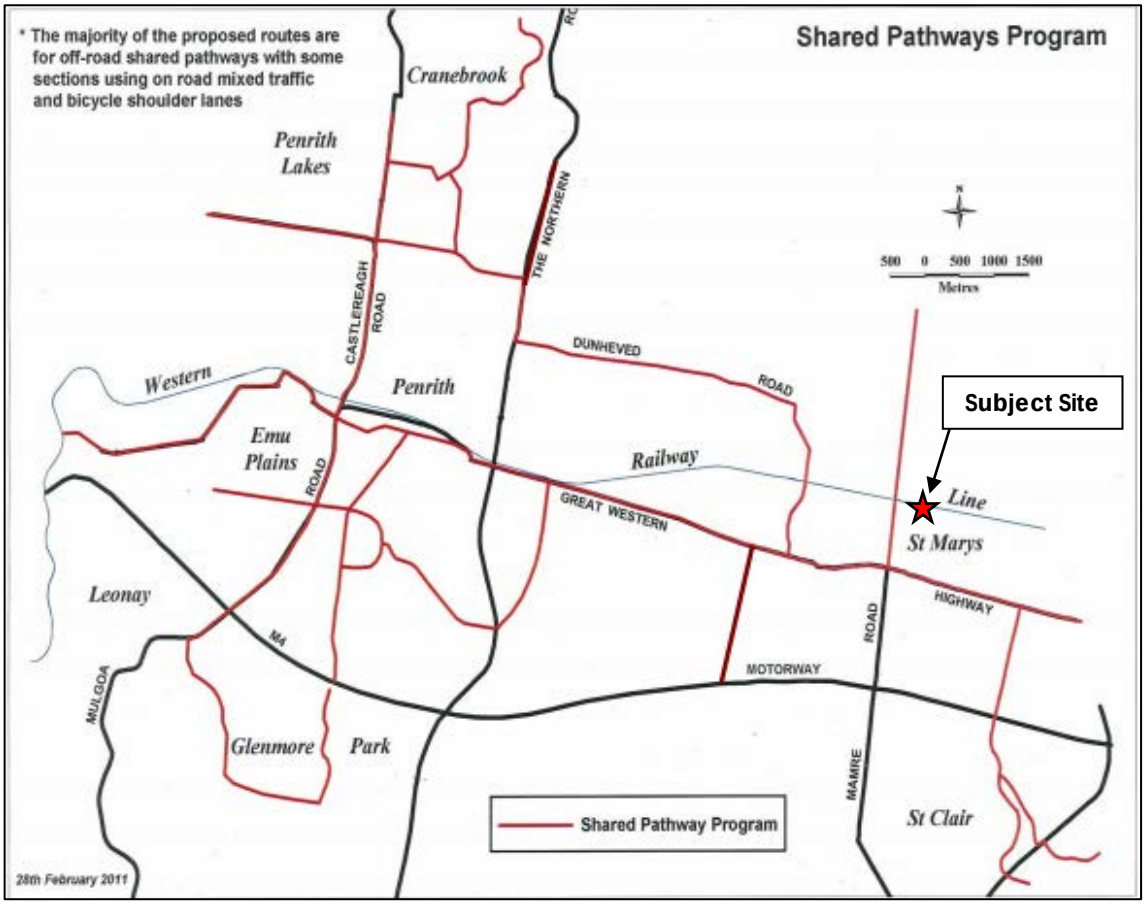
2.8 Cyclist Infrastructure

A range of cycleways and bicycle friendly roads are available in the area surrounding the site. Separate dedicated cycleways are available on the Great Western Highway, south west of the site, while dedicated cycling lanes are available along the M4 Western Motorway, located south of the site.

Council has proposed new cycling paths as part of the Penrith Accessible Trails Hierarchy Strategy (PATHS) to provide quality public infrastructure and promoting sustainable personal mobility choices. The proposed key routes provide major north-south and east-west trails along key transport and open space corridors.

Council's proposed priority routes for the shared pathways network around the site is illustrated in Figure 2.12.

Figure 2.12: Existing and proposed bicycle network around the site



Source: Penrith City Council, https://www.penrithcity.nsw.gov.au/Documents/Building-and-Development/PATHS-Strategy/, visited 15 December 2017

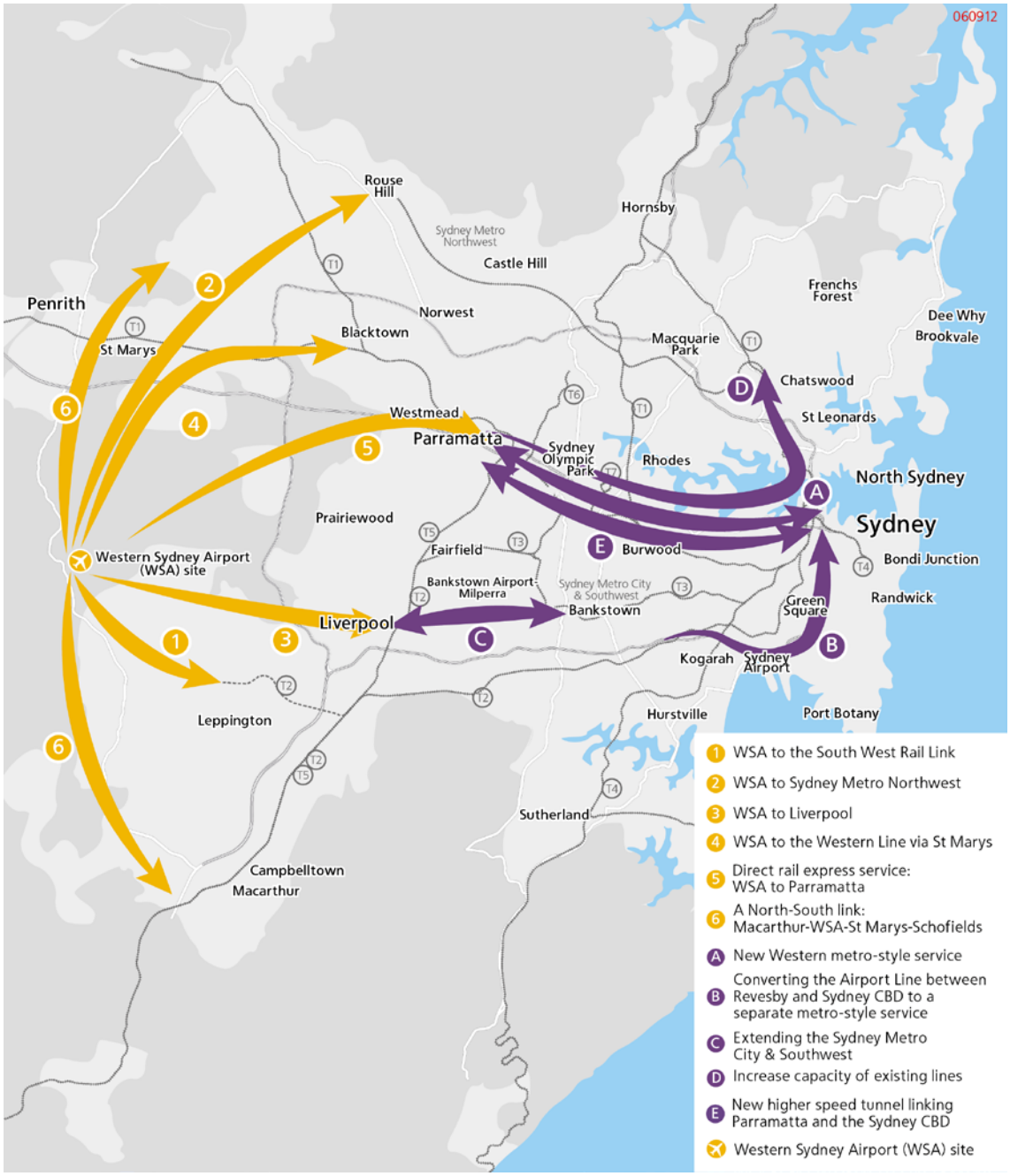
2.9 Transport Studies

The South West Rail Link Extension Corridor project is a joint initiative between the Australian Government and the NSW Government. The project aims to investigate transport infrastructure upgrades expected to be required to support the proposed Western Sydney Airport, forming part of the growing Western Sydney transport infrastructure.

Initial plans include north-south link option, connecting the Western Sydney Airport to St Marys, as shown in Figure 2.13. Consequently, the South West Rail Link Extension would promote population growth in the St Marys area.

The final report for the South West Rail Link Extension Corridor is currently under investigation and review.

Figure 2.13: Route options for the South West Rail Link Extension Corridor project



Source: https://www.westernsydneyrail.transport.nsw.gov.au/route-options/photos/28547, visited 15 December 2017

3. Development Proposal

3.1 Land Uses

The proposal includes 102 apartments over three residential flat buildings, as well as a basement car park and landscaping across the site, with the expected breakdown of unit sizes summarised in Table 3.1.

Table 3.1: Development schedule

Number of bedrooms	Number of apartments
1-bedroom	63
2-bedroom	33
3-bedroom	4
4-bedroom	2
TOTAL	**102**

The proposed concept layout for the site is shown in Figure 3.1.

Figure 3.1: Proposed concept layout

Source: Penrith City Council – Preliminary Concept Design, dated October 2017

3.2 Vehicle Access

The site concept layout (see Figure 3.1) identifies a single two-way basement car park access via Lethbridge Street, along the western boundary of the site to clearly separate vehicle access from pedestrian access along Chesham Street.

The proposed site access location is considered undesirable, as it may cause driver confusion with regards to vehicle priority at the Station Street and Lethbridge Street intersection (bend). Therefore, it is recommended to provide site access from south via Chesham Street. This is likely to result in the loss of some existing on-street parking spaces on the northern side of Chesham Street to accommodate the driveway.

Chesham Street is a low traffic volume, local street with a cul-de-sac at its eastern end and a carriageway width of approximately 7.5 metres. If emergency and waste vehicles are unable to turn right out of the proposed development due to vehicles being parked on the southern kerbside of Chesham Street and the existing narrow carriageway, the cul-de-sac can be used by the larger vehicles to perform a U-turn movement to access Lethbridge Street. However, the design of the access to the proposed development will consider the turning movements of vehicles turning into and out of Chesham Street to minimise impact to existing on-street parking provisions.

Considering the above and with low traffic movements on Chesham Street as observed during site visit, it is recommended to provide access for the proposed development via Chesham Street. It is noted that detailed topographic surveys and architectural plans are required to identify the exact location of the proposed access, which is not generally provided at the planning proposal phase. Therefore, further consideration for an alternative site access via Chesham Street and its exact location will be investigated during Development Application (DA) and detailed design stages. During the detailed design stage, it is also recommended to consider the pedestrian activity along the proposed access, to avoid conflicts with vehicle movements from the proposed development.

3.3 Pedestrian Facilities

It is proposed that a pedestrian access point would be provided for each residential flat building along the southern boundary of the site on Chesham Street. As such, it is recommended that a footpath be provided along the frontage of the site on Chesham Street and linking with the surrounding footpaths along Lethbridge Street.

To accommodate mobility impaired people, it is recommended to ensure appropriate accessible paths from all pedestrian access points and accessible parking spaces with all supporting facilities linking common areas and dwellings. It is noted that further opportunities to facilitate movement of mobility impaired people, would be investigated during the DA and detailed design stages of the proposed development.

3.4 Bicycle Facilities

Council's DCP 2014 recommends that bicycle parking be provided in accordance with the Planning Guidelines for Walking and Cycling (NSW Government, 2004). The relevant rates for the proposed residential development result in the bicycle parking provisions presented in Table 3.2.

Table 3.2: DCP 2014 bicycle parking requirements

Use	Quantity	User	Bicycle parking rate	Parking requirement
1-bedroom units	63	Resident	20-30% per unit	13-19
		Visitor	5-10% per unit	4-7
2-bedroom units or more	39	Resident	20-30% per unit	8-12
		Visitor	5-10% per unit	2-4
Total spaces				**27-42**

Based on the proposed number of apartments, the development would be required to provide a minimum of 27 bicycle spaces. It is recommended that the resident bicycle parking be provided within the basement car park, while visitor parking could be provided at-grade and near main building entries.

3.5 Loading Areas

DCP 2014 requires one space per 40 units for service vehicles. This results in a requirement for three service vehicle bays.

3.6 Refuse Collection

The site concept layout does not ascertain any location for on-site waste collection. However, it is proposed to provide an on-site waste collection point, which should be accessible for Council's standard waste collection vehicles.

Council's standard waste collection vehicles available for refuse collection comprise of:

- 10.5 metres heavy rigid rear-loading vehicle
- 9.1 metres hook lift vehicle
- 8.3 metres hook lift vehicle
- 7 metres hook lift vehicle.

The waste management policy for residential flat building developments as outlined in DCP 2014, requires safe access for the Council's standard waste collection vehicles to enter and leave the site in a forward direction and service the development efficiently with little or no need to reverse. The access ramp to the site and on-site manoeuvring of waste vehicles should comply with Australian Standard 2890.2 Parking Facilities Part 2: Off Street Commercial Vehicle Facilities. Therefore, it is also recommended to consider the manoeuvring requirements of the standard waste collection vehicles, during the DA and detailed design stages of the development as per the requirement of DCP 2014.

4. Car Parking

4.1 Car Parking Requirements

4.1.1 DCP Parking Requirements

The car parking provision requirements for different development types are set out in Council's DCP 2014.

A review of the car parking requirement rates and the number of proposed units results in a DCP minimum parking requirement for the proposed development as summarised in Table 4.1.

Table 4.1: DCP car parking requirements

Description	Parking breakdown	Number of apartments	DCP parking rate	DCP parking requirement
Residential flat buildings	1 and 2 bedrooms	96	1 space per unit	96
	3 and 4 bedrooms	6	2 spaces per unit	12
	Visitor parking	102	1 space per 5 units or part thereof	21
	Car wash bay	102	1 space for car washing for every 50 units up to a maximum of 4 spaces per building	3
Total				**132 spaces (minimum)**

Table 4.1 indicates that the proposed development as per the DCP parking criteria requires a minimum 132 parking spaces, with 108 residential parking spaces, 21 visitor parking spaces and three spaces as car wash bays.

4.1.2 Alternative Parking Requirements

The State Environmental Planning Policy (SEPP) No. 65 for Apartment Design Guide states that car parking provisions for developments within 800 metres of a railway station in the Sydney Metropolitan Area should follow the minimum car parking requirement for residents and visitors set out in the Guide to Traffic Generating Developments (Roads and Maritime, 2002), or the car parking requirement prescribed by the relevant council, whichever is less.

Adopting the parking requirements set out in the Guide to Traffic Generating Developments (the Guide) for high density residential flat buildings in a Metropolitan Sub-Regional Centre, a minimum of 97 off-street residential parking spaces for high density residential flat buildings in metropolitan sub-regional centres, as summarised in Table 4.2.

Table 4.2: Roads and Maritime car parking requirements

Description	Parking breakdown	Number of apartments	Parking rate	Parking requirement
High density residential flat buildings (Metropolitan Sub-Regional Centre)	1 bedroom	63	0.6 spaces per unit	38
	2 bedrooms	33	0.9 spaces per unit	30
	3 and 4 bedrooms	6	1.4 spaces per unit	8
	Visitor parking	-	1 space per 5 units or part thereof	21
Total				**97 spaces**

4.1.3 Recommended Parking Provision

It is recommended that parking provision for the site is based on the minimum requirements of DCP 2014. This higher off-street parking rate would better align with likely market expectations and demographics of the site and its surrounds. Particularly given the limited amount of higher density residential developments in the area.

4.1.4 Disabled Car Parking Requirements

DCP 2014 recommends disabled parking for residential uses should be in accordance with the Access to Premises Standards, Building Code of Australia (BCA). Therefore, the BCA requirements have been referenced to determine the disabled car parking requirements. The BCA outlines requirements for the provision of car parking for people with disabilities. The disabled car parking spaces must also comply with AS2890.6:2009.

Section D3.5 of the BCA specifies the accessible parking provision requirements for various classes of buildings. Typically, the level of accessible parking provision for residential development is determined based on the number of accessible sole-occupancy units, subject to final confirmation by the building surveyor.

5. Traffic Impact Assessment

5.1 Traffic Generation

5.1.1 Design Rates

The Council's localised traffic generation rates for high density residential flat building developments within 800 metres from a railway station or sites within 400 metres of land zoned, B3 Commercial Core and B4 Mixed Use, recommends average peak trip generation rates as shown in Table 5.1.

Table 5.1: Council's localised high density flat building traffic generation rate

Year	Average peak trip per unit
2026	0.33
2031	0.30
2036	0.26

As such the site is a high density residential apartment with its peak operational year as 2026, the traffic generation rates suggest 0.33 vehicle trips per unit for the weekday AM and PM peak hours would be expected. On this basis, the proposed development is expected to generate a total of 34 vehicle trips per hour during peak periods.

5.2 Distribution and Assignment

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

i Configuration of the arterial road network in the immediate vicinity of the site
ii Existing operation of intersections providing access between the local and arterial road network
iii Distribution of households near the site
iv Surrounding employment centres, retail centres and schools in relation to the site
v Configuration of access points to the site.

It is expected that the proposed development would attract users relatively evenly throughout the surrounding local and regional area. Notwithstanding this, for this assessment, it has been assumed that all traffic generated by the site would use the Glossop Street/ Phillip Street intersection to access the surrounding road network. This is considered a worst-case scenario, given that some of this traffic may use alternative routes including Lethbridge Street and Chapel Street.

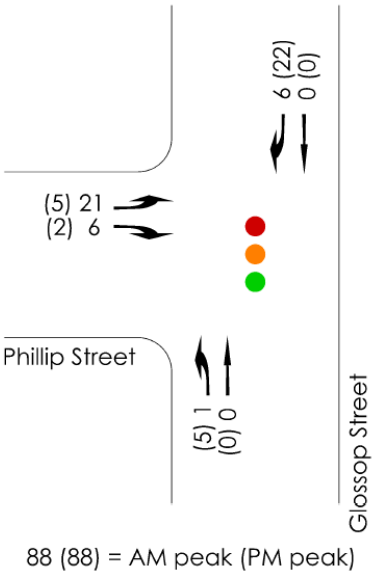
The traffic generation estimates have been apportioned to individual turning movements at the Glossop Street/ Phillip Street intersection, based on the existing survey data.

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

- AM peak hour: 20% inbound and 80% outbound
- PM peak hour: 80% inbound and 20% outbound.

Based on the above, the development traffic volumes expected at the intersection of Glossop Street/ Phillip Street during the AM and PM peak hours are shown in Figure 5.1.

Figure 5.1: Proposed development traffic at the Glossop Street/ Phillip Street



5.3 Traffic Growth for this study

To account for growth in the surrounding network traffic, a two per cent annual growth rate has been used for the extrapolating the traffic volumes at Glossop Street/ Phillip Street intersection. This growth factor will allow to assess the traffic impact of the proposed development on the Glossop Street/ Phillip Street intersection during the horizon year 2027.

5.4 Traffic Impact

Table 5.2 presents a summary of the operation during peak periods for the 2027 growth scenarios, with and without the development. Detailed results are presented in Appendix A of this report.

Table 5.2: 2027 intersection operating conditions

Intersection	Peak	Leg	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
Glossop Street/ Phillip Street (without development)	AM	South	0.77	23	210	B
		North	0.60	10	95	A
		West	0.70	35	84	C
		Overall	**0.77**	**19**	**210**	**B**
	PM	South	0.86	32	289	C
		North	0.85	14	125	A
		West	0.84	42	150	C
		Overall	**0.86**	**26**	**289**	**B**
Glossop Street/ Phillip Street (with development)	AM	South	0.77	23	210	B
		North	0.61	11	97	B
		West	0.75	36	91	C
		Overall	**0.77**	**19**	**210**	**B**
	PM	South	0.89	37	309	C
		North	0.87	15	137	B
		West	0.85	42	149	C
		Overall	**0.89**	**28**	**309**	**B**

The results in Table 5.2 show that with the expected background growth traffic and additional trips generated by the proposed development, the intersection of Glossop Street/ Phillip Street would operate at an acceptable level of service. The proposed development would generally have limited impact on the overall intersection operation and the intersection would continue to operate with a satisfactory level of service of B.

The traffic volumes on the eastbound approach of the intersection of Glossop Street/ Phillip Street was surveyed to be less than 1,000 vehicles per hour. Based on site observations, the total traffic volume entering and exiting the westbound approach of the roundabout intersection of Lethbridge Street/ Phillip street would also be less than 1,000 vehicles per hour. Considering this low traffic volume, it is expected that the roundabout intersection of Lethbridge Street/ Phillip Street will not experience any significant capacity issues with the addition of proposed development traffic.

6. Conclusion

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

i The proposed includes the reclassification of the land at 11-13 Chesham Street, St Marys for construction of approximately 100 high density residential apartments.

ii The proposed site access would be located along Lethbridge Street. Although it is recommended that consideration for a more suitable access via Chesham Street be considered during design development.

iii The proposed development generates a DCP 2014 minimum parking requirement of 132 spaces and a Roads and Maritime parking requirement of 97 spaces.

iv It is recommended that the development includes 132 off-street parking to spaces, including resident and visitor parking.

v The proposed development requires a minimum of 27 bicycle parking spaces for use by residents and visitors.

vi The proposed development requires three service vehicle bays for waste removal, loading, removalists etc.

vii The site is expected to generate an additional 30 vehicle trips during peak hour respectively.

viii There is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development, including the intersection of Glossop Street/ Phillip Street, which provides the main connection to the surrounding arterial network.

Overall, the traffic and parking implications associated with the proposed residential redevelopment is considered acceptable.

Appendix A

SIDRA Intersection Results

MOVEMENT SUMMARY

Site: [Phillip Street/ Glossop Street EX_AM]

Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Glossop Street											
1	L2	63	11.7	0.551	20.1	LOS B	16.7	127.3	0.67	0.62	37.4
2	T1	1064	9.9	0.551	14.7	LOS B	17.4	132.3	0.68	0.62	45.4
Approach		1127	10.0	0.551	15.0	LOS B	17.4	132.3	0.68	0.62	45.0
North: Glossop Street											
8	T1	933	14.6	0.327	2.9	LOS A	6.0	47.6	0.29	0.26	56.5
9	R2	293	2.9	0.542	23.9	LOS B	11.6	83.4	0.90	0.87	35.6
Approach		1225	11.8	0.542	7.9	LOS A	11.6	83.4	0.44	0.41	50.4
West: Phillip Street											
10	L2	266	2.8	0.457	33.9	LOS C	10.4	74.6	0.85	0.80	30.3
12	R2	71	9.0	0.505	55.2	LOS D	3.5	26.5	1.00	0.76	20.2
Approach		337	4.1	0.505	38.4	LOS C	10.4	74.6	0.88	0.79	27.9
All Vehicles		2689	10.1	0.551	14.7	LOS B	17.4	132.3	0.59	0.54	44.3

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians							
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	13.0	LOS B	0.1	0.1	0.51	0.51
All Pedestrians		105	28.7	LOS C			0.73	0.73

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: [Phillip Street/ Glossop Street EX_PM]

Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Glossop Street											
1	L2	59	10.7	0.710	26.7	LOS B	22.4	174.1	0.82	0.74	33.0
2	T1	1165	12.9	0.710	21.6	LOS B	23.5	183.1	0.83	0.75	40.8
Approach		1224	12.8	0.710	21.8	LOS B	23.5	183.1	0.83	0.75	40.5
North: Glossop Street											
8	T1	1231	8.9	0.445	5.0	LOS A	11.1	83.4	0.41	0.37	54.2
9	R2	266	3.2	0.698	46.7	LOS D	12.5	90.0	0.98	0.85	26.4
Approach		1497	7.9	0.698	12.4	LOS A	12.5	90.0	0.51	0.45	46.7
West: Phillip Street											
10	L2	394	3.5	0.555	29.3	LOS C	14.7	106.2	0.82	0.81	32.2
12	R2	162	3.2	0.687	52.3	LOS D	8.0	57.7	1.00	0.85	21.0
Approach		556	3.4	0.687	36.0	LOS C	14.7	106.2	0.87	0.82	28.5
All Vehicles		3277	9.0	0.710	19.9	LOS B	23.5	183.1	0.69	0.63	40.6

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians							
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	17.4	LOS B	0.1	0.1	0.59	0.59
All Pedestrians		105	30.9	LOS D			0.77	0.77

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: [Phillip Street/ Glossop Street AM + Dev]

Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Glossop Street											
1	L2	64	11.5	0.552	20.1	LOS B	16.8	127.5	0.67	0.62	37.4
2	T1	1064	9.9	0.552	14.7	LOS B	17.4	132.4	0.68	0.62	45.4
Approach		1128	10.0	0.552	15.0	LOS B	17.4	132.4	0.68	0.62	45.0
North: Glossop Street											
8	T1	933	14.6	0.327	2.9	LOS A	6.0	47.6	0.29	0.26	56.5
9	R2	298	2.8	0.551	24.3	LOS B	11.8	84.9	0.90	0.88	35.3
Approach		1231	11.7	0.551	8.1	LOS A	11.8	84.9	0.44	0.41	50.2
West: Phillip Street											
10	L2	286	2.6	0.491	34.3	LOS C	11.3	81.1	0.86	0.81	30.1
12	R2	76	8.3	0.540	55.5	LOS D	3.8	28.5	1.00	0.77	20.2
Approach		362	3.8	0.540	38.7	LOS C	11.3	81.1	0.89	0.80	27.8
All Vehicles		2721	9.9	0.552	15.0	LOS B	17.4	132.4	0.60	0.55	44.0

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	13.0	LOS B	0.1	0.1	0.51	0.51
All Pedestrians		105	28.7	LOS C			0.73	0.73

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: [Phillip Street/ Glossop Street PM + Dev]

Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Glossop Street											
1	L2	64	9.8	0.728	27.6	LOS B	23.0	178.6	0.83	0.76	32.5
2	T1	1165	12.9	0.728	22.5	LOS B	24.2	187.9	0.85	0.77	40.3
Approach		1229	12.8	0.728	22.7	LOS B	24.2	187.9	0.85	0.77	40.0
North: Glossop Street											
8	T1	1231	8.9	0.445	5.0	LOS A	11.1	83.4	0.41	0.37	54.2
9	R2	287	2.9	0.718	46.5	LOS D	13.6	97.4	0.98	0.86	26.4
Approach		1518	7.8	0.718	12.8	LOS A	13.6	97.4	0.51	0.46	46.3
West: Phillip Street											
10	L2	398	3.4	0.542	28.6	LOS C	14.7	105.7	0.81	0.81	32.5
12	R2	164	3.2	0.696	52.5	LOS D	8.2	58.7	1.00	0.85	20.9
Approach		562	3.4	0.696	35.6	LOS C	14.7	105.7	0.86	0.82	28.6
All Vehicles		3309	8.9	0.728	20.4	LOS B	24.2	187.9	0.70	0.64	40.3

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.
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.
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HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians							
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	18.0	LOS B	0.1	0.1	0.60	0.60
All Pedestrians		105	31.2	LOS D			0.77	0.77

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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