TRAFFIC IMPACT ASSESSMENT (TIA)

Planning Proposal for a Mixed- Use Development
65-79 Macquarie Street, 38 Hunter Street, 195 Church Street and 45 Hunter Street, Parramatta

Reference: 17.305r02v03
Date: March 2022

TRAFFIX
TRAFFIC & TRANSPORT PLANNERS

Suite 2.08, 50 Holt St
Surry Hills, NSW 2010

t: (02) 8324 8700
w: www.traffix.com.au

DOCUMENT VERIFICATION

Job Number	17.305			
Project	**St John's Cathedral, Parramatta**			
Client	**Anglican Church Property Trust Diocese of Sydney**			
Revision	Date	Prepared By	Checked By	Signed
v03	10/03/2022	Hasnat Khan	Hayden Dimitrovski	

CONTENTS

1. INTRODUCTION

TRAFFIX has been commissioned by Anglican Church Property Trust Diocese of Sydney as Trustee of the Parish of Parramatta (ACPT) to undertake a Traffic Impact Assessment (TIA) for a Planning Proposal relating to a proposed mixed-use commercial, retail, residential and a place of public worship development located at:

- 65-79 Macquarie Street, Parramatta;
- 38 Hunter Street, Parramatta;
- 195 Church Street, Parramatta; and
- 45 Hunter Street, Parramatta

The development is situated in the Parramatta City Council Local Government Area and has been assessed under that Council's controls. The site is also subject to Parramatta City Council Local Environmental Plan and Development Control Plan (2011).

This report documents the findings of our investigations and should be read in the context of the Planning Proposal & Urban Design Report. The proposed development includes a commercial premises exceeding 10,000m^2 and therefore constitutes *'Traffic generating development to be referred to RMS' under the provisions of SEPP (Infrastructure) 2007'*. While it is noted that these provisions relate to a development application and not a Planning Proposal, it is assumed that referral will occur in any case.

The report is structured as follows:

- Section 2: Describes the site and its location;
- Section 3: Documents existing traffic conditions;
- Section 4: Describes the proposed development;
- Section 5: Assesses the parking requirements;
- Section 6: Assesses traffic impacts;
- Section 7: Discusses access and internal design aspects;
- Section 8: Presents the overall study conclusions

2. LOCATION AND SITE

The site is situated within the Parramatta CBD and is bound by Centenary Square and Macquarie Street to the north, Parramatta Square to the east and retail and commercial buildings to the south and west. The site is located approximately 200m northwest of the Parramatta Railway Station and Bus Interchange and 20 kilometres west of the Sydney CBD.

The site is irregular in configuration having a total site area of approximately 10,857m^2. The site currently accommodates the following development types at each address provided in **Table 1** below. The individual site areas are also provided.

Table 1: Development Type

Address	Development Type	Site Area
65 - 79 Macquarie Street	Retail & Commercial Development	940 m^2
38 Hunter Street	Commercial Development	1,450 m^2
195 Church Street	St John's Cathedral – Warden's Cottage	1,015 m^2
	St John's Cathedral – Church & grounds	6,587 m^2
45 Hunter Street	Commercial Development	844 m^2

The existing vehicular accesses to the development are from Hunter Street with three driveways to at grade parks to the north, east and south.

A Location Plan is presented in **Figure 1**, with a Site Plan presented in **Figure 2**. Reference should also be made to the Photographic Record presented in **Appendix A** which provides an appreciation of the general character of roads and other key attributes in proximity to the site.

Figure 1: Location Plan

Figure 2: Site Plan

3. EXISTING TRAFFIC CONDITIONS

3.1 Road Network

The road hierarchy in the vicinity of the site is shown in **Figure 3** with the following roads of particular interest:

- Church Street: a classified main road and highway (MR 184/HW 5), local road, light rail corridor and pedestrian mall that runs in a north-south direction between North Rocks Road in the north and Parramatta Road in the south. Church Street is a classified main road (MR 184) between North Rocks Road and Victoria Road, a local road between Victoria Road and Market Street, a light rail corridor and pedestrian mall between Market Street and Macquarie Street, a pedestrian mall between Macquarie Street and Darcy Street and a local road between Darcy Street and Parkes Street and forms part of the Great Western Highway (HW 5) between Parkes Street and Parramatta Road. In the vicinity of the site, Church Street is a pedestrian mall along the site frontage, a light rail corridor and pedestrian mall to the north of Macquarie Street and a local road to the south of Darcy Street with one lane of traffic southbound between Darcy Street and Argyle Street and one lane in each direction between Argyle Street and Campbell Street, a speed zoning of 40km/h with a high pedestrian activity area and no parking provided along either kerbside.
- Marsden Street: a local collector road which traverses in a north-south direction between Market Street in the north and Railway Street in the south. South of Hunter Street, it provides two lanes of traffic in each direction. North of Hunter Street it provides two lanes of traffic northbound and one lane southbound. It carries a 40km/h speed zoning with a high pedestrian activity area with no parking provided along either kerbside in the vicinity of the site.
- Macquarie Street: a local road that runs in an east-west direction between Harris Street and Pitt Street in several sections. It runs one-way (westbound) between Harris Street and Smith Street, is a light rail

only corridor between Smith Street and Horwood Lane and is one-way (eastbound) between Horwood Place and O'Connell Street. It provides one lane of traffic along the site frontage between Horwood Place and Marsden Street. The light rail corridor runs along Macquarie Street between Harris Street in the east and Church Street in the west. Macquarie Street is subject to a 40km/h speed zoning with a high pedestrian activity area and provides restricted parallel parking both kerbsides in the vicinity of the site.

- Hunter Street: a local road which traverses in an east-west direction between a cul-de-sac configuration in the east and Pitt Street in the west. In the vicinity of the site, it provides one lane of traffic in each direction with a 40km/h speed zoning with a high pedestrian activity area and restricted parallel parking along both kerbsides in the vicinity of the site.

It can be seen from **Figure 3** that the site is conveniently located with respect to the arterial and sub-arterial road systems serving the region to effectively distribute potential development traffic onto the wider road network.

Figure 3: Road Hierarchy

3.2 Key Intersections

The following intersections around the development have been identified as the critical intersections that will be affected as a result of the proposed development. **Figure 4** provides an overview of their locations relative to the site. Detailed descriptions and aerials of each intersection are provided in the following subsections.

Figure 4: Key intersections relative to the site

3.2.1 Argyle Street and Marsden Street

The intersection of Argyle Street and Marsden Street is located approximately 121 metres south-west of the site. The southern leg (Marsden Street) of the intersections allows left and through movements and the northern leg (Marsden Street) allows through movements only with the exception of TfNSW, Police and Council vehicles which are permitted to turn left. The eastern leg (Argyle Street) of the intersection allows all movements whilst the western leg allows through movements for buses only. An aerial image of the intersection is provided in **Figure 5** below.

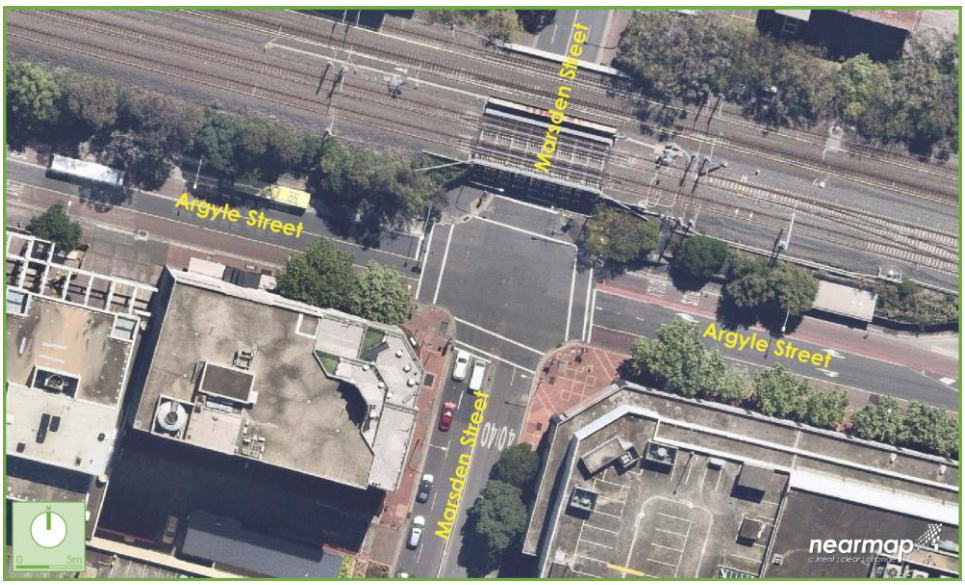


Figure 5: Aerial photo of intersection of Marsden Street and Argyle Street, Parramatta

3.2.2 Hunter Street and Marsden Street

The intersection of Hunter Street and Marsden Street is located approximately 80 metres west of the site. Both streets provide two way traffic flow and the intersection is controlled by signals. All four (4) legs provide pedestrian footpaths on both sides of the streets. An aerial image of the intersection is provided in **Figure 6**, overleaf.

Figure 6: Aerial photo of intersection of Marsden Street and Hunter Street, Parramatta

3.2.3 Church Street and Macquarie Street

The intersection of Church Street and Macquarie Street is located to the north east of the site. The intersection is currently part of the light rail construction. As part of the reconfiguration to allow for the light rail corridor Macquarie Street is now restricted to one-way traffic flow eastbound. Church Street will continue to be a pedestrianised mall to the south and a shared light rail corridor and pedestrianised mall. An aerial image of the intersection is provided in **Figure 7**, below.

Figure 7: Aerial photo of intersection of Macquarie Street and Church Street, Parramatta

3.3 Public Transport

The existing bus services that operate in the locality are shown in **Figure 8**. The site benefits from excellent bus services being situated within 400 metres of numerous bus stops including the Parramatta bus interchange. These bus services provide connections to such centres as Pennant Hills, Penrith, Blue Mountains, Blacktown, Liverpool and the Sydney CBD.

The site is approximately 200 metres walking distance (i.e. three (3) minute walk) to Parramatta Railway Station. This railway station connects Sydney CBD to most of western Sydney local town centres with high frequency services. This station provides services along the T1 North Shore, Northern & Western Line, Blue Mountains Line and the T5 Cumberland Line as shown in **Figure 9**.

The site is located approximately 750m southwest of the Parramatta Ferry Wharf. The wharf provides regular ferry services along Parramatta River to Circular Quay. Services operate everyday between 7:00am and 7:00pm and the journey takes approximately 50 minutes. The location of the Parramatta ferry wharf is indicated on **Figure 9**.

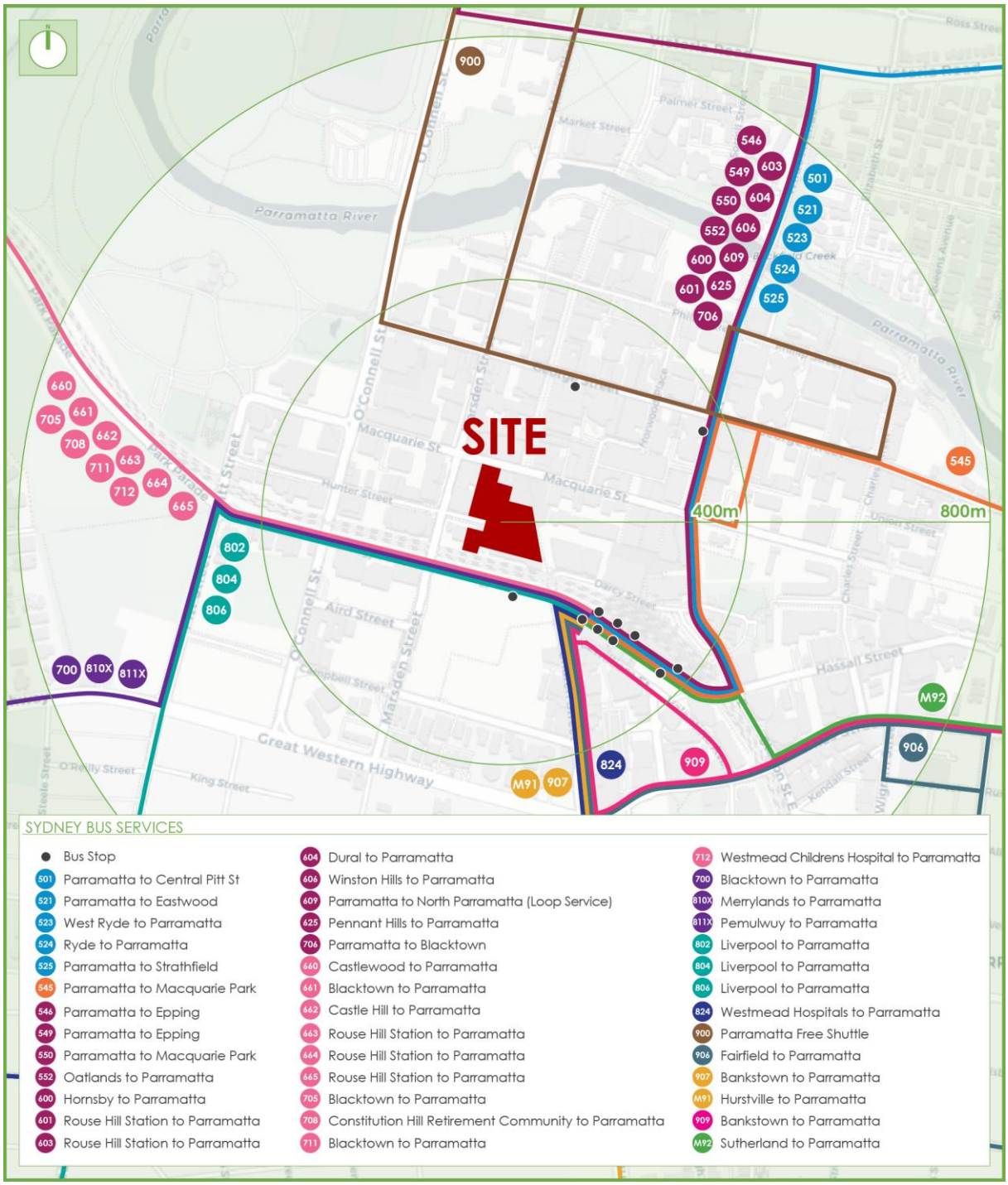


Figure 8: Bus Services

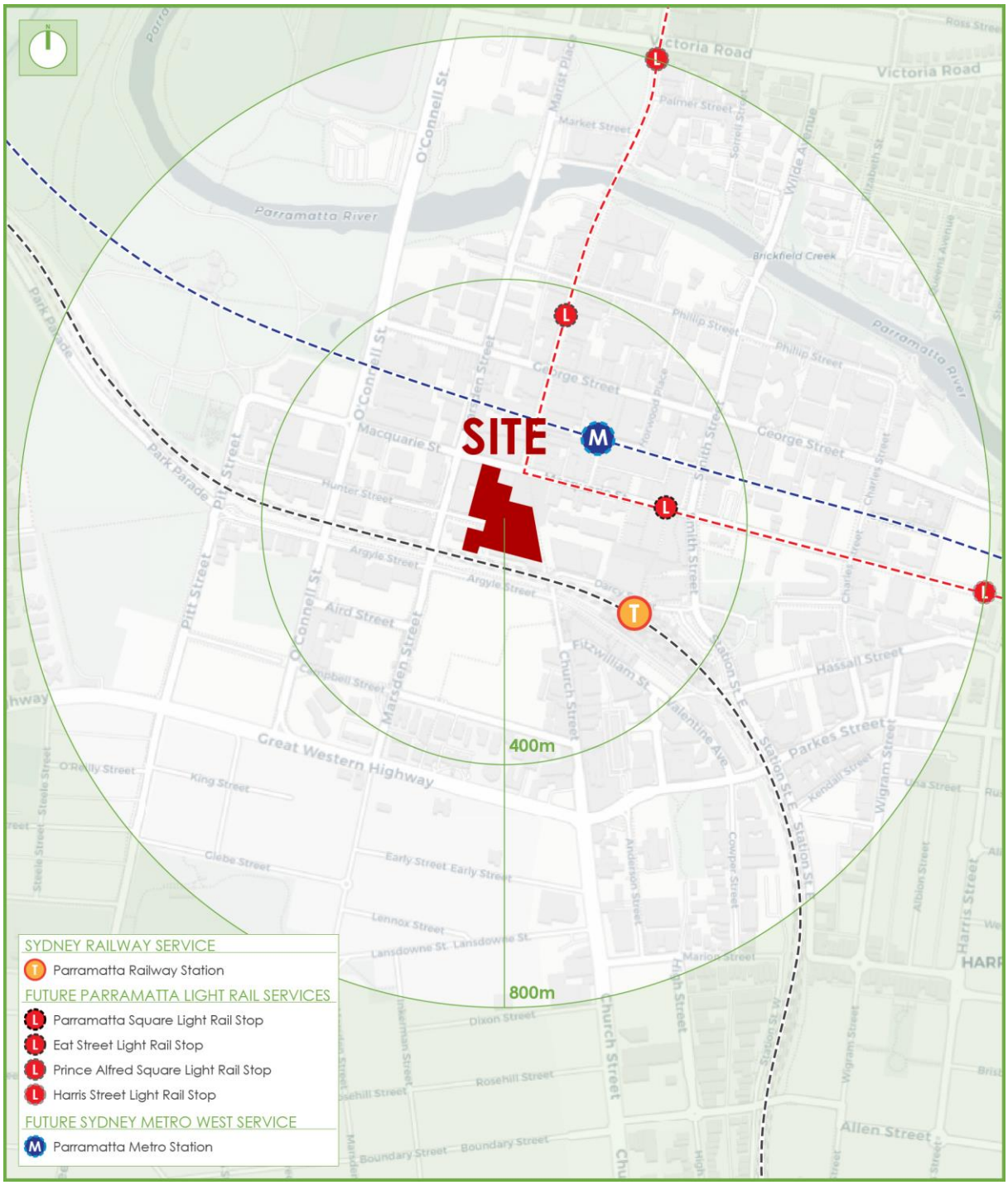


Figure 9: Rail Services

4. DESCRIPTION OF PROPOSED DEVELOPMENT

The Planning Proposal seeks to facilitate a redevelopment of the site. The exact quantum of floor space and proposed uses will be the subject of future development applications. Based on the Master Plan prepared by Architectus, the Planning Proposal is envisaged to facilitate a development comprising the following aspects:

- Retention of the existing St John's Anglican Cathedral, St John's Building and Warden's (Vergers) Cottage. In addition, the following demolition depending on the two options:
  - Option A includes the demolition of all other buildings on the site.
  - Option B includes retention of the Parish Hall and the demolition the remaining buildings on the site.
- A Northern Tower of 46 storeys and plant level including the following components:
  - Providing Church uses over the first three storeys of the tower replacing the existing buildings that will be demolished.
  - Commercial floor area on Levels 3-46.
- A Southern Tower of 13 storeys and plant level including the following components :
  - Retail tenancies on the Ground Floor
  - Commercial space on Level 1-3
  - Residential apartments on Levels 4-13
- A public square at the Hunter Street cul-de-sac
- A common two (2) level basement car park with main vehicular access from Hunter Street providing:
  - A 205 space car park for Option A or 141 spaces for Option B.
  - Bicycle parking spaces for all uses on site.
  - Up to five (5) loading bays with up three (3) which can accommodate an 8.8m MRV.

The parking and traffic impacts arising from the development are discussed in **Section 5** and **Section 6**. Reference should be made to the plans submitted separately to Council which are presented at reduced scale in **Appendix B**.

5. PARKING REQUIREMENTS

5.1 Car Parking

5.1.1 Council Controls

The Parramatta Central Business District Strategic Transport Study dated 10 April 2017 resolved. "THAT Council endorses the action recommended by the Parramatta CBD Strategic Transport Study to reduce maximum car parking rates to levels currently used by City of Sydney CBD." Accordingly, the parking requirements of the two options for the concept development have been assessed against the parking rates of the City of Sydney Local Environmental Plan 2012 and are summarised in **Table 2** below:

Table 2: Council Parking Rates and Provision

Type	Area/Units		Council DCP Parking Rate	Maximum Spaces Allowed	
	Option A	Option B		Option A	Option B
Retail	1,017	970	See Formula	2	**3**
Commercial	70,679	53,377		190	187
Residential	18	18	0.3 spaces per 1-bedroom dwelling	5	**5**
	18	18	0.7 spaces per 2-bedroom dwelling	13	**13**
			Totals	**210**	**208**

* Maximum Retail and Office parking requirements under CoS LEP

The required parking is to be calculated using the following formula: **M = (G x A) / (50 x T) where:**

M is the maximum number of parking spaces, and

G is the gross floor area of all retail premises in the building in square metres, and

A is the site area in square metres, and

T is the total gross floor area of all buildings on the site in square metres.

It can be seen from Table 2 that the development is permitted to provide a maximum of 210 spaces for Option or 208 space for Option B. In response to the maximum parking control under the LEP as detailed in Table 2 above, a total of 205 spaces are proposed for Option A and 141 space for Option B, both of which comply with the maximum permissible parking provision under the relevant controls. Therefore, the parking provision for both concept Options in considered acceptable and supportable.

5.2 Accessible Parking

Schedule 7.8.5 of the City of Sydney Council's DCP 2012 states the following requirements regarding accessible parking:

- One (1) accessible car parking space is to be provided for every adaptable residential unit.
- One (1) space for every 20 car parking spaces or part thereof is to be allocated as accessible visitor parking.
- The space shall meet the requirements of AS2890.6 providing an adjacent 'shared zone' of 2.4m x 5.4m to assist with loading and unloading.
- For residential development, accessible car parking spaces are to be allocated to adaptable units, or as visitor parking. Accessible car parking spaces allocated to adaptable dwelling units are to be a part lot to an adaptable unit in the strata plan.

With regards to the subject development, the site location within land use Category A precludes the provision of visitor parking on site. As such, accessible visitor spaces are not required.

5.3 Bicycle Parking

Part 4 of Council's City Centre DCP requires provision for secure bicycle parking at the rates specified in **Table 3** below:

Table 3: Council Bicycle Parking Rates and Requirement

Type	Area/Units		Council DCP Parking Rate	Maximum Spaces Allowed	
	Option A	Option B		Option A	Option B
Retail + Commercial	71,696	54,347	1 space per 200m^2	358	272
Residential	36	36	1 spaces per 2 dwellings	18	18
			Totals	**376**	**290**

The development is required to provide 376 bicycle parking spaces for Option A or 290 spaces for Option B as shown in Table 3. The bicycle parking arrangement will be further addressed during the DA stage.

5.4 Motorcycle Parking

Council's DCP requires motorcycle parking to be provide at rate of one motorcycle space for every 25 on-site car parking spaces provided, or part thereof. Based on a provision of 205 parking spaces for the concept development, a provision of 44 motorcycle bicycle parking spaces is required to meet the requirements of Council's DCP.

5.5 Servicing

The RMS *Guide to Traffic Generating Developments* recommends the following service vehicle parking bays be provided at the following rates:

- Commercial (50% for trucks)
  - 1 spaces per 4,000m2 for the first 20,000m2 GFA, plus
  - 1 space per 8,000m^2 over 20,000m^2 GFA
- Retail (all spaces for trucks)
  - 5 + 1 space per 1,000m2 for more than 2,000m2 GFA

Application of these rates to the subject development results in a requirement to provide up to 16 service vehicle spaces. However, the proposed retail tenancies are relatively small and likely to be serviced by smaller vehicles, including vans from the proposed servicing areas along Macquarie Street as per GTA's OTMP for the Parramatta CBD. As such, the five (5) commercial vehicle spaces for trucks is considered to be an acceptable provision.

A Loading Dock Management Plan can be prepared by building management to ensure that demands for service vehicles bays is appropriately managed and this can be conditioned as part of a consent for a future development application. It is expected that this Management Plan would restrict service vehicle access to the site outside of peak periods to reduce potential conflicts with cars using the basement car park.

6. TRAFFIC AND TRANSPORT IMPACTS

6.1 Existing Site Generation

To establish the existing traffic for the precinct surrounding St John's Cathedral, Parramatta traffic surveys were undertaken during the AM and PM peak periods on Tuesday 21 November 2017 at the following intersections:

- Argyle Street and Marsden Street
- Church Street and Macquarie Street; and
- Hunter Street and Marsden Street

Surveys of the above intersections we modelled in SIDRA 7.0. The results of the modelling are discussed in detail below. The three (3) intersections are considered to be critical for potential traffic impacts of the concept development and have been included in the modelling assessment.

6.2 Existing Intersection Performance

For the purposes of the assessment of traffic impacts of this development, surveys were undertaken on at a number of intersections immediately adjacent to the site. These surveys included the critical intersections of Macquarie Street / Church Street and Marsden Street/ Hunter Street and Horwood Place / George Street.

The results of these surveys were analysed using the SIDRA computer program to determine their performance characteristics under existing traffic conditions. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS – the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD – the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS – this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

Table 4: Intersection Performance Parameters

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals	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 and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

A summary of the modelled results are provided in **Table 5** overleaf. Reference should also be made to the SIDRA outputs provided in **Appendix C** which provide detailed results for individual lanes and approaches.

Table 5: Intersection Performance – Existing

Intersection Description	Control Type	Period	Level of Service	Degree of Saturation	Intersection Delay
Argyle Street & Marsden Street	Signalised	AM	B	21.1	0.666
		PM	B	28.1	0.577
Hunter Street & Marsden Street	Signalised	AM	A	14.2	0.421
		PM	B	16.0	0.514
Macquarie Street & Church Street	Signalised	AM	B	16.7	0.446
		PM	B	16.7	0.446

It can be seen from Table 5 that all intersections operate satisfactorily under the existing 'base case' scenario, with a Level of Service (LoS) A or B, during all peak periods and with minimal delays.

Nevertheless, the most important use of this analysis is to compare changes to these existing delays as a result of the proposed development which is discussed further in **Section 6**.

6.3 Development Trip Generation

Each component of the development has been assessed to determine the traffic generation of the concept development. Option A has been used as it is the larger development, which is a more conservative approach.

6.3.1 Residential

In August 2013, TfNSW released Technical Direction TDT 2013/04a, which provides revised trip generation advice for a number of land uses based on survey data obtained since 2009. One of the land uses covered by TDT 2013/04a is high density residential development. The average Sydney weekday trip rates provided by TDT 2013/04a have been adopted for assessing the traffic generating potential of the subject development. The relevant trip rates are as follows:

- 0.19 vehicle trips per unit during the morning peak hour; and
- 0.15 vehicle trips per unit during the evening peak hour.

Application of these trip rates to the 36 residential units proposed, and adopting an 80:20 split, results in the following predicted trip generation volumes:

- 7 vehicle trips per hour during the morning peak period (2 in, 6 out); and
- 5 vehicle trips per hour during the evening peak period (4 in, 1 out).

6.3.2 Commercial

The Technical Direction also specifies rate for office blocks. However as the development is located in Parramatta which had surveys conducted demonstrating a significantly lower rate of traffic generation than the overall due to the accessibility of the area which are as follows.

- 0.69 vehicle trips per unit during the morning peak hour; and
- 0.28 vehicle trips per unit during the evening peak hour.

In addition, the surveyed site had a much larger parking provision than permitted under the current LEP maximum parking rates. The parking rate of 1.49 space per 100m^2 for the surveyed development is 4.3 times the rate of the maximum parking provision for the Option B concept development (up to 0.35 spaces per 100m^2). Therefore, a discount of 77% to the above rates has been applied to the trip generation to account for the lower parking provision. The trip generation of the proposed office component (70,679m^2 of GFA) of the concept development in the peak periods is as follows:

- 112 vehicle trips per hour (90 in, 22 out) during the morning peak hour; and
- 46 vehicle trips per hour (10 in, 36 out) during the evening peak hour.

6.3.3 Retail

Due to the limited parking provision of the retail component of the development a first principal assessment has been conducted. This assessment assumes the spaces are used by staff only and all staff arrive in the morning peak and depart during evening peak period, which results in the following trip generation:

- 3 vehicle trips per hour during the morning peak period (3 in, 0 out); and
- 3 vehicle trips per hour during the evening peak period (0 in, 3 out).

6.3.4 Combined Generation

The combined generation of the residential and commercial components can be summarised as follows:

- 122 vehicle trips per hour (95 in, 28 out) during the morning peak hour; and
- 54 vehicle trips per hour (14 in, 40 out) during the evening peak hour.

6.4 Traffic Distribution

The traffic generation has been distributed around the road network with the main access on Hunter Street. Based on this arrangement, all vehicles will approach the development from the west turning left from Marsden Street or continuing eastbound on Hunter Street. The access is expected to be located on the northern kerbside of Hunter Street and as such vehicles will turn left into the site. Vehicles exiting must turn right onto Hunter Street to exit and continue to Hunter Street or turn on to Hunter Street.

Application of this traffic distribution to the traffic generation above, results in the development traffic network demand flows presented in **Figure 10** below.

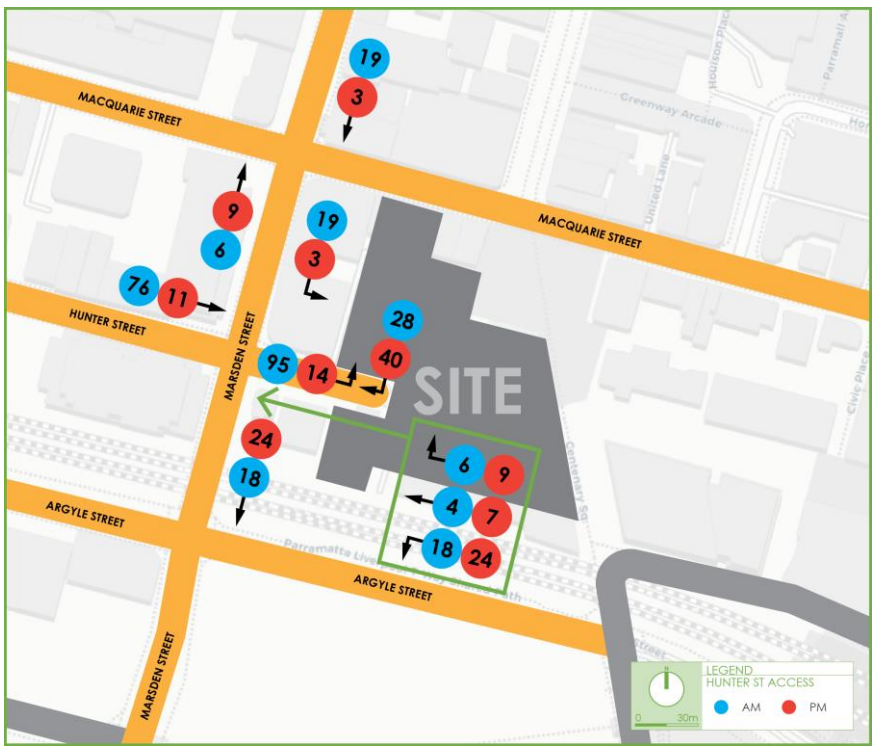


Figure 10: AM and PM Peak period distribution diagram– Hunter Street Access

6.5 Peak Period Intersection Performance

The traffic impacts arising from the proposed development have been assessed by loading the distributed traffic volumes into the SIDRA Intersection model using the distributions detailed in the previous section. As the distributions are based on the total traffic generation of the proposed development rather than the net increase this is considered a conservative assessment. The results of this software modelling are summarised in **Table 6** below, with detailed outputs provided in **Appendix C** for individual lanes and approaches.

Table 6: Intersection Performance Existing Road Layout: Existing + Development Traffic

Intersection Description	Control Type	Scenario	Period	Level of Service	Degree of Saturation	Intersection Delay
Argyle Street & Marsden Street	Signalised	Existing	AM	B	21.1	0.666
		Existing + Hunter St Access		B	26.4	0.494
		Existing	PM	B	28.1	0.577
		Existing + Hunter St Access		B	27.8	0.577
Hunter Street & Marsden Street	Signalised	Existing	AM	A	14.2	0.421
		Existing + Hunter St Access		B	20.6	0.503
		Existing	PM	B	16.0	0.514
		Existing + Hunter St Access		B	17.4	0.516
Macquarie Street & Church Street*	Signalised	Future LR	AM	B	16.7	0.446
		Future LR	PM	B	16.7	0.446

*Hunter Street Access does not increase traffic at this intersection.

It can be seen from Table 6 that the proposed development will have minimal impacts on key intersections analysed above with the only change to existing Levels of Service during the AM peak periods for the Hunter Street access arrangement at the intersection of Hunter Street and Marsden Street. Therefore, the proposed development will not require and changes to the existing road network to accommodate the additional traffic generation.

7. ACCESS AND INTERNAL DESIGN ASPECTS

7.1 Vehicular Access

7.1.1 Standard Requirements

With 220 'Class 1A' vehicle spaces with access on a local road, the development is required to provide a 'Category 2' driveway under AS2890.1. This requires a combined entry exit driveway of 6.0m – 9.0m. In response, the development proposes a 6m driveway with 300mm kerbs on both sides, in compliance with the requirements of AS2890.1.

A number of options were explored for access arrangements which are discussed in the following sections.

7.1.2 Macquarie Street Access

The option of vehicular access from Macquarie Street is currently not possible until Transport for NSW confirms its plans for this corridor. Therefore, this option has not been considered for this assessment as it is unlikely to occur but can be investigated further at DA stage should this frontage become available for vehicular access.

7.1.3 Hunter Street Access

A number of options were explored for vehicular access from Hunter Street and it was determined the access being along the western boundary north of Hunter Street would be ideal to maximise the public domain around the cathedral.

7.1.4 Marsden Street Access

The right of way provided along the south boundary of the site was explored as a potential access however is not considered for the main access for the following reasons:

- Marsden Street is the highest order frontage road and as such is considered the least suitable for vehicular access.
- Two other developments would be accessed via this right of way and the size of the development would result in a significant volume of traffic generation along this right of way. As such, the access facility category would likely be increased to Category 3 and the 6.0m

wide carriageway does not allow for separated entry and exits in accordance with the standard.

- The width of the site frontage to the right of way is limited and combined with the 6.0m wide right of way the ability for vehicles to manoeuvre in and out of the development onto the right of way was determined to be difficult, particular for service vehicles.
- The access being such a significant distance from the north end of the site also complicates servicing arrangement as it would be practical for service vehicles to traverse the basement due to the 6.0m head height clearance required.

Therefore, this access arrangement is not considered a practical or feasible option for the main access to the concept development. However, the a secondary or ancillary access could be investigated as part of the DA process, which would be for light vehicles only.

7.2 Internal Design

The internal basement car park will be required to comply with the requirements of AS 2890.1 (2004) and the following characteristics are noteworthy:

7.2.1 Parking Modules

- All parking spaces are to be designed in accordance with the appropriate User Class in accordance with AS 2890.1 (2004).
- All spaces located adjacent to obstructions of greater than 150mm in height are to be provided with an additional width of 300mm.
- Dead-end aisles are to be provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.
- All disabled parking spaces are to be designed in accordance with AS2890.6. Spaces are provided with a clear width of 2.4m and located adjacent to a minimum shared area of 2.4m.

7.2.2 Ramps

- Access to the site is to be provided via a ramp from Ground Level to Basement Levels with a maximum gradient of 1:6.5 in accordance with AS2890.2 for access by commercial vehicles.

7.2.3 Clear Head heights

- A minimum clear head height of 2.2m is to be provided for all areas within the basement car park as required by AS2890.1. A clear head height of 2.5m is provided above all disabled spaces as required by AS2890.6.
- A headroom of 4.5 metres is required for access to/from the proposed truck loading spaces, with an increased height of 6.0 metres is required within the service area, as stated in Part 4 of the Parramatta City Centre DCP.

7.2.4 Other Considerations

- All columns are required to be located outside of the parking space design envelope shown in Figure 5.2 of AS 2890.1 (2004).
- Appropriate visual splays are to be provided in accordance with the requirements of Figure 3.3 of AS2890.1 at all accesses. Special consideration should be given to maintaining acceptable sight distances at the future interface between the subject development and the adjoining 57 Macquarie Street (Australia Post) site.
- Vehicle control points require a maximum grade of 1:20 for a minimum of 6.0 metres. Furthermore, the max gradient of 1:10 is required for not less than 80% of the queuing length.

7.3 Summary

In summary, the internal layout of the basement car park and loading have generally been designed in accordance with relevant standards (AS2890.1, AS2890.2, AS2890.3 and AS2890.6). It is however envisaged that a detail design would be provided at the Development Application stage demonstrating that the proposed car park is in compliance with AS2890 and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

8. CONCLUSIONS

In summary:

- The development forms part of the redevelopment of the Parramatta Square Precinct and forms an important component of the Parramatta CBD. As part of the CBD, the site is afforded with excellent access to public transport services including both rail and buses providing access to the wider Sydney region. The proposed mixed-use development includes residential, commercial, a place of public worship and retail uses. The proposal also includes a public square incorporating the existing public domain around the church and part of Hunter Street. The main vehicular access is proposed from Hunter Street.
- An expected total of 205 parking spaces are proposed which complies Council's maximum provision of 210 spaces for Option A and 208 spaces for Option B.
- Having regard for the reduced car parking provision proposed, the development will generate 122 trips and 54 trips in the AM and PM peak periods respectively. SIDRA modelling of the future intersection layouts for Marsden Street and Macquarie Street with the additional traffic generation of the concept development demonstrates that the proposed network has sufficient capacity to accommodate to proposed traffic generation of the proposed development
- The main vehicular access arrangement is expected to be from Hunter Street , which is considered the most suitable for vehicular access to a development of this size and scale. An ancillary vehicular access to Marsden Street via the right of way along the southern boundary may be considered as part of the DA process. Based on current advice from Transport for NSW, vehicular access from Macquarie Street is considered unlikely. The internal design will be further considered at DA stage however it is expected the development will comply with all Australian Standards and Council controls.
- It is therefore concluded that the proposed Planning Proposal is supportable on traffic planning grounds and will operate satisfactorily.

This traffic impact assessment therefore demonstrates that the subject application is supportable on traffic planning grounds. TRAFFIX anticipates an ongoing involvement during the development approval process.

.

APPENDIX A

Photographic Record

View looking east towards the site from Hunter Street, Parramatta

View looking west at St John's Parish Hall from within the site.

View looking east at Parramatta Square from within the site

View looking east at St John’s Cathedral from Hunter Street, Parramatta

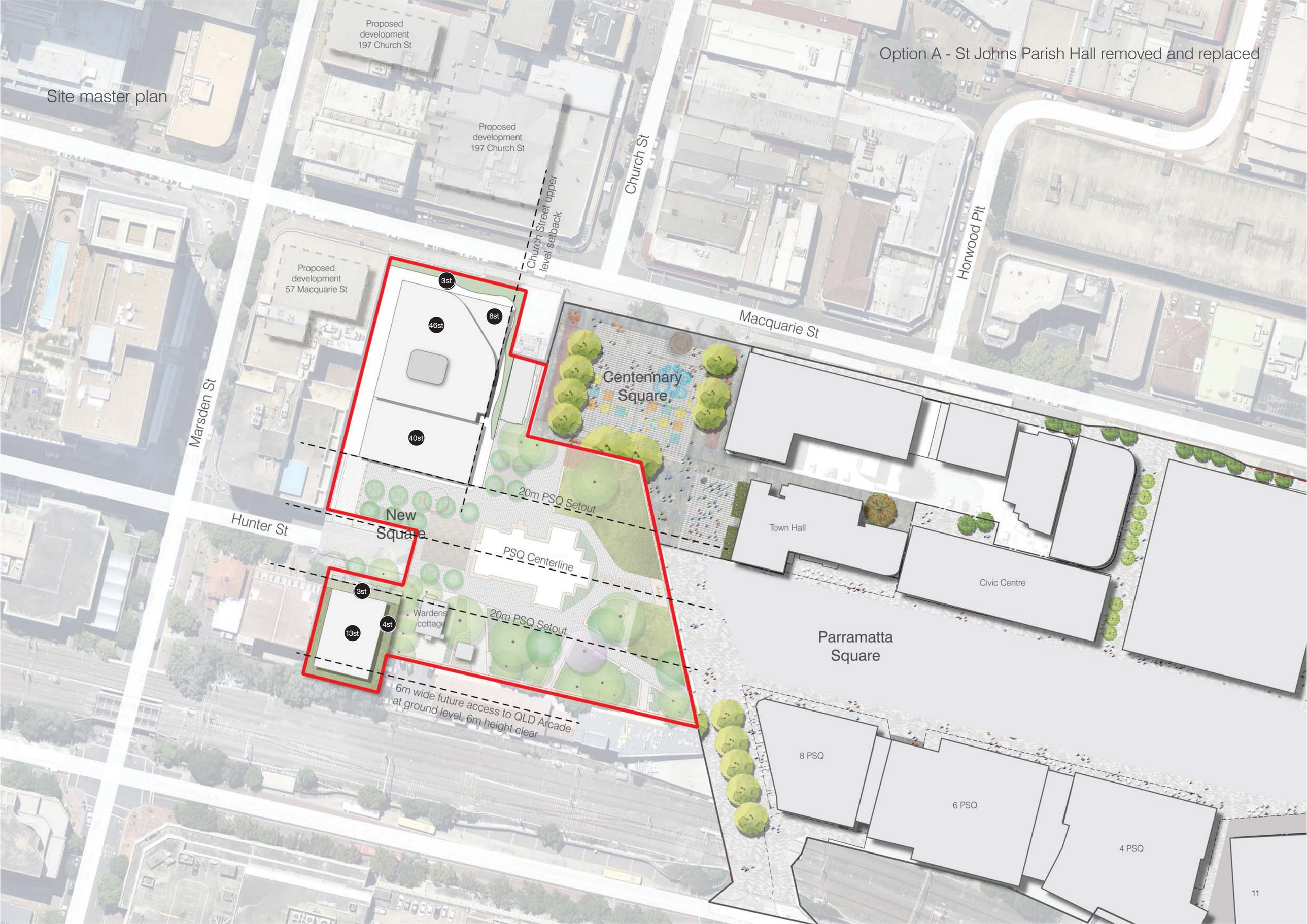
APPENDIX B

Reduced Plans

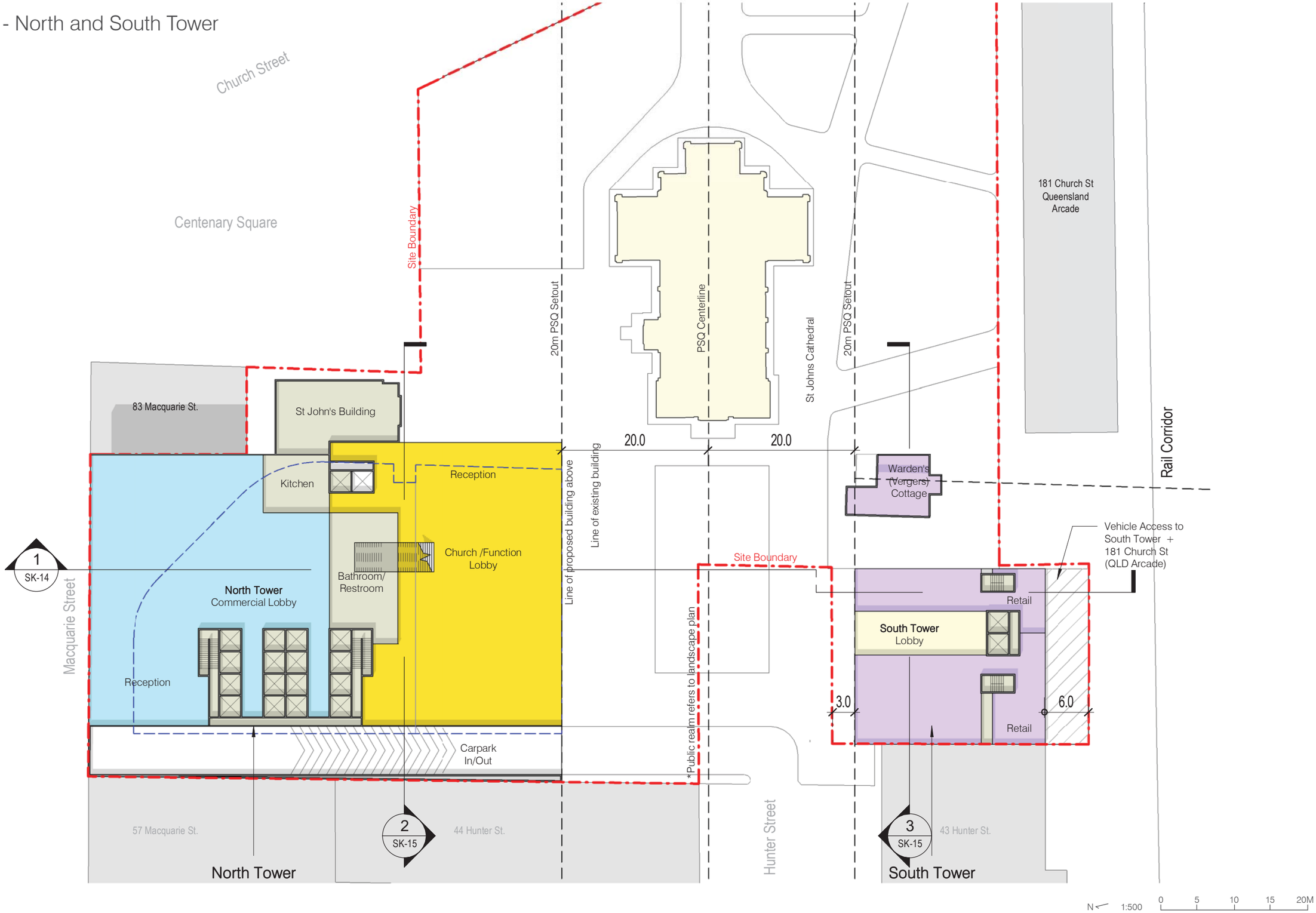
2.0 Design Option A - St John's Parish Hall removed and replaced

Site master plan

Option A - St Johns Parish Hall removed and replaced

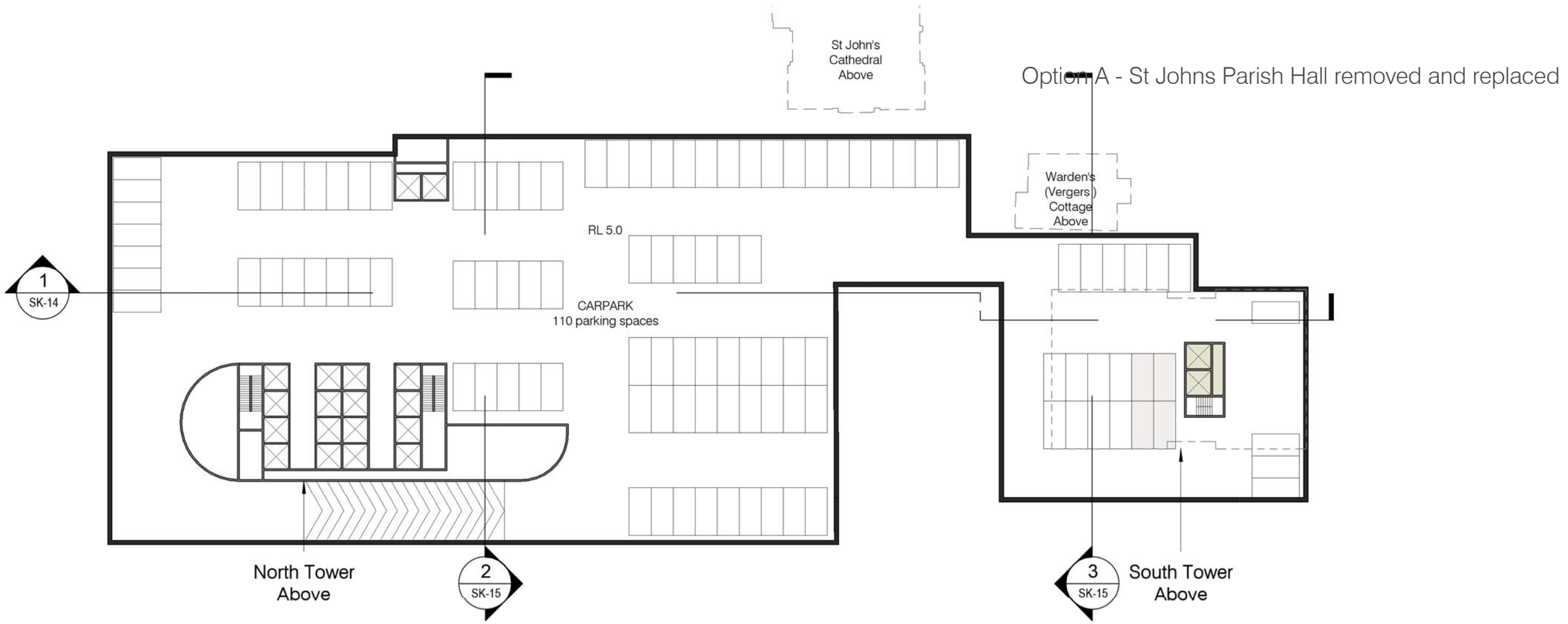


Ground floor - North and South Tower

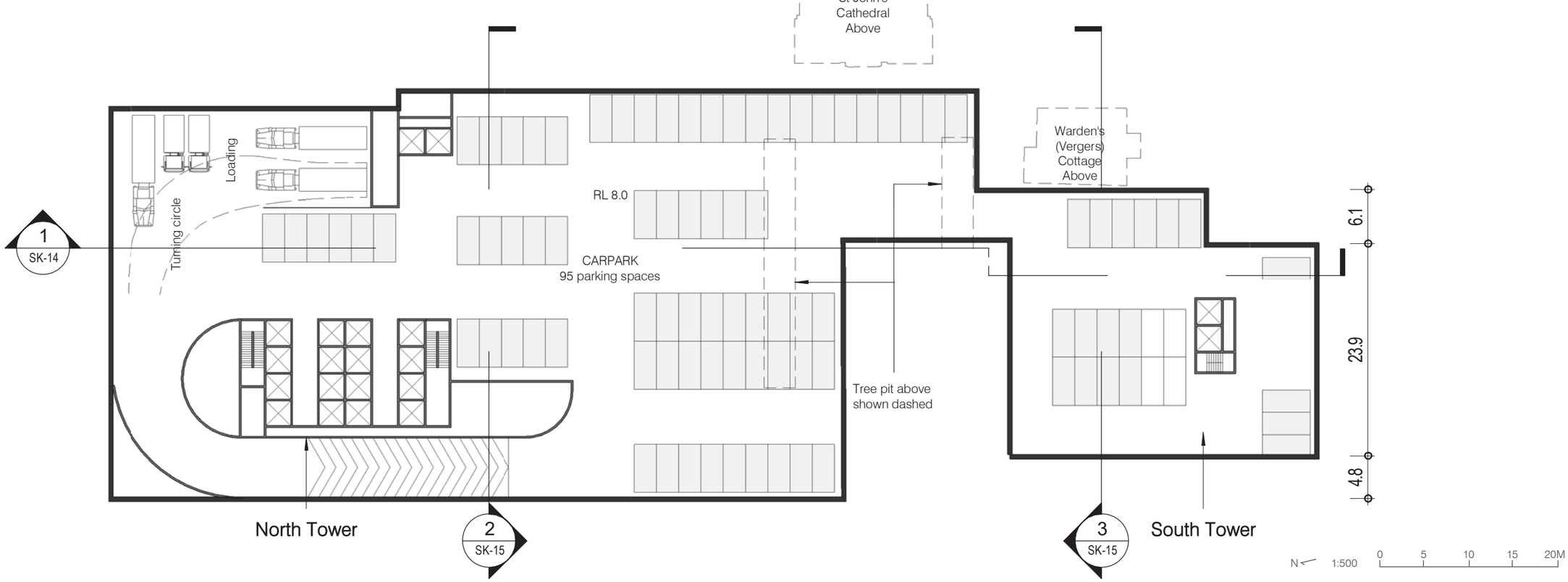


Option A - St Johns Parish Hall removed and replaced

Basement 2



Basement 1



3.0 Design Option B - St John's Parish Hall partially retained

Site master plan

Option B - St Johns Parish Hall partially replaced

Proposed development 197 Church St

Proposed development 197 Church St

Church Street upper level setback

Church St

Horwood Plt

Proposed development 57 Macquarie St

Marsden St

Macquarie St

3st

46st

8st

40st

St John's Hall

Centennary Square

20m PSQ Setout

Hunter St

PSQ Centerline

Town Hall

Civic Centre

3st

13st

4st

Wardens cottage

20m PSQ Setout

Parramatta Square

6m wide future access to QLD Arcade at ground level, 6m height clear

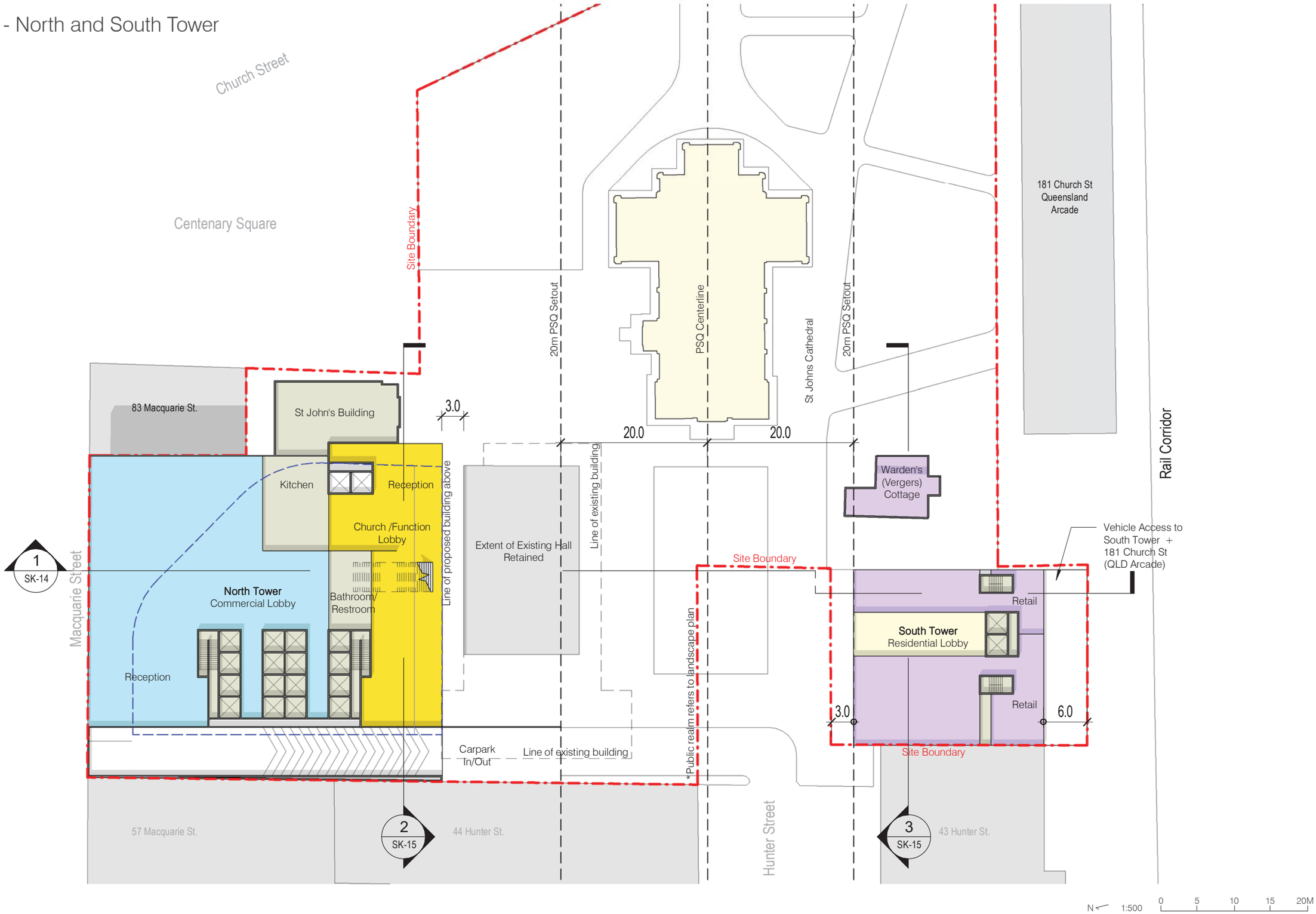
8 PSQ

6 PSQ

4 PSQ

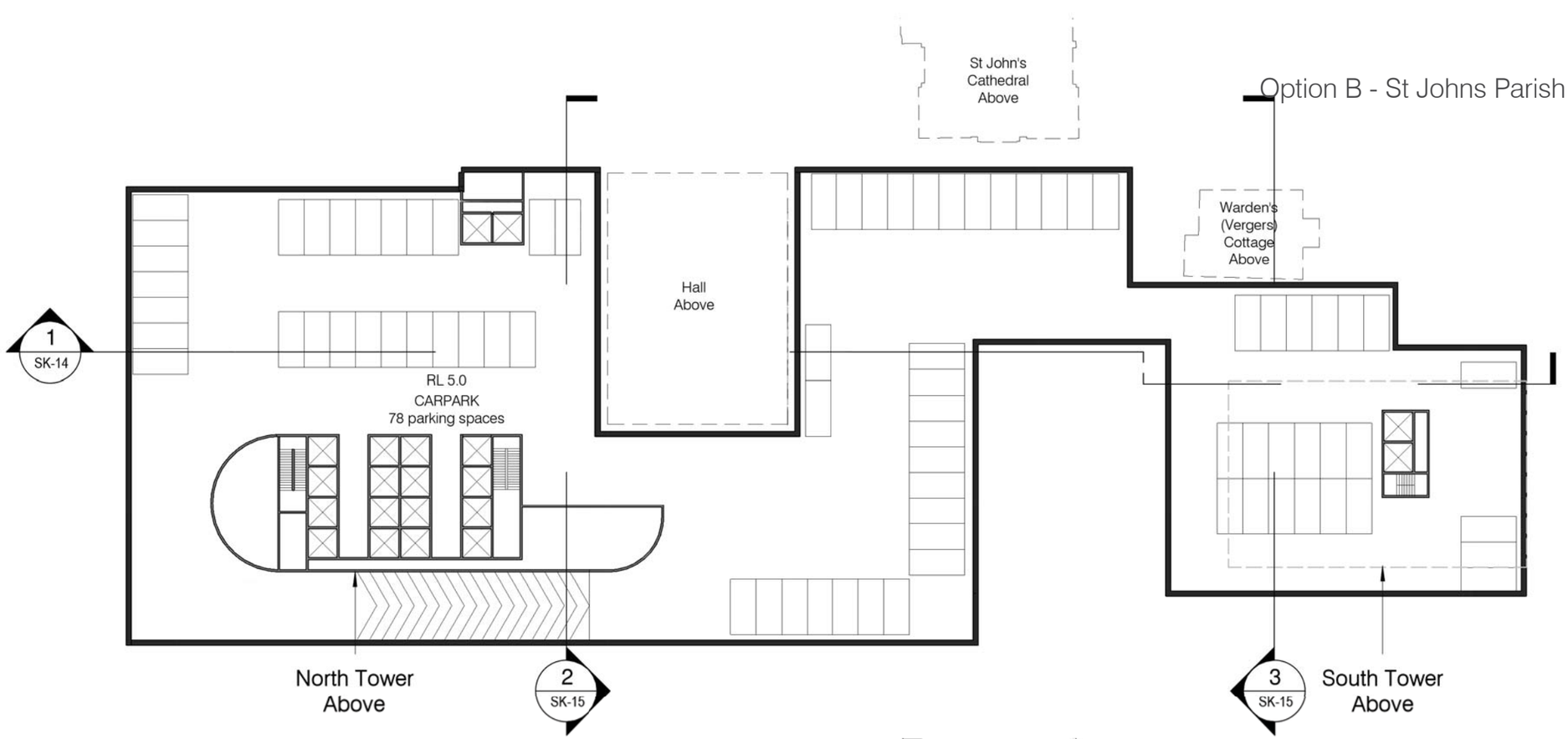
26

Ground floor - North and South Tower

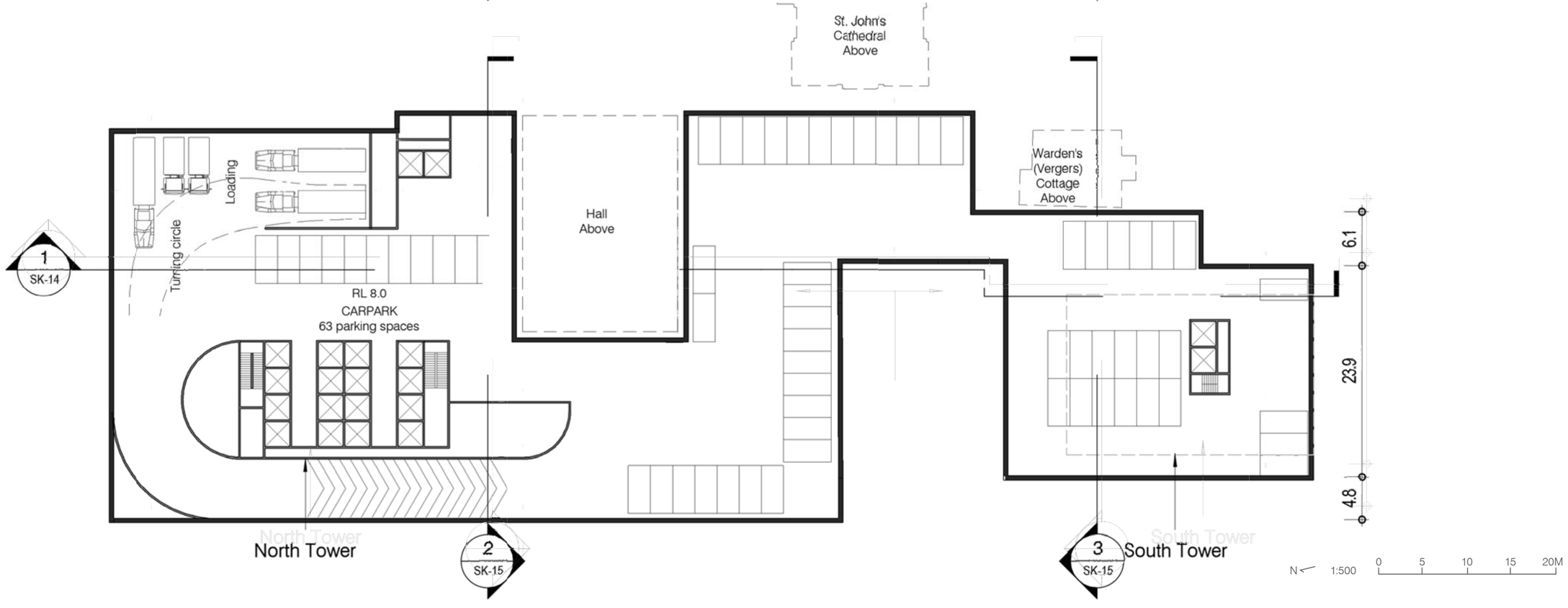


Option B - St Johns Parish Hall partially retained

Basement 2



Basement 1



APPENDIX C

SIDRA Outputs

USER REPORT FOR SITE

All Movement Classes

Project: 17.305m01v03 TRAFFIX Marsden and Macquarie Street Network + Proposed Development

Template: Layouts

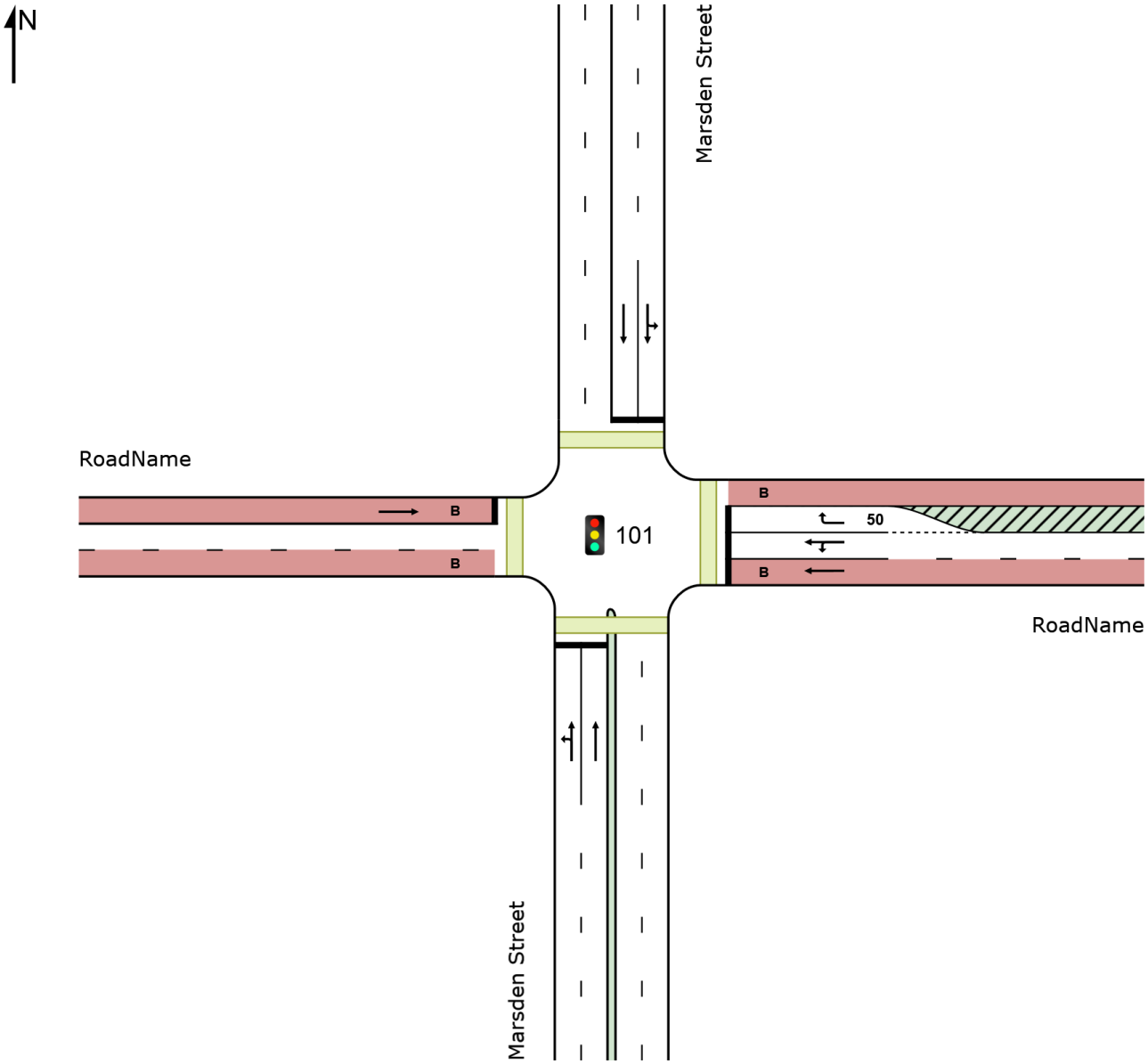
Site: 101 [Argyle and Marsden FU AM (Site Folder: General)]

Intersection: Argyle Street and Marsden Street
Scenario: Existing AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



USER REPORT FOR SITE

All Movement Classes

Project: 17.305m01v03 TRAFFIX Marsden and Macquarie Street Network + Proposed Development

Template: Movement Summaries

Site: 101 [Argyle and Marsden FU AM (Site Folder: General)]

Intersection: Argyle Street and Marsden Street
Scenario: Existing AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Marsden Street														
1	L2	75	5.0	79	5.0	*0.633	24.4	LOS B	12.4	90.4	0.88	0.77	0.88	29.0
2	T1	759	5.0	799	5.0	0.633	19.8	LOS B	12.7	92.5	0.88	0.77	0.88	27.1
Approach		834	5.0	878	5.0	0.633	20.2	LOS B	12.7	92.5	0.88	0.77	0.88	27.3
East: RoadName														
4	L2	38	5.0	40	5.0	0.666	41.9	LOS C	3.8	28.5	1.00	0.84	1.16	22.4
5	T1	121	55.0	127	55.0	*0.666	26.5	LOS B	3.8	28.5	0.94	0.76	1.02	28.1
6	R2	74	20.0	78	20.0	0.562	41.2	LOS C	2.8	23.2	1.00	0.79	1.07	17.7
Approach		233	35.7	246	35.7	0.666	33.7	LOS C	3.8	28.5	0.97	0.78	1.06	22.8
North: Marsden Street														
7	L2	3	0.0	3	0.0	0.381	22.1	LOS B	6.8	49.3	0.78	0.66	0.78	28.3
8	T1	505	5.0	532	5.0	0.381	17.5	LOS B	6.8	49.4	0.78	0.66	0.78	28.8
Approach		508	5.0	535	5.0	0.381	17.6	LOS B	6.8	49.4	0.78	0.66	0.78	28.8
West: RoadName														
11	T1	113	100.0	119	100.0	*0.503	16.9	LOS B	2.7	35.4	0.93	0.74	0.93	35.6
Approach		113	100.0	119	100.0	0.503	16.9	LOS B	2.7	35.4	0.93	0.74	0.93	35.6
All Vehicles		1688	15.6	1777	15.6	0.666	21.1	LOS B	12.7	92.5	0.86	0.74	0.88	27.4

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

* Critical Movement (Signal Timing)

Site: 101 [Argyle and Marsden FU+DEV AM (Hunter) (Site Folder: General)]

Intersection: Argyle Street and Marsden Street
Scenario: Future + Development AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Marsden Street														
1	L2	75	4	79	5.0	* 0.494	27.6	LOS B	17.2	125.9	0.74	0.68	0.74	27.3
2	T1	759	38	799	5.0	0.494	23.0	LOS B	17.6	128.5	0.74	0.66	0.74	25.3
Approach		834	42	878	5.0	0.494	23.4	LOS B	17.6	128.5	0.74	0.66	0.74	25.5
East: RoadName														
4	L2	38	2	40	5.0	0.489	59.9	LOS E	5.9	44.0	0.98	0.78	0.98	18.0
5	T1	121	67	127	55.0	* 0.489	38.9	LOS C	5.9	44.0	0.81	0.64	0.81	23.6
6	R2	74	15	78	20.0	0.413	59.7	LOS E	4.4	36.2	0.97	0.77	0.97	13.9
Approach		233	83	246	35.7	0.489	48.9	LOS D	5.9	44.0	0.89	0.71	0.89	18.3
North: Marsden Street														
7	L2	3	0	3	0.0	0.308	25.1	LOS B	9.8	71.5	0.66	0.57	0.66	26.4
8	T1	523	25	551	4.8	0.308	20.5	LOS B	9.8	71.6	0.66	0.56	0.66	27.0
Approach		526	25	554	4.8	0.308	20.6	LOS B	9.8	71.6	0.66	0.56	0.66	26.9
West: RoadName														
11	T1	113	113	119	100.0	* 0.483	28.7	LOS C	4.7	60.8	0.93	0.75	0.93	27.7
Approach		113	113	119	100.0	0.483	28.7	LOS C	4.7	60.8	0.93	0.75	0.93	27.7
All Vehicles		1706	263	1796	15.4	0.494	26.4	LOS B	17.6	128.5	0.75	0.64	0.75	24.5

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

* Critical Movement (Signal Timing)

Site: 201 [Argyle and Marsden FU PM (Site Folder: General)]

Intersection: Argyle Street and Marsden Street
Scenario: Existing AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Marsden Street														
1	L2	216	5.0	227	5.0	*0.568	28.8	LOS C	19.8	151.4	0.77	0.75	0.77	26.0
2	T1	744	5.0	783	5.0	0.568	23.7	LOS B	22.1	154.4	0.77	0.70	0.77	24.7
Approach		960	5.0	1011	5.0	0.568	24.8	LOS B	22.1	154.4	0.77	0.71	0.77	25.0
East: RoadName														
4	L2	41	5.0	43	5.0	0.493	55.4	LOS D	7.8	58.3	0.96	0.78	0.96	19.0
5	T1	188	55.0	198	55.0	0.529	40.9	LOS C	7.8	58.3	0.96	0.77	0.96	21.9
6	R2	141	20.0	148	20.0	*0.577	56.6	LOS E	8.3	67.9	0.98	0.81	0.98	14.4
Approach		370	36.1	389	36.1	0.577	48.4	LOS D	8.3	67.9	0.97	0.79	0.97	18.2
North: Marsden Street														
7	L2	1	0.0	1	0.0	0.360	25.1	LOS B	11.9	86.7	0.67	0.58	0.67	26.4
8	T1	624	5.0	657	5.0	0.360	20.6	LOS B	11.9	86.7	0.67	0.58	0.67	26.8
Approach		625	5.0	658	5.0	0.360	20.6	LOS B	11.9	86.7	0.67	0.58	0.67	26.8
West: RoadName														
11	T1	102	100.0	107	100.0	*0.574	31.3	LOS C	4.3	56.1	0.97	0.78	0.97	26.5
Approach		102	100.0	107	100.0	0.574	31.3	LOS C	4.3	56.1	0.97	0.78	0.97	26.5
All Vehicles		2057	15.3	2165	15.3	0.577	28.1	LOS B	22.1	154.4	0.78	0.69	0.78	23.8

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

* Critical Movement (Signal Timing)

Site: 201 [Argyle and Marsden FU+DEV PM (Hunter) (Site Folder: General)]

Intersection: Argyle Street and Marsden Street
Scenario: Future + Development PM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Marsden Street														
1	L2	216	11	227	5.0	*0.568	28.7	LOS C	20.5	149.7	0.77	0.74	0.77	26.1
2	T1	744	37	783	5.0	0.568	23.7	LOS B	21.4	155.9	0.77	0.70	0.77	24.7
Approach		960	48	1011	5.0	0.568	24.8	LOS B	21.4	155.9	0.77	0.71	0.77	25.1
East: RoadName														
4	L2	41	2	43	5.0	0.493	55.4	LOS D	7.8	58.3	0.96	0.78	0.96	19.0
5	T1	188	103	198	55.0	0.493	37.4	LOS C	7.8	58.3	0.82	0.67	0.82	23.6
6	R2	141	28	148	20.0	*0.577	56.6	LOS E	8.3	67.9	0.98	0.81	0.98	14.4
Approach		370	134	389	36.1	0.577	46.7	LOS D	8.3	67.9	0.89	0.73	0.89	18.6
North: Marsden Street														
7	L2	1	0	1	0.0	0.374	25.3	LOS B	12.4	90.6	0.67	0.59	0.67	26.4
8	T1	648	31	682	4.8	0.374	20.7	LOS B	12.4	90.6	0.67	0.59	0.67	26.9
Approach		649	31	683	4.8	0.374	20.8	LOS B	12.4	90.6	0.67	0.59	0.67	26.9
West: RoadName														
11	T1	102	102	107	100.0	*0.574	31.3	LOS C	4.3	56.1	0.97	0.78	0.97	26.5
Approach		102	102	107	100.0	0.574	31.3	LOS C	4.3	56.1	0.97	0.78	0.97	26.5
All Vehicles		2081	315	2191	15.1	0.577	27.8	LOS B	21.4	155.9	0.77	0.68	0.77	24.0

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

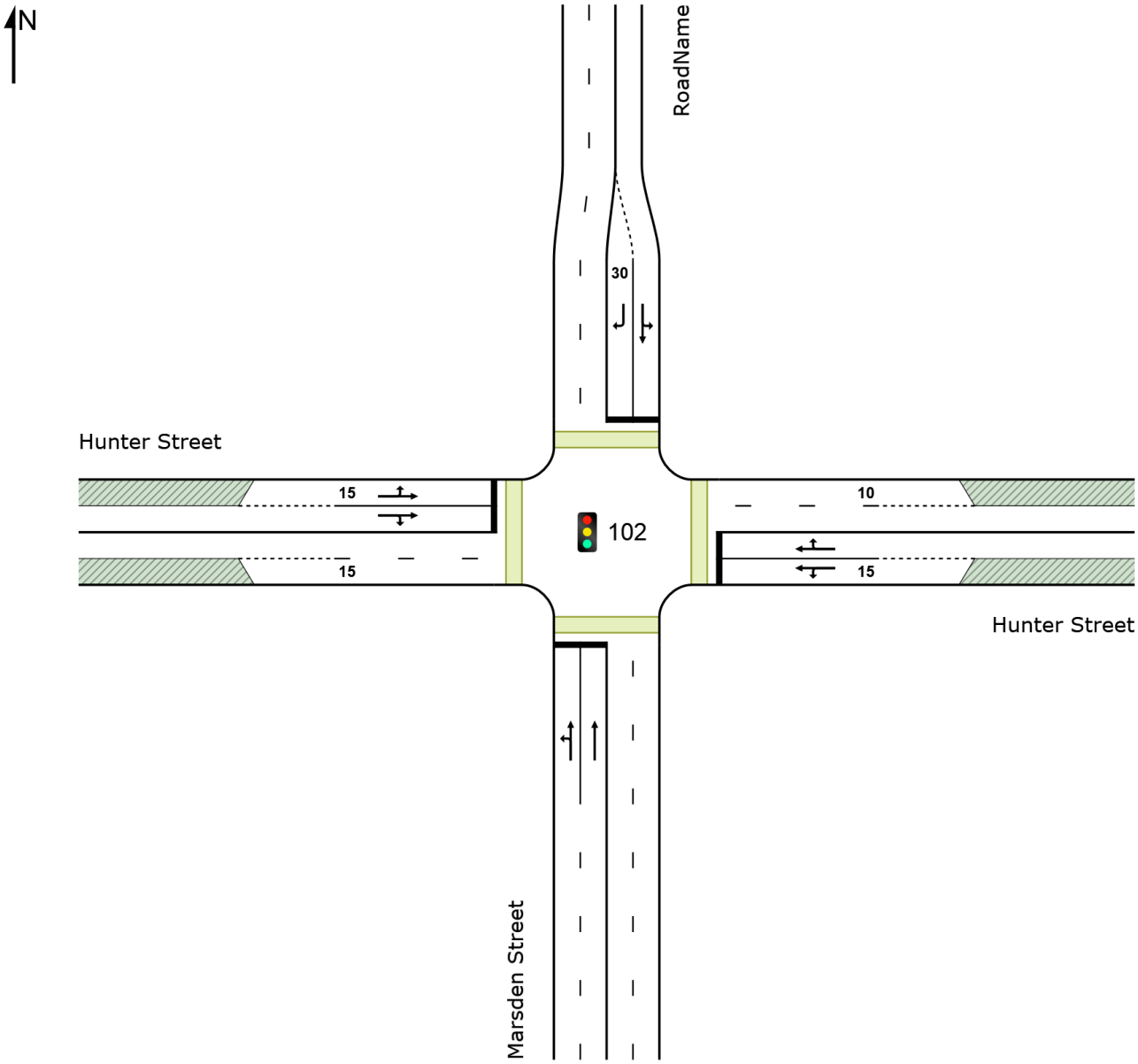
Site: 102 [Hunter and Marsden FU AM (Site Folder: General)]

Intersection: Hunter Street and Marsden Street
Scenario Future AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing (phase reduction applied)
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, C, D

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Site: 102 [Hunter and Marsden FU AM (Site Folder: General)]

Intersection: Hunter Street and Marsden Street
Scenario Future AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing (phase reduction applied)
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, C, D

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Marsden Street														
1	L2	89	5.0	94	5.0	*0.408	18.2	LOS B	13.8	100.6	0.57	0.55	0.57	29.0
2	T1	780	5.0	821	5.0	0.408	13.4	LOS A	14.1	102.7	0.57	0.53	0.57	26.2
Approach		869	5.0	915	5.0	0.408	13.9	LOS A	14.1	102.7	0.57	0.53	0.57	26.5
East: Hunter Street														
4	L2	4	5.0	4	5.0	0.031	57.6	LOS E	0.3	2.1	0.93	0.64	0.93	8.8
5	T1	8	5.0	8	5.0	0.155	56.7	LOS E	1.2	8.6	0.96	0.69	0.96	11.8
6	R2	13	5.0	14	5.0	0.155	61.6	LOS E	1.2	8.6	0.96	0.70	0.96	8.6
Approach		25	5.0	26	5.0	0.155	59.4	LOS E	1.2	8.6	0.95	0.69	0.95	9.7
North: RoadName														
7	L2	30	5.0	32	5.0	0.421	8.8	LOS A	9.1	66.4	0.33	0.31	0.33	24.6
8	T1	472	5.0	497	5.0	0.421	4.1	LOS A	9.1	66.4	0.33	0.31	0.33	38.8
9	R2	93	5.0	98	5.0	*0.176	10.3	LOS A	1.3	9.9	0.46	0.66	0.46	32.9
Approach		595	5.0	626	5.0	0.421	5.3	LOS A	9.1	66.4	0.35	0.37	0.35	36.6
West: Hunter Street														
10	L2	69	5.0	73	5.0	0.147	39.8	LOS C	3.2	23.4	0.79	0.73	0.79	17.2
11	T1	30	5.0	32	5.0	*0.373	55.7	LOS D	3.6	26.6	0.97	0.75	0.97	12.0
12	R2	31	5.0	33	5.0	0.373	60.3	LOS E	3.6	26.6	0.97	0.75	0.97	13.1
Approach		130	5.0	137	5.0	0.373	48.4	LOS D	3.6	26.6	0.88	0.74	0.88	14.8
All Vehicles		1619	5.0	1704	5.0	0.421	14.2	LOS A	14.1	102.7	0.52	0.49	0.52	26.4

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

* Critical Movement (Signal Timing)

Site: 102 [Hunter and Marsden FU+DEV AM (Hunter) (Site Folder: General)]

Intersection: Hunter Street and Marsden Street
Scenario Future+ Development AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing (phase reduction applied)
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, C, D

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Marsden Street														
1	L2	89	4	94	5.0	*0.490	25.9	LOS B	17.3	126.3	0.71	0.66	0.71	23.9
2	T1	780	39	821	5.0	0.490	21.1	LOS B	17.7	129.2	0.71	0.64	0.71	20.7
Approach		869	43	915	5.0	0.490	21.6	LOS B	17.7	129.2	0.71	0.65	0.71	21.1
East: Hunter Street														
4	L2	22	0	23	0.9	0.063	46.1	LOS D	1.1	7.7	0.84	0.70	0.84	10.4
5	T1	12	0	13	3.3	0.118	43.7	LOS D	1.6	11.5	0.86	0.69	0.86	14.5
6	R2	19	1	20	3.4	0.118	48.1	LOS D	1.6	11.5	0.86	0.69	0.86	10.6
Approach		53	1	56	2.4	0.118	46.3	LOS D	1.6	11.5	0.85	0.70	0.85	11.5
North: RoadName														
7	L2	49	2	52	3.1	0.503	14.6	LOS B	14.4	105.2	0.50	0.47	0.50	20.3
8	T1	472	24	497	5.0	0.503	9.4	LOS A	14.4	105.2	0.50	0.47	0.50	30.4
9	R2	93	5	98	5.0	*0.210	15.4	LOS B	2.0	14.8	0.62	0.70	0.62	28.4
Approach		614	30	646	4.8	0.503	10.7	LOS A	14.4	105.2	0.51	0.51	0.51	29.0
West: Hunter Street														
10	L2	69	3	73	5.0	0.108	30.5	LOS C	2.7	19.9	0.68	0.71	0.68	20.2
11	T1	106	2	112	1.4	0.460	42.7	LOS D	7.2	51.4	0.89	0.74	0.89	15.3
12	R2	31	2	33	5.0	*0.460	47.3	LOS D	7.2	51.4	0.89	0.74	0.89	16.3
Approach		206	7	217	3.2	0.460	39.3	LOS C	7.2	51.4	0.82	0.73	0.82	17.0
All Vehicles		1742	81	1834	4.6	0.503	20.6	LOS B	17.7	129.2	0.66	0.61	0.66	21.9

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

* Critical Movement (Signal Timing)

Site: 202 [Hunter and Marsden FU PM (Site Folder: General)]

Intersection: Hunter Street and Marsden Street
Scenario Existing AM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing (phase reduction applied)
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, C, D

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Marsden Street														
1	L2	60	5.0	63	5.0	0.438	23.0	LOS B	15.3	111.4	0.65	0.61	0.65	25.9
2	T1	772	5.0	813	5.0	0.438	18.1	LOS B	15.5	113.1	0.65	0.59	0.65	22.7
Approach		832	5.0	876	5.0	0.438	18.4	LOS B	15.5	113.1	0.65	0.59	0.65	22.9
East: Hunter Street														
4	L2	20	5.0	21	5.0	0.157	62.5	LOS E	1.2	8.8	0.97	0.70	0.97	8.1
5	T1	24	5.0	25	5.0	*0.338	58.6	LOS E	2.7	20.0	0.98	0.74	0.98	11.7
6	R2	21	5.0	22	5.0	0.338	62.9	LOS E	2.7	20.0	0.98	0.74	0.98	8.5
Approach		65	5.0	68	5.0	0.338	61.2	LOS E	2.7	20.0	0.98	0.73	0.98	9.6
North: RoadName														
7	L2	31	5.0	33	5.0	0.514	8.4	LOS A	10.4	75.9	0.32	0.31	0.32	25.0
8	T1	552	5.0	581	5.0	*0.514	3.7	LOS A	10.4	75.9	0.32	0.31	0.32	39.6
9	R2	162	5.0	171	5.0	0.254	10.7	LOS A	2.6	18.9	0.50	0.69	0.50	32.4
Approach		745	5.0	784	5.0	0.514	5.4	LOS A	10.4	75.9	0.36	0.39	0.36	36.6
West: Hunter Street														
10	L2	63	5.0	66	5.0	0.108	33.3	LOS C	2.6	19.1	0.72	0.71	0.72	19.2
11	T1	10	5.0	11	5.0	0.322	58.6	LOS E	2.5	18.3	0.98	0.74	0.98	11.4
12	R2	31	5.0	33	5.0	0.322	63.2	LOS E	2.5	18.3	0.98	0.74	0.98	12.5
Approach		104	5.0	109	5.0	0.322	44.7	LOS D	2.6	19.1	0.82	0.72	0.82	15.7
All Vehicles		1746	5.0	1838	5.0	0.514	16.0	LOS B	15.5	113.1	0.55	0.52	0.55	24.9

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

* Critical Movement (Signal Timing)

USER REPORT FOR SITE

All Movement Classes

Project: 17.305m01v04 TRAFFIX Marsden and Macquarie Street Network + Proposed Development

Template: Movement Summaries

Site: 202 [Hunter and Marsden FU+DEV PM (Hunter) (Site Folder: General)]

Intersection: Hunter Street and Marsden Street
Scenario Future + Development PM
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing (phase reduction applied)
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, C, D

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Marsden Street														
1	L2	60	3	63	5.0	0.438	23.0	LOS B	15.3	111.4	0.65	0.61	0.65	25.9
2	T1	772	39	813	5.0	0.438	18.1	LOS B	15.5	113.1	0.65	0.59	0.65	22.7
Approach		832	42	876	5.0	0.438	18.4	LOS B	15.5	113.1	0.65	0.59	0.65	22.9
East: Hunter Street														
4	L2	44	1	46	2.3	0.338	63.8	LOS E	2.7	19.3	0.99	0.74	0.99	8.1
5	T1	31	1	33	3.9	*0.462	59.5	LOS E	3.8	27.3	0.99	0.76	0.99	11.6
6	R2	30	1	32	3.5	0.462	63.8	LOS E	3.8	27.3	0.99	0.76	0.99	8.5
Approach		105	3	111	3.1	0.462	62.5	LOS E	3.8	27.3	0.99	0.75	0.99	9.3
North: RoadName														
7	L2	34	2	36	4.6	0.516	8.5	LOS A	10.5	76.5	0.32	0.31	0.32	24.9
8	T1	552	28	581	5.0	*0.516	3.7	LOS A	10.5	76.5	0.32	0.31	0.32	39.6
9	R2	162	8	171	5.0	0.254	10.7	LOS A	2.6	18.9	0.50	0.69	0.50	32.4
Approach		748	37	787	5.0	0.516	5.5	LOS A	10.5	76.5	0.36	0.39	0.36	36.6
West: Hunter Street														
10	L2	63	3	66	5.0	0.108	33.3	LOS C	2.6	19.1	0.72	0.71	0.72	19.2
11	T1	21	1	22	2.4	0.399	59.1	LOS E	3.2	23.1	0.99	0.75	0.99	11.6
12	R2	31	2	33	5.0	0.399	63.7	LOS E	3.2	23.1	0.99	0.75	0.99	12.6
Approach		115	5	121	4.5	0.399	46.2	LOS D	3.2	23.1	0.84	0.73	0.84	15.4
All Vehicles		1800	87	1895	4.8	0.516	17.4	LOS B	15.5	113.1	0.56	0.53	0.56	23.9

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

* Critical Movement (Signal Timing)

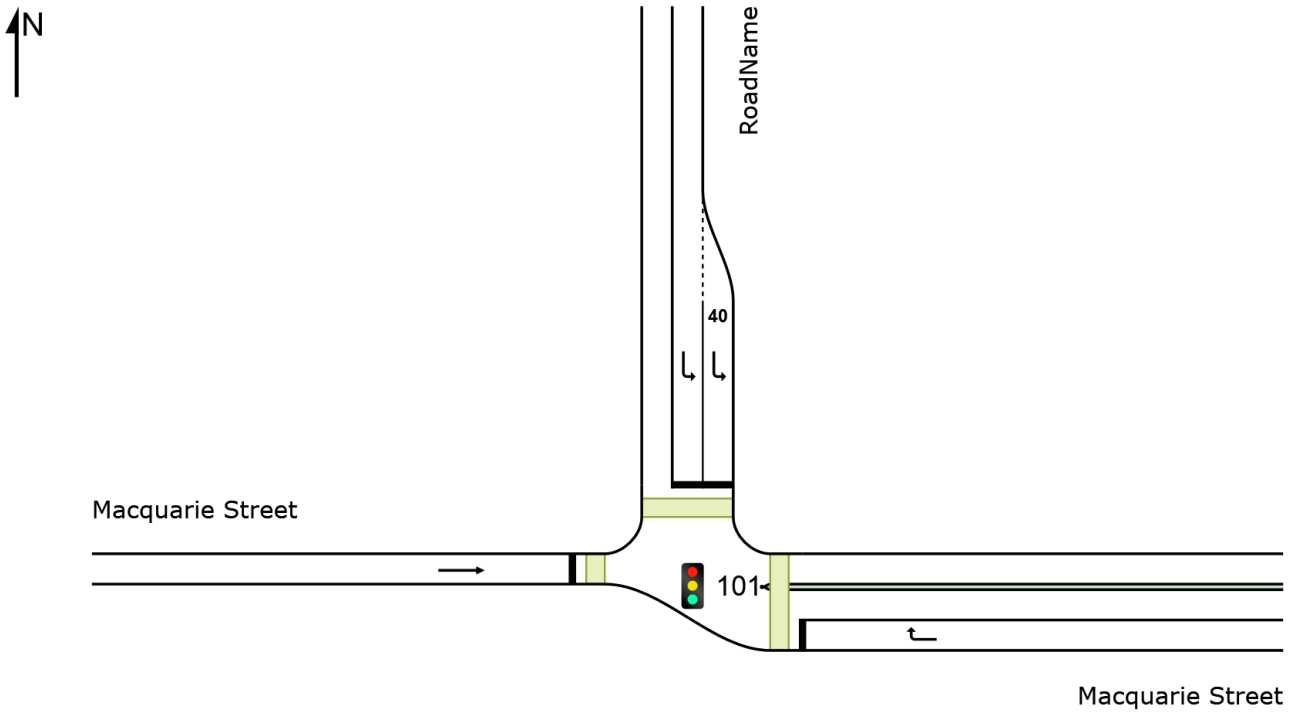
Site: 101 [Macquarie St Church St w LR FU - AM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Site: 101 [Macquarie St Church St w LR FU - AM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Macquarie Street														
6	R2	6	6	6	100.0	0.088	32.5	LOS C	0.2	5.2	0.93	0.65	0.93	18.4
Approach		6	6	6	100.0	0.088	32.5	LOS C	0.2	5.2	0.93	0.65	0.93	18.4
North: RoadName														
7	L2	8	7	8	87.5	* 0.103	32.1	LOS C	0.2	6.1	0.93	0.65	0.93	21.6
Approach		8	7	8	87.5	0.103	32.1	LOS C	0.2	6.1	0.93	0.65	0.93	21.6
West: Macquarie Street														
11	T1	268	54	282	20.1	* 0.446	15.9	LOS B	6.4	52.6	0.80	0.68	0.80	24.6
Approach		268	54	282	20.1	0.446	15.9	LOS B	6.4	52.6	0.80	0.68	0.80	24.6
All Vehicles		282	67	297	23.8	0.446	16.7	LOS B	6.4	52.6	0.81	0.68	0.81	24.4

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

* Critical Movement (Signal Timing)

Site: 101 [Macquarie St Church St w LR FU - PM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Macquarie Street														
6	R2	6	6	6	100.0	0.088	32.5	LOS C	0.2	5.2	0.93	0.65	0.93	18.4
Approach		6	6	6	100.0	0.088	32.5	LOS C	0.2	5.2	0.93	0.65	0.93	18.4
North: RoadName														
7	L2	8	7	8	87.5	* 0.103	32.1	LOS C	0.2	6.1	0.93	0.65	0.93	21.6
Approach		8	7	8	87.5	0.103	32.1	LOS C	0.2	6.1	0.93	0.65	0.93	21.6
West: Macquarie Street														
11	T1	268	54	282	20.1	* 0.446	15.9	LOS B	6.4	52.6	0.80	0.68	0.80	24.6
Approach		268	54	282	20.1	0.446	15.9	LOS B	6.4	52.6	0.80	0.68	0.80	24.6
All Vehicles		282	67	297	23.8	0.446	16.7	LOS B	6.4	52.6	0.81	0.68	0.81	24.4

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

* Critical Movement (Signal Timing)