Traffic Impact Assessment

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

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1. Introduction

TRAFFIX has been commissioned by Anglican Church Property Trust Diocese of Sydney as Trustee of the Parish of Parramatta (ACPT) and St John's Parramatta Endowment Fund 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) and the City of Parramatta Local Environmental and Development Control Plan.

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, a retail, commercial and residential building to the south and office and retail premises at Marsden & Hunter Street to the west. The site is located approximately 200m North West 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 – Community Centre	1,015 m^2
	St John's Cathedral – Church & grounds	6,587 m^2
45 Hunter Street	Commercial Development	844 m^2

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 close proximity to the site.

Figure 1: Location Plan

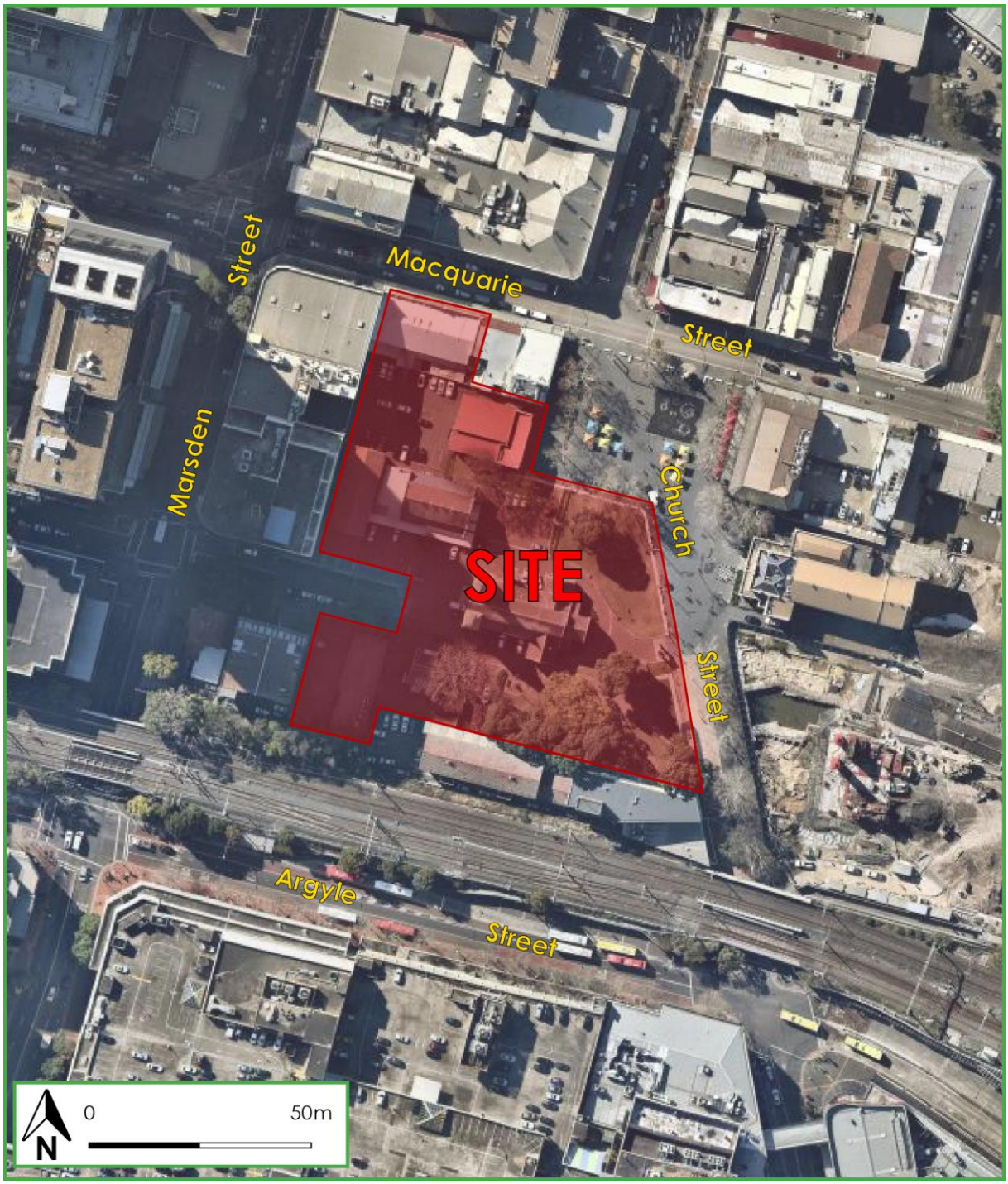

Figure 2: Site Plan

3. Existing Traffic Conditions

3.1 Road Hierarchy

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

- Macquarie Street: a local road that runs in an east-west direction between Harris Street and Pitt Street. It runs one-way (westbound) between Harris Street and O'Connell Street and one-way (eastbound) to the west of O'Connell Street. Macquarie Street is subject to a 50km/h speed zoning.
- Church Street: a local road that runs in a north-south direction to the west of the Civic Precinct where it forms a pedestrian mall between Macquarie Street and Darcy Street. An overhead rail bridge is provided at its intersection with Darcy Street which has a height clearance of 3.9 metres.
- Marsden Street: a local collector road which traverses in a north-south direction between Victoria Road in the north and the Great Western Highway in the south.
- Hunter Street: a local road which traverses in an east-west direction between Pitt Street in the west and a cul-de-sac configuration in the east.

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.

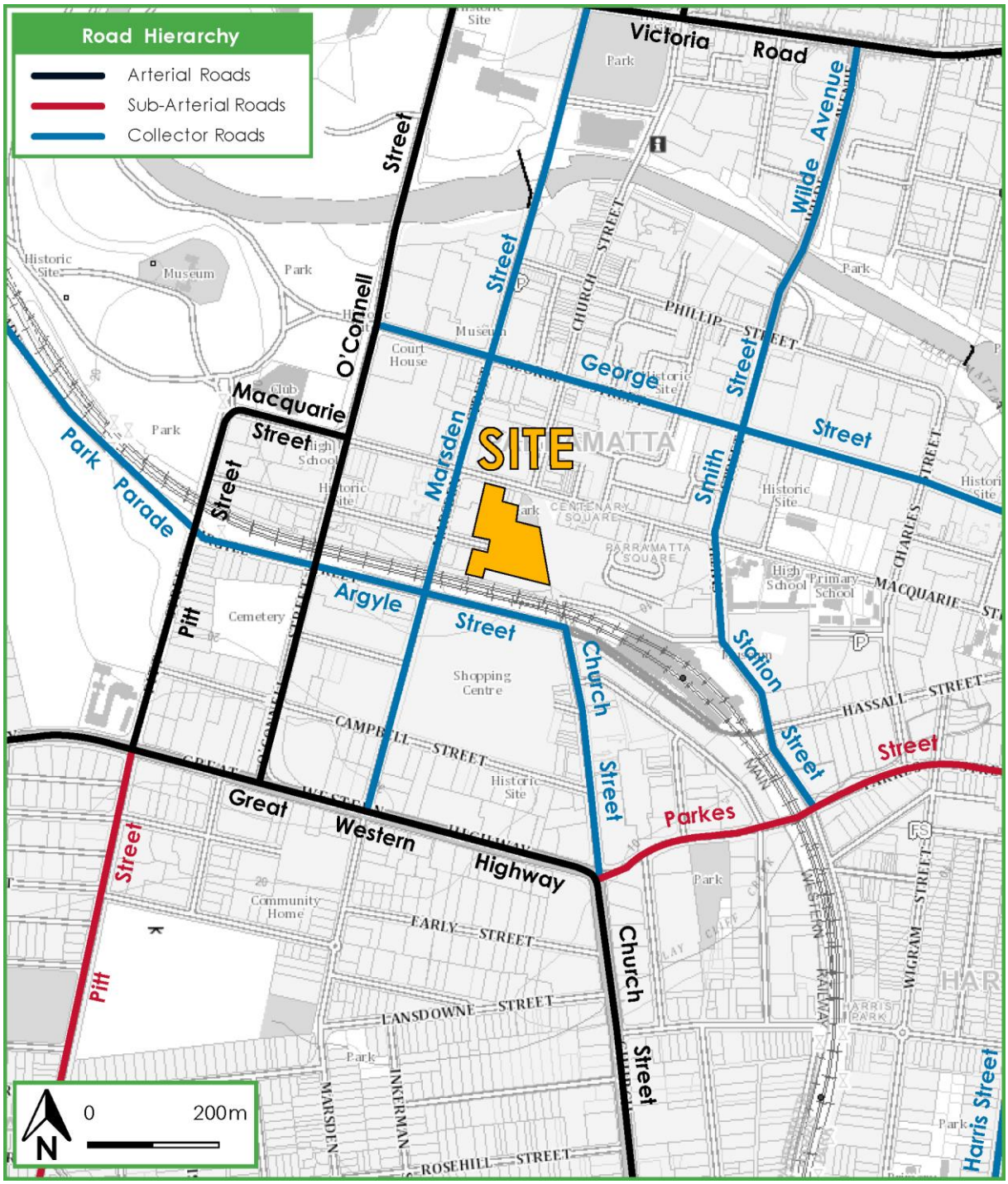

Figure 3: Road Hierarchy

3.2 Existing Services

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 7**.

The existing bus services that operate in the locality are shown in **Figure 7**. The site benefits from excellent bus services being situated within 400 metres of seven (7) 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. Details of these services are provided in **Table 2**, overleaf.

The site is located approximately 750m south west 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 7**.

In addition to the Bus Routes described above, the Parramatta Shuttle Bus (Service Number 900) is a free service which connects tourists, residents and commuters to the commercial, retail and recreational sites within the Parramatta CBD. The Service operates every ten minutes between 7:00am and 6:30pm Monday – Friday and 8:00am - 4:00pm Saturday, Sunday and Public Holidays. A copy of the Shuttle Service Route is provided in **Figure 8**.

Table 2: Bus Services Destination and Attributes.

Bus Number	Operating from	Destinations	Service Operations
520	Parramatta to City	University of Western Sydney, Rydalmere, Ermington, West Ryde, Ryde, Gladesville, Drummoyne, Rozelle, White Bay, City	Daily early morning and evening service
521	Eastwood to Parramatta	Carlingford, Dundas, Rydalmere	Monday – Saturday service
523	West Ryde to Parramatta	West Ryde Station, Melrose Park, Ermington, Rydalmere	Daily full time service
524	West Ryde to Parramatta	West Ryde Station, Melrose Parking, Ermington, Rydalmere	Daily full time service
525	Burwood to Parramatta	Western Sydney University, Rydalmere, Ermington, Silverwater, Newington, Sydney Olympic Park, Strathfield	Service operates daily
545	Chatswood to Parramatta	Parramatta, Telopea, Dundas Valley, Eastwood, Macquarie University, Macquarie Centre and Chatswood	Daily full time service
546	Epping Station / North Rocks to Parramatta	North Parramatta, Oatlands, Carlingford, North Rocks, Epping	Daily full time service
547	Parramatta Station to Macarthur Street	Parramatta & North Parramatta	Monday to Friday service
549	Epping to Parramatta	North Parramatta, North Rocks, Carlingford, Epping	Daily full time service
552	Oatlands/ North Rocks to Parramatta	North Parramatta, Oatlands	Monday to Friday service
600	Castle Hill to Parramatta	West Pennant Hills, Cherrybrook, Castle Hill, Baulkham Hills, Northmead, North Parramatta	Early morning and late evening daily service
601	Rouse Hill to Parramatta	Beaumont Hills, Kellyville, Castle Hill, Baulkham Hills, Northmead, North Rocks, North Parramatta	Daily full time service
603	Rouse Hill to Parramatta	Kellyville, Glenhaven, Castle Hill, East Baulkham Hills	Monday to Saturday. Service operates between Rouse Hill Town Centre and Castle Hill only on Sunday and Public Holidays
604	Castle Hill to Parramatta	Northmead, Winston Hills, Baulkham Hills, Showground Road	Monday to Saturday
606	Winston Hills to Parramatta	Northmead , Old Windsor Road	Service operates daily
700	Blacktown to Parramatta	Pendle Hill. Girraween, Prospect & Blacktown Hospital	Service operates daily
705	Blacktown to Parramatta	Lalor Park, Seven Hills, Toongabbie, Girraween, Pendle Hill, Wentworthville, Westmead Hospital	Service operates daily
708	Constitution Hill to Parramatta	Old Toongabbie, Pendle Hill, Wentworthville, Westmead Hospital	Monday to Friday
711	Blacktown to Parramatta	Lalor Park, Seven Hills, Toongabbie, Wentworthville, Westmead Hospital, Westmead	Service operates daily

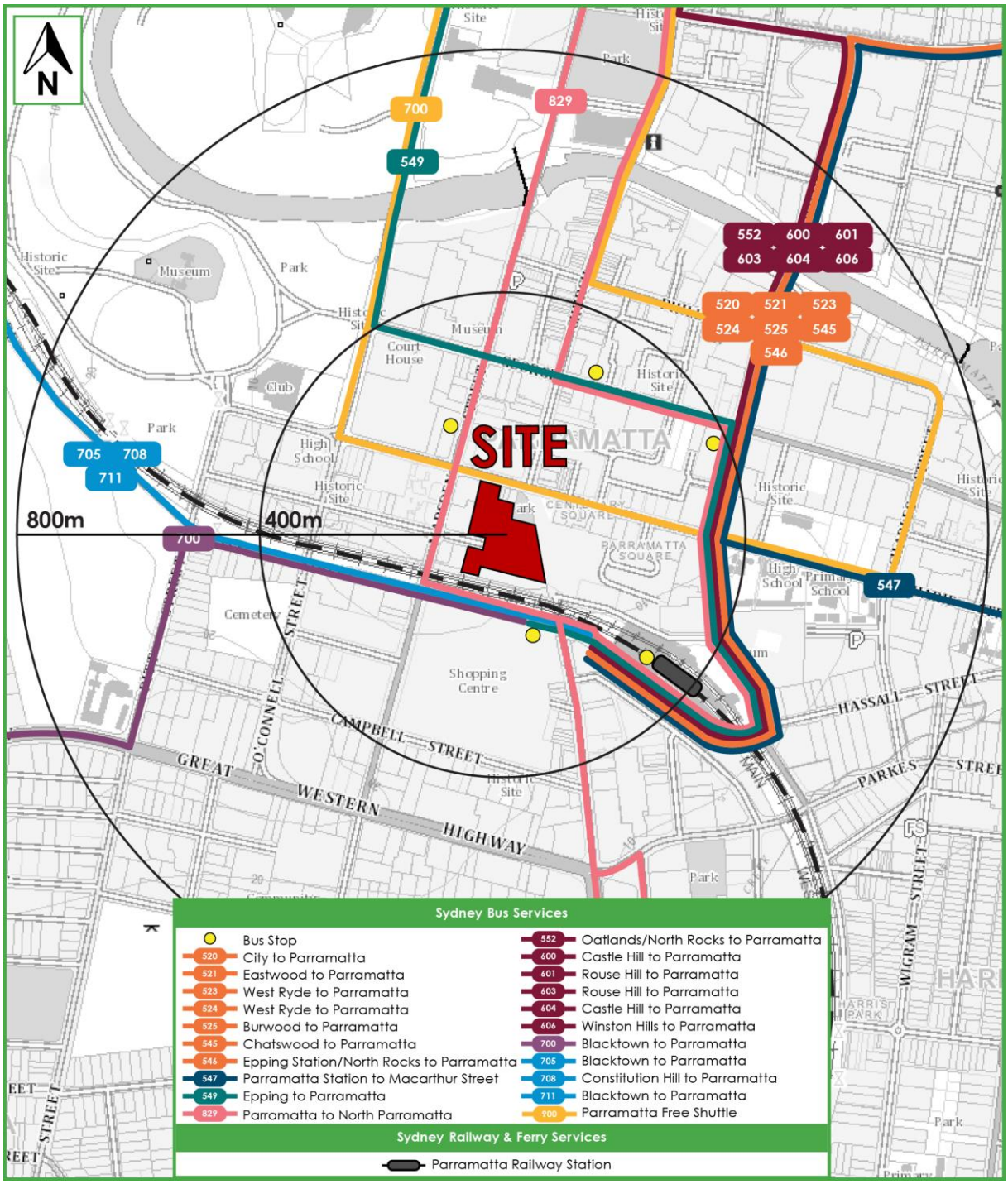

Figure 4: Public Transport

Figure 5: Transdev's Parramatta Free Shuttle Service Route

3.3 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 the critical intersections for the site.

3.4 Existing Intersection Operation

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:

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity 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 2** overleaf. Reference should also be made to the SIDRA outputs provided in **Appendix B** which provide detailed results for individual lanes and approaches.

Table 3: Intersection Performance - Existing

Intersection Description	Control Type	Period	Level of Service	Degree of Saturation	Intersection Delay
Argyle Street & Marsden Street	Signalised	AM	B	25.7	0.730
		PM	C	30.1	0.773
Hunter & Marsden Street	Signalised	AM	A	11.8	0.611
		PM	A	11.6	0.583
Macquarie Street & Church Street	Signalised	AM	A	3.8	0.233
		PM	A	4.0	0.360

It can be seen from Table 3 that the intersections of Hunter Street / Marsden Street and Macquarie Street/ Church Street operate satisfactorily under the existing 'base case' scenario, with a Level of Service (LoS) A, during all peak periods and with minimal delays. The intersection of Argyle Street / Marsden Street operates at an acceptable Level of Service (LoS) B in the AM peak period and C during the PM peak period.

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**.

3.4.1 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 RMS, 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 6**, overleaf.

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

3.4.2 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 7**, below.

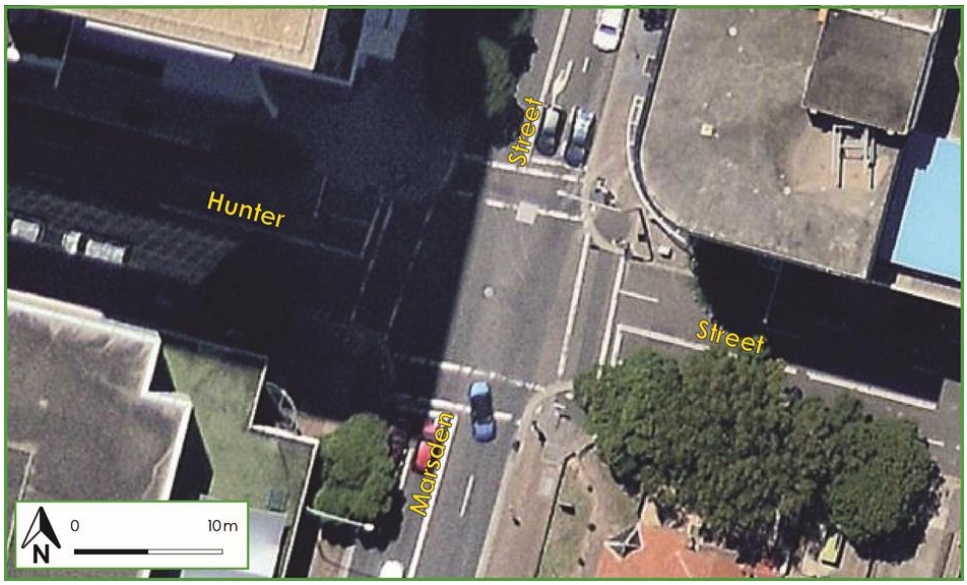

Figure 7: Aerial photo of intersection of Marsden Street and Hunter Street, Parramatta

3.4.3 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 a signalised T-intersection. Macquarie Street is restricted to one-way traffic flow westbound and Church Street is restricted to one-way traffic flow northbound. All legs provide pedestrian footpaths on both sides of the street. An aerial image of the intersection is provided in **Figure 8**, overleaf.

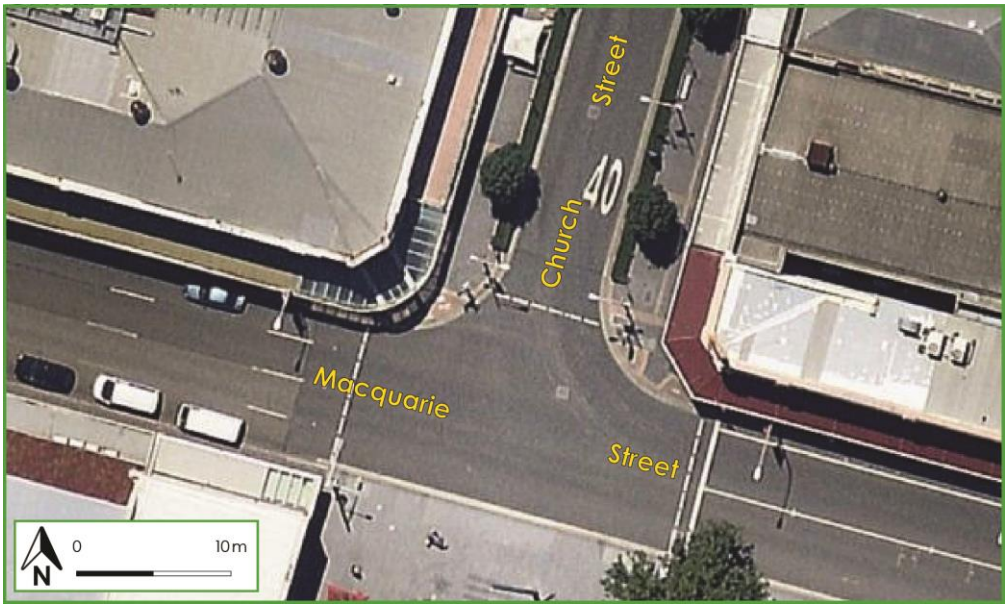

Figure 8: Aerial photo of intersection of Macquarie Street and Church Street, Parramatta

4. Description of Future Development

4.1 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 a total of 52,575m^2 commercial GFA, 838m^2 retail GFA, 5,368m^2 Place of Public Worship and 14,224 m^2 residential GFA as follows:

- Northern Tower
  - 46 storeys + plant
- Southern Tower
  - 43 storeys + plant
- A public square at the Hunter Street cul-de-sac
- A public laneway connecting the square to Macquarie Street
- A common two (2) level basement car park with access from Macquarie Street providing:
  - Up to 220 car parking spaces
  - 267 bicycle parking spaces
  - Three (3) loading bays two (2) of which are capable of accommodating an 8.8m MRV.

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

4.2 Description of Proposed Light Rail

The Western Sydney Light Rail Network (WSLRN) is planned for the Parramatta CBD area with the proposed service providing connections between Castle Hill, Macquarie Park, Rhodes and Bankstown. The proposed lines will run along Macquarie Street and Church Street. The Parramatta Square stop is proposed adjacent to the subject site on Macquarie Street. A map of the preferred route for the WSLRN is provided in **Figure 5** below for reference.

Figure 5: Transdev's Parramatta Free Shuttle Service Route

4.3 Description of Proposed Road Network

According to GTA's *Parramatta Light Rail, Operational Traffic and Transport Technical Assessment Report* dated August 2018 a light rail and pedestrian zone is proposed in Church Street between Market Street and Macquarie Street, including the Lennox Bridge. There are no traffic lanes are proposed in

Church Street between Market Street and Macquarie Street with a single northbound lane provided on the south approach to the Church Street / Market Street intersection to maintain property access only. All parking and loading is proposed to be removed along Church Street.

As such, the intersection of Church Street and Macquarie Street is proposed to maintain signalised control. However, Macquarie Street will be altered to one-way eastbound.

The proposed intersection layout and operation for Church Street and Macquarie Street undertaken by GTA Consultants is included in **Appendix D** for reference.

5. Parking Requirements

5.1 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 requirement of the proposed development have been assessed against the parking rates of the City of Sydney Local Environmental Plan 2012 and are summarised in **Table 4** below.

Table 4: Council Maximum Parking Rates and Provision

Type	Area (GFA) / No	Council DCP Parking Rates	Maximum allowable spaces	Proposed parking provision
Retail	838 m^2	See Formula *	158	220
Commercial	52,575 m^2			
Residential	84	0.3 spaces per 1-bedroom dwelling	25	
	84	0.7 spaces per 2-bedroom dwelling	59	
		Totals	242	220

* 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 4 that the development is permitted to provide a maximum of 242 spaces under Council's controls for the retail, commercial and residential components of the proposed development. In the City of Sydney Local Government Area, a development application seeking consent for a land use for which there is no maximum car parking rate prescribed by the LEP is to be accompanied by a 'Parking and Access Report'. The report includes an assessment of the appropriate provision of on-site car parking. It is considered that the parking requirements of the Place of Public Worship component of the proposed development will be subject to this assessment at the Development Application Stage. In response to the maximum parking control under the LEP as detailed in Table 4 above, a total of 220 spaces are proposed which complies with the maximum permissible parking provision under the relevant controls and is considered to be supportable noting the following:

- The indicative retail tenancies are of a relatively small size and therefore future businesses are expected to be of a nature that will service staff and visitors of the proposed development and other surrounding land uses. As such, the ground floor retail uses are unlikely to generate significant visitor parking demands with on-site provision for staff only being considered acceptable. As such, an allocation of one (1) space for each retail tenancy would be a reasonable allowance.

- Parramatta Railway Station and the bus interchange are located adjacent to the site. As such, the site benefits from excellent access to the wider public transport network and is therefore a prime example of a candidate site for reduced car parking provision to encourage the use of these services which is a key objective of NSW State Government planning.

In summary, the proposed car parking provision is considered appropriate for the subject development and will encourage the use of public transport and other non-car travel modes to access the site. In this regard, the parking rates adopted are considered to embrace the State Government objectives to promote the use of public transport for commuter trips.

5.2 Adaptable and Disabled Parking

Schedule 7.8.5 of the City of Sydney Council's DCP 2012 states the following requirements with regard to 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 a rate of one bicycle parking space per 200m^2 commercial / retail GFA or part thereof. As such, the development is nominally required to provide 267 bicycle parking spaces.

5.4 Motorcycle Facilities

Council's DCP requires an area equal to a minimum of one motorcycle space to be provided as separate parking for motorcycles for every 25 on-site car parking spaces provided, or part thereof. Therefore, the development is required to provide 44 motorcycle bicycle parking spaces 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 4,000m^2 for the first 20,000m^2 GFA, plus
  - 1 space per 8,000m^2 over 20,000m^2 GFA
- Retail (all spaces for trucks)
  - 5 + 1 space per 1,000m^2 for more than 2,000m^2 GFA

Application of these rates to the subject development results in a requirement to provide up to 13 service vehicle spaces. However, the proposed retail tenancies are relatively small in size 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 three (3) 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 Impacts

6.1 Trip Generation

From the GFA of the commercial and residential developments provided in Table 3 above it is evident that approximately 33% of the proposed development will be residential. Commercial will equate for 67% when considering these two uses only. It is highly noteworthy that the retail development is considered negligible for the scale of the proposal and the place of public worship is likely to generate is peak traffic volumes outside of the network peak.

The RMS *Guide to Traffic Generating Developments* recommends a traffic generation rate of 1.6 and 1.2 trips per 100m^2 GFA for commercial developments in the AM and PM peak periods, respectively. However, this rate assumes an unconstrained car parking provision (1 space per 40m^2 GFA) and is therefore not considered applicable to the subject development. Therefore the traffic generation of the development has been assessed on a first principles assessment whereby 67% of the proposed parking provision is considered to be provided as commercial parking spaces and 33% is considered to be residential.

In this regard, a traffic generation rate recommended by the RMS Technical Direction 04a equates to approximately 0.64 trips per space for commercial developments during both peak periods. However, this trip rate relates to an unrestrained situation. In this regard, the RMS Technical Direction 04a provides a rate of 0.15 and 0.12 trips per car space for high density residential developments during the AM and PM periods respectively and these rates are appropriate for application to the subject site.

6.1.1 Commercial Development Traffic Generation

Application of 0.64 rate discussed above to 67.5% of the proposed parking being a total of 175 spaces, results in a peak hourly traffic generation of 113 vehicles per hour during the critical AM peak period for the proposed mixed-use development. The trip generation of the proposed development in the peak periods is as follows:

- AM Peak 113 vehicle trips (91 in, 22 out); and
- PM Peak 113 vehicle trips (22 in, 91 out)

6.1.2 Residential Development Traffic Generation

Application of 0.15 and 0.12 rates discussed above to 33% of the proposed parking being a total of 84 spaces, results in a peak hourly traffic generation of 13 and 10 vehicles per hour during the AM & PM peak period for the residential component of the development. The trip generation of the proposed development in the peak periods is as follows:

- AM Peak 13 vehicle trips (2 in, 11 out); and
- PM Peak 10 vehicle trips (8 in, 2 out)

6.1.3 Combined Traffic Generation

The combined traffic generation of the proposed development is as follows:

- AM Peak 126 vehicle trips (93 in, 33 out); and
- PM Peak 123 vehicle trips (30 in, 93 out)

6.2 Traffic Distribution

6.2.1 Existing Road Layout with Planning Proposal

Under the existing conditions of the road network in Parramatta CBD all traffic for the proposed development will travel through the intersection of Marsden Street / Macquarie Street and Macquarie Street / Church Street. Vehicles entering the site will all travel through the intersection of Macquarie Street / Church Street and all vehicles exiting the site will travel through Marsden Street / Macquarie Street. In this regard, the two (2) abovementioned intersections are the critical intersection for assessment as identified in Section 3.2.

Application of this traffic distribution to the traffic generation above, results in the development traffic network demand flows presented in **Figure 6 & 7 below.**

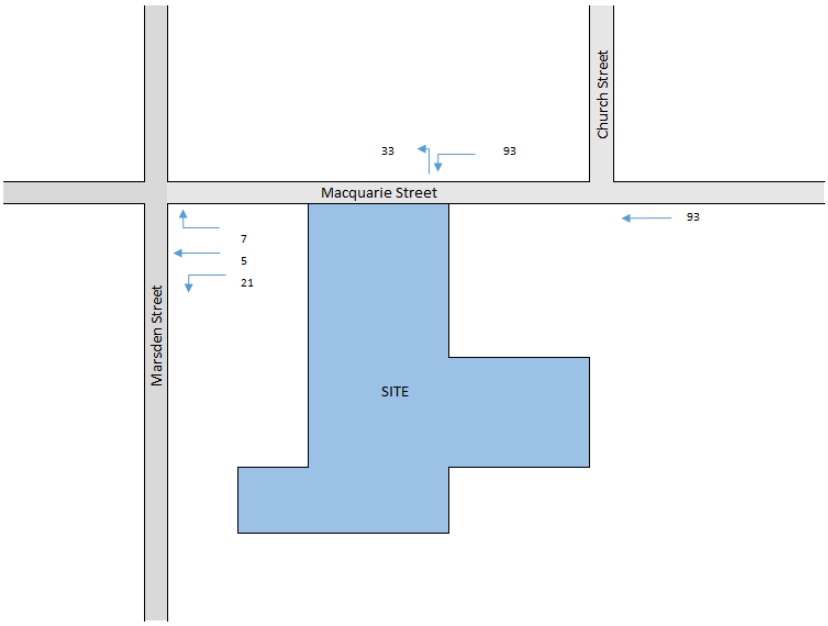

Figure 6: AM Peak period distribution diagram with existing road network

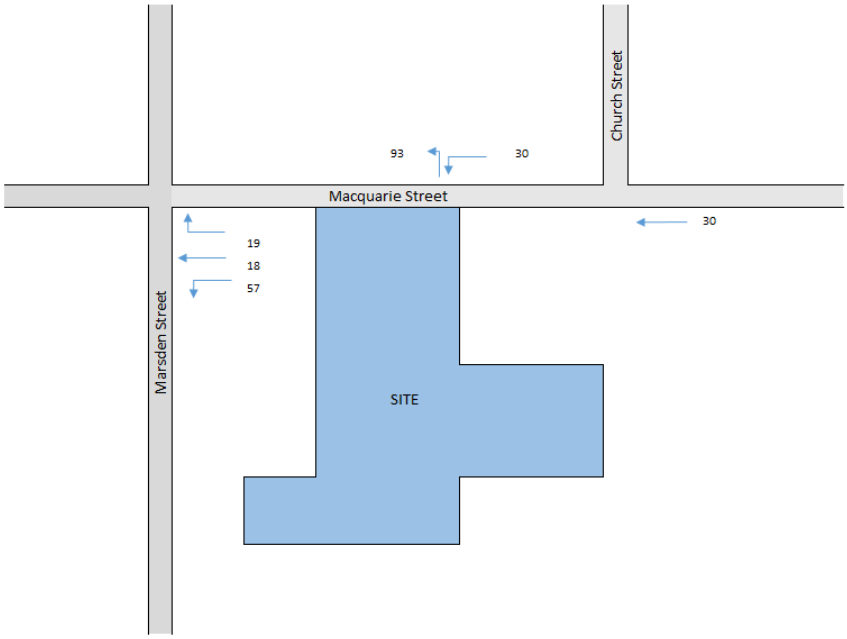

Figure 7: PM Peak period distribution diagram with existing road network

Table 5: 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	25.7	0.730
		Existing + Development		B	25.7	0.730
		Existing	PM	C	30.1	0.773
		Existing + Development		C	30.0	0.773
Hunter & Marsden Street	Signalised	Existing	AM	A	11.8	0.611
		Existing + Development		A	11.7	0.611
		Existing	PM	A	11.6	0.583
		Existing + Development		A	12.5	0.659
Macquarie Street & Church Street	Signalised	Existing	AM	A	3.8	0.233
		Existing + Development		A	3.8	0.285
		Existing	PM	A	4.0	0.360
		Existing + Development		A	4.0	0.375

It can be seen from Table 5 that the proposed development will have no measurable impacts on key intersections analysed above with no change to existing Levels of Service during the AM Peak or PM peak periods. The SIDRA outputs have been included in **Appendix E** for reference.

6.2.2 Future Road Layout with Western Sydney Light Rail Network (WSLRN) Planning Proposal

Due to significant changes to the Parramatta CBD with the inclusion of the Parramatta Light Rail (described in Section 4.3 above) 100% of the proposed development traffic will travel to the site through the intersection of Marsden Street and Macquarie Street and leave the site through Macquarie Street and Horwood Place.

The trip distribution splits of the proposed development under the future 2026 road network layout is considered to be as follows:

- AM Peak
  - Vehicles entering the site: 100% from Marsden Street;
  - Vehicles exiting the site: 100% to Horwood Place;

- PM Peak

  - Vehicles entering the site: 100% from Marsden Street;
  - Vehicles exiting the site: 100% to Horwood Place;

The impacts of the above traffic distribution on the future road network layout are discussed below.

6.3 Traffic Impacts

GTA's *Parramatta Light Rail, Operational Traffic and Transport Technical Assessment Report* dated August 2018 demonstrates the Levels of Service summarised in **Table 6** below for the critical intersections for the development.

Table 6: Intersection Performance
2026 Future Road Network Layout (without development)

Intersection Description	Scenario	Control Type	Period	Level of Service	Degree of Saturation	Intersection Delay
Church Street / Macquarie Street	2026 with Light Rail	Signalised	AM	B	0.42	18
			PM	B	0.29	23
Macquarie Street / Marsden Street	2026 with Light Rail + road Improvements	Signalised	AM	C	0.91	32
			PM	B	0.95	28

It is evident from Table 6 above that all intersections will operate with an acceptable Level of Service (LoS) B with the exception of Macquarie Street with Marsden during the AM peak period which operates at a LoS C. It is considered that the future road network without the proposed development will have similar intersection performances to that of the existing road layout (as shown in Table 5). It is considered that the future road network has sufficient capacity to accommodate the proposed development. The proposed road networks SIDRA outputs undertaken by GTA Consultants is included in **Appendix F** for reference.

7. Access & Internal Design Aspects

7.1 Public Domain Changes

As mentioned in Section 4 of this report, the development proposes three (3) loading bays, with two (2) capable of accommodating up to an 8.8m MRV design vehicles. In addition, the GTA 2-26 Road Network Layout, provided in Appendix D, states that the northern and southern side of Macquarie Street between Marsden Street and Church Street will be allocated as loading areas for Parramatta City Centre developments.

7.2 Vehicular Access

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 swept path assessment has been undertaken to demonstrate the satisfactory operation of the proposed driveway, the results of which can be viewed in **Appendix G**.

The DCP currently prohibits vehicular access from Macquarie Street. However, noting the proposed development seeks to create a public square within Hunter Street it is considered appropriate to separate vehicular access from the envisaged pedestrian thoroughfare. Furthermore, the SIDRA model presented in Section 6 of this report demonstrates that the proposed distribution of traffic to and from the Macquarie Street frontage can be readily accommodated within the road network. The proposed access is therefore considered to be located on the most suitable street frontage of the site and is supportable on traffic engineering grounds.

7.3 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:

7.3.1 Parking Modules

- All staff parking spaces have been designed in accordance with a Class 1A user and are provided with a minimum space length of 5.4m a minimum width of 2.4m and a minimum aisle width of 5.8m.

- All spaces located adjacent to obstructions of greater than 150mm in height are provided with an additional width of 300mm.

- Dead-end aisles are provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.

- All disabled parking spaces are 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.

7.3.2 Ramps

- Access to the site is 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.

7.3.3 Clear Head heights

- A minimum clear head height of 2.2m is 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.

7.3.4 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.

- A swept path analysis of all critical movements has been undertaken to confirm geometry and compliance with the relevant standards.

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 includes a public square on Hunter Street and a pedestrian link between the square and Macquarie Street. As such, vehicular access is proposed from Macquarie Street, Parramatta.

- A total of 220 parking spaces are proposed which therefore satisfies Council's controls. This reduced provision is considered supportable having regard for the relatively low demand for retail customer parking and proximity of the site to a range of public transport services. In this regard, the proposed parking provision is consistent with State Government objectives which seek to promote the use of public transport for work related travel. A subsequent 'Parking and Access' report will accompany a subsequent DA to ensure the parking requirements of the Place of Public Worship are accommodated.

- Having regard for the reduced car parking provision proposed, the development will generate 126 trips and 123 trips in the AM and PM peak periods respectively. SIDRA modelling undertaken by GTA for the future intersection layouts for Macquarie Street demonstrates that the proposed network has sufficient capacity to accommodate to proposed traffic generation of the proposed development. It is noted that a detail traffic model would be provided with the Development Application demonstrating the traffic impacts of the development. Furthermore, the assessment included in this analysis includes no discount for the existing traffic generation of the site and is therefore a 'worst-case' scenario.

- The proposed access and internal design is considered acceptable and will operate safely and efficiently. It is recommended that an operational Loading Management Plan be prepared and implemented to manage the servicing demands of future building tenants. This can be provided prior to issue of an Occupation Certificate and conditioned accordingly.

It is therefore concluded that the proposed Planning Proposal is supportable on traffic planning grounds and will operate satisfactorily.

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

SIDRA Outputs – Existing

MOVEMENT SUMMARY

Site: 101 [Argyle and Marsden EX AM]

Intersection: Argyle Street and Marsden Street
Scenario: Existing AM
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Practical 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: Marsden Street											
1	L2	79	5.0	0.697	30.0	LOS C	15.0	109.8	0.93	0.82	26.1
2	T1	799	5.0	0.697	25.4	LOS B	15.4	112.1	0.93	0.82	24.0
Approach		878	5.0	0.697	25.8	LOS B	15.4	112.1	0.93	0.82	24.3
East: RoadName											
4	L2	40	5.0	0.730	47.6	LOS D	4.4	33.2	1.00	0.90	20.8
5	T1	127	55.0	0.730	28.5	LOS B	4.4	33.2	0.89	0.75	28.1
6	R2	78	20.0	0.642	47.9	LOS D	3.3	27.1	1.00	0.83	16.1
Approach		246	35.7	0.730	37.8	LOS C	4.4	33.2	0.94	0.80	21.4
North: Marsden Street											
7	L2	3	0.0	0.406	26.7	LOS B	7.8	57.0	0.81	0.69	25.5
8	T1	514	5.0	0.406	22.1	LOS B	7.8	57.1	0.81	0.69	25.9
Approach		517	5.0	0.406	22.1	LOS B	7.8	57.1	0.81	0.69	25.9
West: RoadName											
11	T1	119	100.0	0.350	14.8	LOS B	2.7	34.5	0.83	0.67	37.6
Approach		119	100.0	0.350	14.8	LOS B	2.7	34.5	0.83	0.67	37.6
All Vehicles		1759	15.7	0.730	25.7	LOS B	15.4	112.1	0.89	0.77	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.
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	17.7	LOS B	0.1	0.1	0.85	0.85
P2	East Full Crossing	53	24.9	LOS C	0.1	0.1	0.79	0.79
P3	North Full Crossing	53	17.1	LOS B	0.1	0.1	0.84	0.84
P4	West Full Crossing	53	22.5	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		211	20.5	LOS C			0.81	0.81

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: 201 [Argyle and Marsden EX PM]

Intersection: Argyle Street and Marsden Street
Scenario: Existing AM
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Practical 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: Marsden Street											
1	L2	227	5.0	0.773	35.2	LOS C	19.8	151.1	0.95	0.90	23.4
2	T1	783	5.0	0.773	30.1	LOS C	22.0	153.9	0.95	0.89	21.8
Approach		1011	5.0	0.773	31.2	LOS C	22.0	153.9	0.95	0.89	22.2
East: RoadName											
4	L2	43	5.0	0.639	47.7	LOS D	6.3	47.4	1.00	0.83	20.8
5	T1	198	55.0	0.639	30.2	LOS C	6.3	47.4	0.93	0.76	26.8
6	R2	148	20.0	0.747	50.6	LOS D	6.9	56.9	1.00	0.89	15.5
Approach		389	36.1	0.747	39.9	LOS C	6.9	56.9	0.96	0.82	20.4
North: Marsden Street											
7	L2	1	0.0	0.446	28.6	LOS C	10.1	73.8	0.82	0.70	24.5
8	T1	598	5.0	0.446	24.0	LOS B	10.1	73.9	0.82	0.70	24.9
Approach		599	5.0	0.446	24.0	LOS B	10.1	73.9	0.82	0.70	24.9
West: RoadName											
11	T1	107	100.0	0.356	17.4	LOS B	2.7	34.7	0.86	0.69	35.2
Approach		107	100.0	0.356	17.4	LOS B	2.7	34.7	0.86	0.69	35.2
All Vehicles		2106	15.6	0.773	30.1	LOS C	22.0	153.9	0.91	0.81	23.0

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	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	19.8	LOS B	0.1	0.1	0.87	0.87
P2	East Full Crossing	53	25.7	LOS C	0.1	0.1	0.76	0.76
P3	North Full Crossing	53	19.2	LOS B	0.1	0.1	0.86	0.86
P4	West Full Crossing	53	23.5	LOS C	0.1	0.1	0.72	0.72
All Pedestrians		211	22.1	LOS C			0.80	0.80

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: 102 [Hunter and Marsden EX AM]

Intersection: Hunter Street and Marsden Street
Scenario Existing AM
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical 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: Marsden Street											
1	L2	94	5.0	0.611	17.8	LOS B	9.0	66.0	0.85	0.75	29.2
2	T1	821	5.0	0.611	13.2	LOS A	9.2	67.2	0.85	0.74	26.4
Approach		915	5.0	0.611	13.7	LOS A	9.2	67.2	0.85	0.74	26.7
East: Hunter Street											
4	L2	4	5.0	0.026	26.4	LOS B	0.1	0.8	0.90	0.63	15.7
5	T1	8	5.0	0.126	23.8	LOS B	0.5	3.8	0.94	0.68	20.4
6	R2	14	5.0	0.126	28.2	LOS B	0.5	3.8	0.94	0.68	15.7
Approach		26	5.0	0.126	26.5	LOS B	0.5	3.8	0.93	0.67	17.3
North: RoadName											
7	L2	32	5.0	0.424	9.4	LOS A	6.2	45.3	0.53	0.48	23.9
8	T1	479	5.0	0.424	4.8	LOS A	6.2	45.3	0.53	0.48	37.4
9	R2	98	5.0	0.216	11.5	LOS A	1.0	7.2	0.74	0.72	31.6
Approach		608	5.0	0.424	6.1	LOS A	6.2	45.3	0.56	0.52	35.2
West: Hunter Street											
10	L2	73	5.0	0.119	17.1	LOS B	1.2	9.1	0.72	0.71	27.1
11	T1	32	5.0	0.327	23.7	LOS B	1.6	11.4	0.95	0.73	20.7
12	R2	33	5.0	0.327	28.3	LOS B	1.6	11.4	0.95	0.73	21.9
Approach		137	5.0	0.327	21.3	LOS B	1.6	11.4	0.83	0.72	24.2
All Vehicles		1686	5.0	0.611	11.8	LOS A	9.2	67.2	0.74	0.66	28.7

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	19.4	LOS B	0.1	0.1	0.88	0.88
P2	East Full Crossing	53	7.9	LOS A	0.0	0.0	0.56	0.56
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
P4	West Full Crossing	53	16.0	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		211	15.7	LOS B			0.78	0.78

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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MOVEMENT SUMMARY

Site: 202 [Hunter and Marsden EX PM]

Intersection: Hunter Street and Marsden Street
Scenario Existing AM
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical 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: Marsden Street											
1	L2	63	5.0	0.583	17.6	LOS B	8.5	62.4	0.83	0.73	29.6
2	T1	813	5.0	0.583	13.0	LOS A	8.7	63.2	0.83	0.73	26.7
Approach		876	5.0	0.583	13.3	LOS A	8.7	63.2	0.83	0.73	26.9
East: Hunter Street											
4	L2	21	5.0	0.117	28.1	LOS B	0.5	3.7	0.94	0.69	14.9
5	T1	25	5.0	0.263	23.6	LOS B	1.2	8.4	0.94	0.72	20.9
6	R2	22	5.0	0.263	27.9	LOS B	1.2	8.4	0.94	0.72	16.1
Approach		68	5.0	0.263	26.4	LOS B	1.2	8.4	0.94	0.71	17.6
North: RoadName											
7	L2	33	5.0	0.460	9.6	LOS A	7.0	50.9	0.55	0.50	23.8
8	T1	522	5.0	0.460	5.0	LOS A	7.0	50.9	0.55	0.50	37.2
9	R2	171	5.0	0.367	12.0	LOS A	1.8	13.3	0.79	0.75	31.2
Approach		725	5.0	0.460	6.8	LOS A	7.0	50.9	0.60	0.56	34.5
West: Hunter Street											
10	L2	66	5.0	0.109	17.0	LOS B	1.1	8.3	0.72	0.70	27.1
11	T1	11	5.0	0.228	23.3	LOS B	1.0	7.6	0.94	0.72	20.4
12	R2	33	5.0	0.228	27.9	LOS B	1.0	7.6	0.94	0.72	21.5
Approach		109	5.0	0.228	20.9	LOS B	1.1	8.3	0.80	0.71	24.5
All Vehicles		1779	5.0	0.583	11.6	LOS A	8.7	63.2	0.74	0.66	28.8

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.
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	19.4	LOS B	0.1	0.1	0.88	0.88
P2	East Full Crossing	53	7.9	LOS A	0.0	0.0	0.56	0.56
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
P4	West Full Crossing	53	16.0	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		211	15.7	LOS B			0.78	0.78

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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MOVEMENT SUMMARY

Site: 103 [Macquarie and Chruch EX AM]

Intersection: Macquarie Street and Church Street
Scenario: Existing AM
Signals - Fixed Time Isolated Cycle Time = 20 seconds (Practical 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
East: Macquarie Street											
5	T1	362	5.0	0.233	3.2	LOS A	1.3	9.4	0.60	0.52	38.0
6	R2	75	5.0	0.233	6.4	LOS A	1.3	9.3	0.60	0.57	27.5
Approach		437	5.0	0.233	3.8	LOS A	1.3	9.4	0.60	0.53	36.3
All Vehicles		437	5.0	0.233	3.8	LOS A	1.3	9.4	0.60	0.53	36.3

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
PD	Diagonal Crossing	53	4.9	LOS A	0.0	0.0	0.70	0.70
All Pedestrians		53	4.9	LOS A			0.70	0.70

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: 203 [Macquarie and Chruch EX PM]

Intersection: Macquarie Street and Church Street
Scenario: Existing AM
Signals - Fixed Time Isolated Cycle Time = 20 seconds (Practical 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
East: Macquarie Street											
5	T1	572	5.0	0.360	3.5	LOS A	2.2	15.7	0.65	0.57	37.4
6	R2	102	5.0	0.360	6.6	LOS A	2.1	15.5	0.65	0.61	27.3
Approach		674	5.0	0.360	4.0	LOS A	2.2	15.7	0.65	0.57	35.9
All Vehicles		674	5.0	0.360	4.0	LOS A	2.2	15.7	0.65	0.57	35.9

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.
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
PD	Diagonal Crossing	53	4.9	LOS A	0.0	0.0	0.70	0.70
All Pedestrians		53	4.9	LOS A			0.70	0.70

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.

Appendix C

Architectural Plans

5.3 Illustrative floor plans

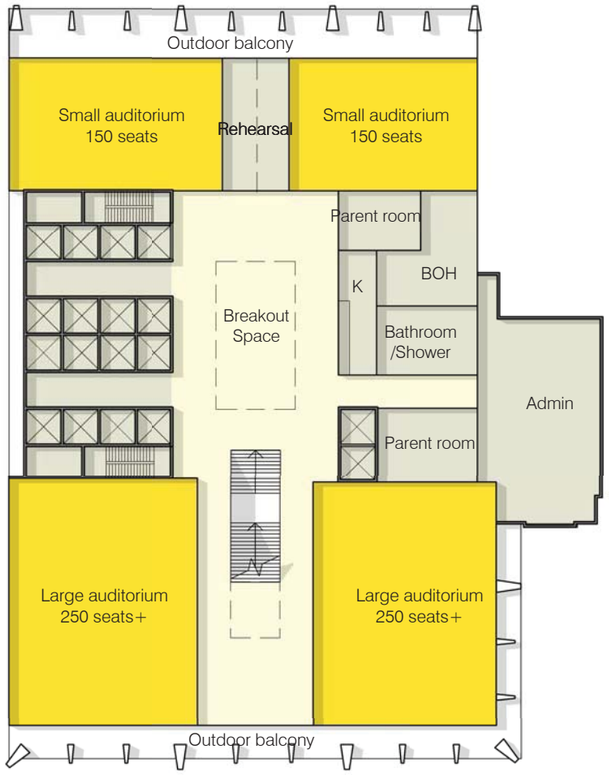
The plans opposite and overleaf demonstrate an initial concept for the site. Final designs will be subject to a design competition DA.

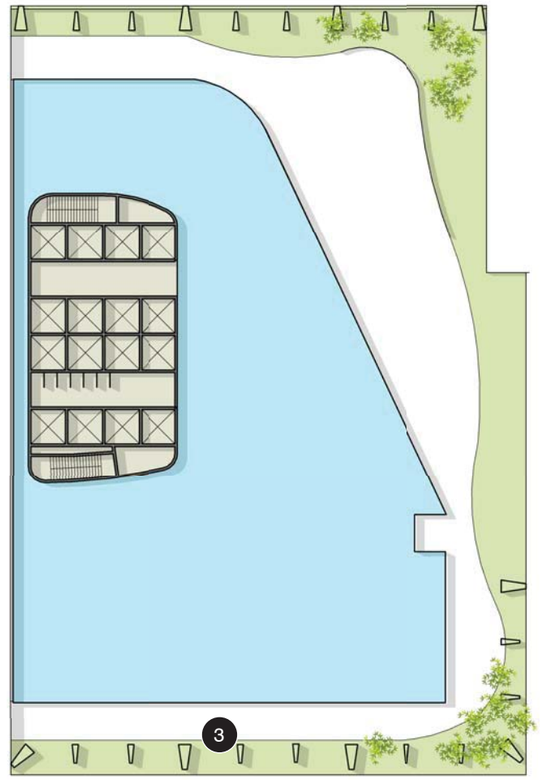
Key features of the master plan:

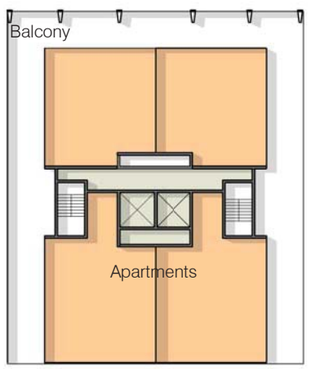
1. **Creation of a new square** – to respect the Cathedral's curtilage and **provide a proper space** in which its spires and western façade can be better appreciated.
2. **Building forms** significantly set back from current controls along Hunter St – to **improve the Cathedral's setting** and align it with other buildings in its context (Parramatta Square and the Town Hall).
3. **Significant setbacks of taller buildings** from the street wall/podium height – to ensure that lower building forms **relate to the scale** of the Cathedral and taller buildings are seen as clearly set back from this.
4. **Renewed landscape** setting for the Cathedral that will **enhance the public appreciation** of the church from all sides.
5. **Creation of a colonnade** - To help visually connect the Church buildings together, providing shade and shelter near the church, and enabling a wider **visual connection** between the new church square and Centennial Sq/Church St across the corner of the colonnade.
6. **Creation of a new laneway** between the new Square and Macquarie St – to further **activate the new square** and western approach to the Cathedral.

Note: Plan to be updated with revised landscape master plan (colonnade area currently shown not clearly, low resolution)

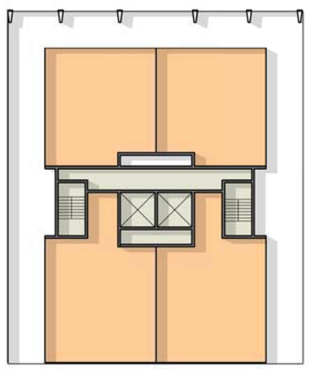
Ground floor plan



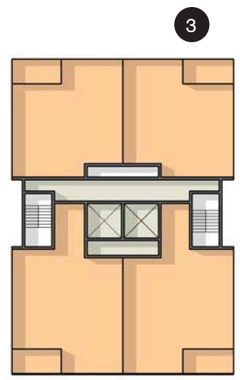




Level 1



Level 2

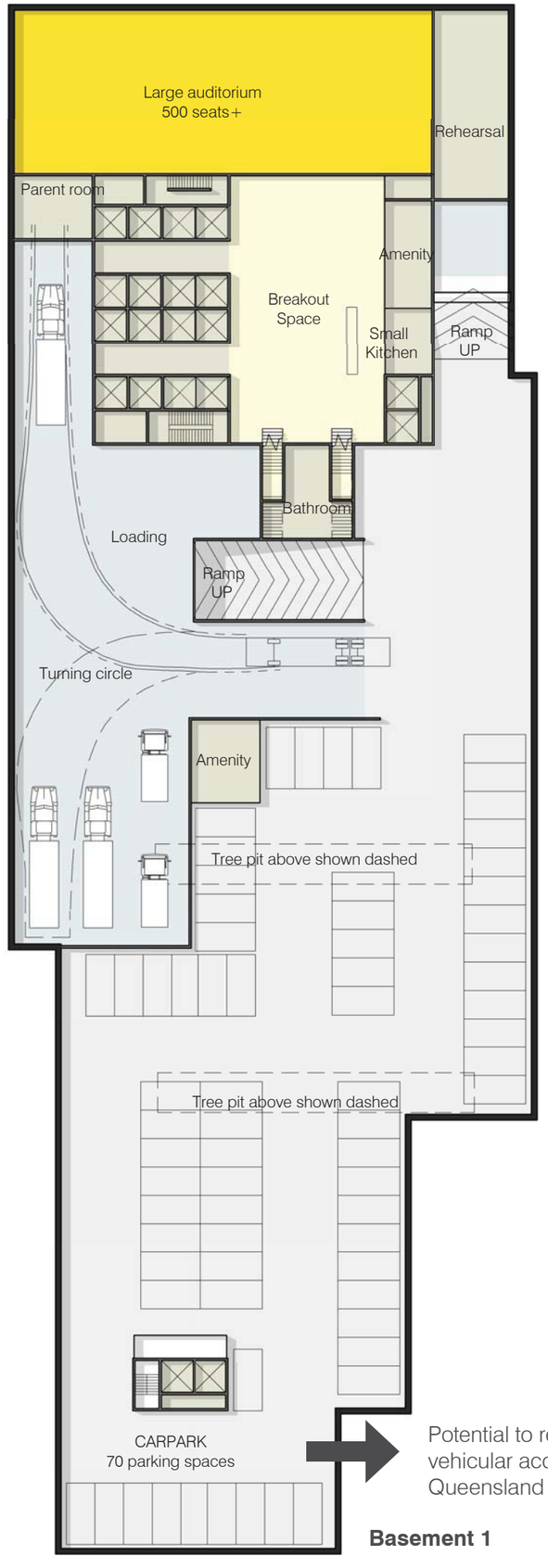


Typical level

N 1 1:500 0 5 10 15 20M

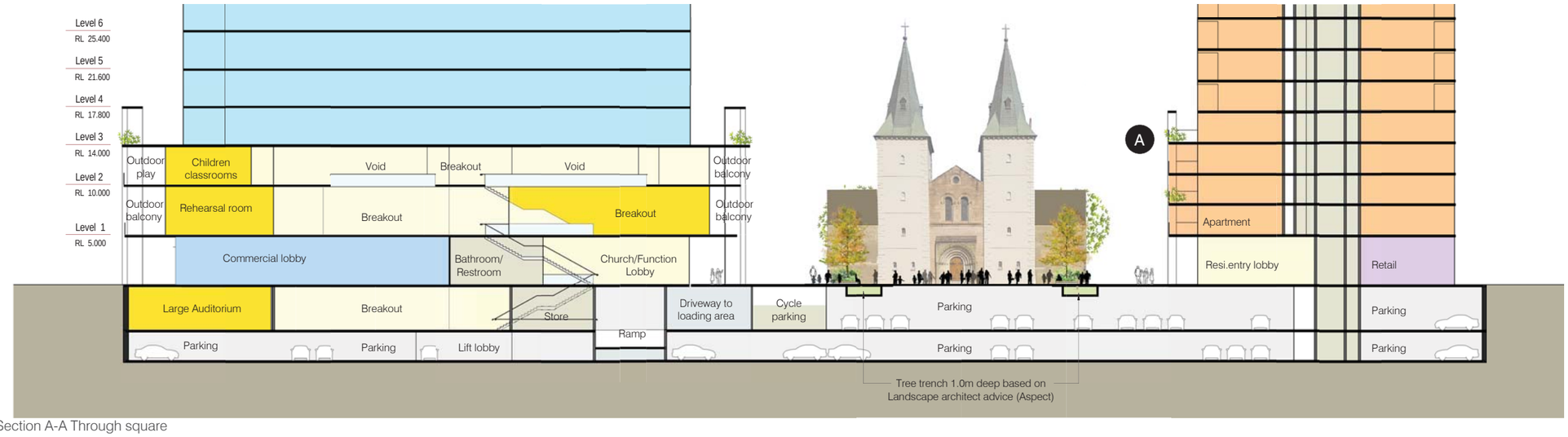
Parking numbers will not be set by this application. However indicated in the drawings are 220 parking spaces.

The illustrative floorplans describe the potential for delivery of slightly under this maximum, across 2 levels of basement.



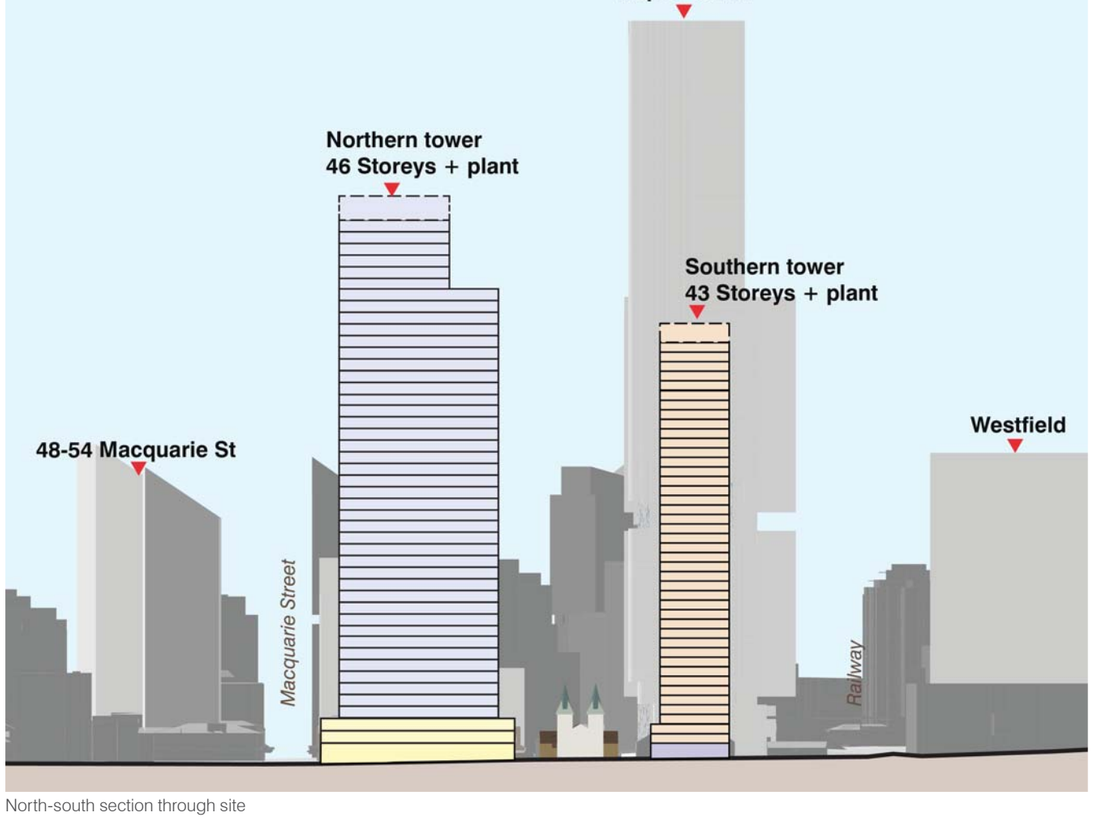
Basement 1

Basement 2

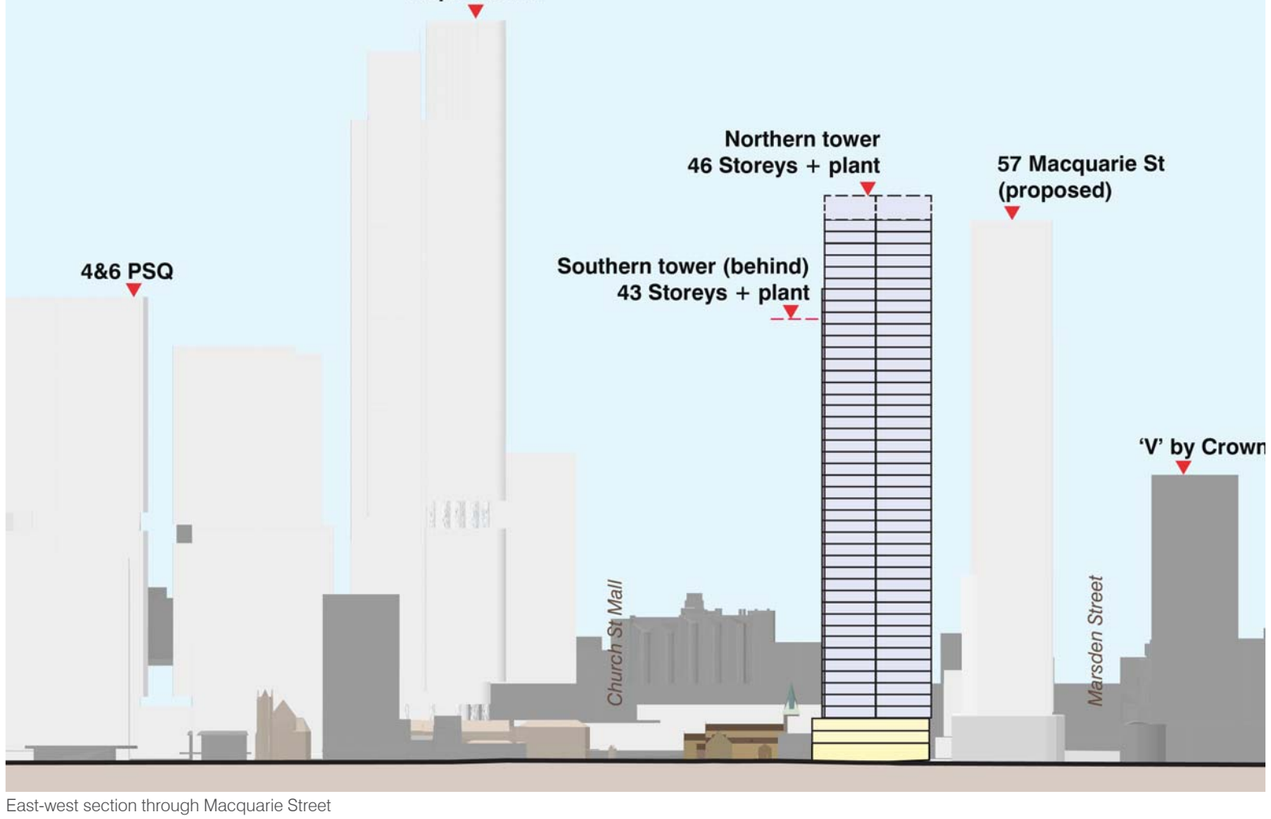


Section A-A Through square

A **Street wall height** set at the underside of the Church spires (equivalent to about 3 commercial storeys)– to **highlight the importance of the Cathedral** and **define the square**



North-south section through site



East-west section through Macquarie Street

Appendix D

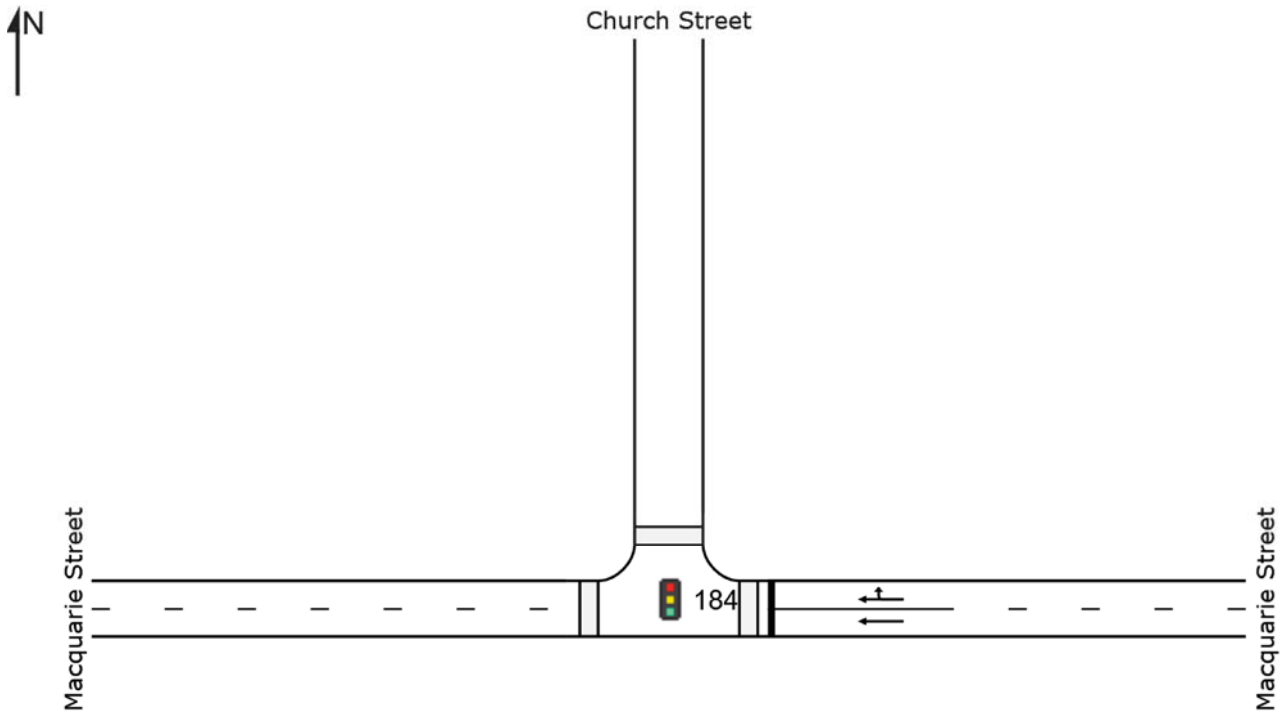
GTA 2026 Road Network Layout

SITE LAYq Tq

Site: 184q[3000_26_Church-Macquarie_2026DN_AM]q

Church StrA t MacquariA StrA t, ParramattaA

Signals - FixAd TimA IsolatAdA



MOVEMENT SUMMARY

Site: 184 [3000_26_Church-Macquarie_2026DN_AM]

Church Street/ Macquarie Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 80 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
East: Macquarie Street											
5	T1	455	0.0	0.315	12.7	LOS A	7.0	48.9	0.63	0.58	38.1
6	R2	143	0.0	0.315	17.5	LOS B	6.8	47.7	0.63	0.65	35.9
Approach		598	0.0	0.315	13.9	LOS A	7.0	48.9	0.63	0.59	37.5
All Vehicles		598	0.0	0.315	13.9	LOS A	7.0	48.9	0.63	0.59	37.5

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.
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
P2	East Full Crossing	208	19.8	LOS B	0.3	0.3	0.71	0.71
P3	North Full Crossing	44	20.3	LOS C	0.1	0.1	0.71	0.71
P4	West Full Crossing	1107	20.5	LOS C	1.8	1.8	0.73	0.73
All Pedestrians		1360	20.4	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: 184 [3000_26_Church-Macquarie_2026DN_PM]

Church Street/ Macquarie Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 80 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
East: Macquarie Street											
5	T1	949	0.0	0.441	7.8	LOS A	10.5	73.8	0.54	0.51	42.0
6	R2	124	0.0	0.441	12.6	LOS A	10.4	73.0	0.54	0.55	39.8
Approach		1074	0.0	0.441	8.4	LOS A	10.5	73.8	0.54	0.52	41.7
All Vehicles		1074	0.0	0.441	8.4	LOS A	10.5	73.8	0.54	0.52	41.7

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
P2	East Full Crossing	605	28.8	LOS C	1.2	1.2	0.86	0.86
P3	North Full Crossing	163	29.1	LOS C	0.3	0.3	0.86	0.86
P4	West Full Crossing	832	29.1	LOS C	1.6	1.6	0.87	0.87
All Pedestrians		1600	29.0	LOS C			0.86	0.86

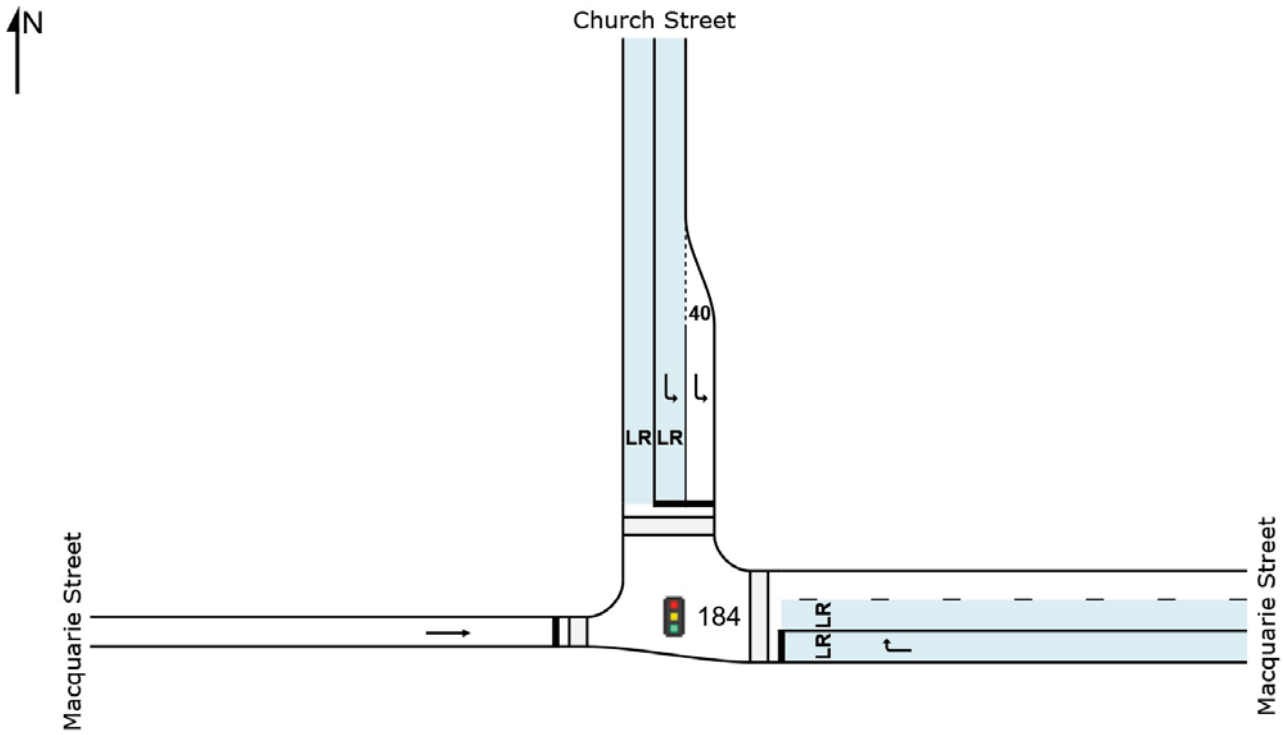
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 184 [3000_26_Church-Macquarie_2026PLR_AM]

Church Street/ Macquarie Street, Parramatta

Signals - Fixed Time Isolated



Organisation: GTA CONSULTANTS | Created: Friday, 21 July 2017 11:35:03 AM
Project: C:\Users\brigette.hr\Desktop\SIDRA\170715sid_Future_2026PLR_AM.sip7

MOVEMENT SUMMARY

Site: 184 [3000_26_Church-Macquarie_2026PLR_AM]

Church Street/ Macquarie Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 60 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
East: Macquarie Street											
6	R2	6	100.0	0.299	37.1	LOS C	0.2	10.5	0.94	0.69	10.3
Approach		6	100.0	0.299	37.1	LOS C	0.2	10.5	0.94	0.69	10.3
North: Church Street											
7	L2	8	87.5	0.299	37.8	LOS C	0.2	10.5	0.96	0.67	10.2
Approach		8	87.5	0.299	37.8	LOS C	0.2	10.5	0.96	0.67	10.2
West: Macquarie Street											
11	T1	268	0.8	0.415	17.0	LOS B	6.2	43.8	0.82	0.69	16.6
Approach		268	0.8	0.415	17.0	LOS B	6.2	43.8	0.82	0.69	16.6
All Vehicles		283	5.6	0.415	18.1	LOS B	6.2	43.8	0.83	0.69	15.9

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.
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
P2	East Full Crossing	208	24.5	LOS C	0.3	0.3	0.91	0.91
P3	North Full Crossing	167	6.6	LOS A	0.1	0.1	0.47	0.47
P4	West Full Crossing	1107	10.1	LOS B	1.1	1.1	0.59	0.59
All Pedestrians		1483	11.7	LOS B			0.62	0.62

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: 184 [3000_26_Church-Macquarie_2026PLR_PM]

Church Street/ Macquarie Street, Parramatta

Signals - Fixed Time Isolated Cycle Time = 60 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
East: Macquarie Street											
6	R2	6	100.0	0.262	35.0	LOS C	0.2	10.1	0.93	0.68	10.7
Approach		6	100.0	0.262	35.0	LOS C	0.2	10.1	0.93	0.68	10.7
North: Church Street											
7	L2	8	87.5	0.262	36.3	LOS C	0.2	10.1	0.95	0.66	10.5
Approach		8	87.5	0.262	36.3	LOS C	0.2	10.1	0.95	0.66	10.5
West: Macquarie Street											
11	T1	129	1.6	0.288	21.0	LOS B	3.2	22.8	0.86	0.69	14.6
Approach		129	1.6	0.288	21.0	LOS B	3.2	22.8	0.86	0.69	14.6
All Vehicles		144	10.9	0.288	22.5	LOS B	3.2	22.8	0.87	0.69	13.9

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.
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
P2	East Full Crossing	604	20.5	LOS C	0.9	0.9	0.84	0.84
P3	North Full Crossing	163	7.1	LOS A	0.1	0.1	0.49	0.49
P4	West Full Crossing	832	6.8	LOS A	0.7	0.7	0.48	0.48
All Pedestrians		1599	12.0	LOS B			0.62	0.62

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.

Appendix E

SIDRA Outputs Existing Road Network Layout + Development

MOVEMENT SUMMARY

Site: 101 [Argyle and Marsden FU AM]

Intersection: Argyle Street and Marsden Street
Scenario: Existing AM
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Marsden Street												
1	L2	79	5.0	0.697	30.0	LOS C	15.0	109.8	0.93	0.82	0.94	26.1
2	T1	799	5.0	0.697	25.4	LOS B	15.4	112.1	0.93	0.82	0.94	24.0
Approach		878	5.0	0.697	25.8	LOS B	15.4	112.1	0.93	0.82	0.94	24.3
East: RoadName												
4	L2	40	5.0	0.730	47.6	LOS D	4.4	33.2	1.00	0.90	1.24	20.8
5	T1	127	55.0	0.730	28.5	LOS B	4.4	33.2	0.89	0.75	1.02	28.1
6	R2	78	20.0	0.642	47.9	LOS D	3.3	27.1	1.00	0.83	1.14	16.1
Approach		246	35.7	0.730	37.8	LOS C	4.4	33.2	0.94	0.80	1.09	21.4
North: Marsden Street												
7	L2	3	0.0	0.420	26.8	LOS B	8.1	59.3	0.82	0.69	0.82	25.5
8	T1	532	5.0	0.420	22.2	LOS B	8.1	59.4	0.82	0.69	0.82	25.9
Approach		535	5.0	0.420	22.3	LOS B	8.1	59.4	0.82	0.69	0.82	25.9
West: RoadName												
11	T1	119	100.0	0.350	14.8	LOS B	2.7	34.5	0.83	0.67	0.83	37.6
Approach		119	100.0	0.350	14.8	LOS B	2.7	34.5	0.83	0.67	0.83	37.6
All Vehicles		1777	15.6	0.730	25.7	LOS B	15.4	112.1	0.89	0.77	0.92	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.
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
P1	South Full Crossing	53	17.7	LOS B	0.1	0.1	0.85	0.85
P2	East Full Crossing	53	24.9	LOS C	0.1	0.1	0.79	0.79
P3	North Full Crossing	53	17.1	LOS B	0.1	0.1	0.84	0.84
P4	West Full Crossing	53	22.5	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		211	20.5	LOS C			0.81	0.81

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: 201 [Argyle and Marsden FU PM]

Intersection: Argyle Street and Marsden Street
Scenario: Existing AM
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Marsden Street												
1	L2	227	5.0	0.773	35.2	LOS C	19.8	151.1	0.95	0.90	1.02	23.4
2	T1	783	5.0	0.773	30.1	LOS C	22.0	153.9	0.95	0.89	1.01	21.8
Approach		1011	5.0	0.773	31.2	LOS C	22.0	153.9	0.95	0.89	1.01	22.2
East: RoadName												
4	L2	43	5.0	0.639	47.7	LOS D	6.3	47.4	1.00	0.83	1.06	20.8
5	T1	198	55.0	0.639	30.2	LOS C	6.3	47.4	0.93	0.76	0.96	26.8
6	R2	148	20.0	0.747	50.6	LOS D	6.9	56.9	1.00	0.89	1.19	15.5
Approach		389	36.1	0.747	39.9	LOS C	6.9	56.9	0.96	0.82	1.06	20.4
North: Marsden Street												
7	L2	1	0.0	0.490	29.0	LOS C	11.3	82.7	0.83	0.71	0.83	24.3
8	T1	657	5.0	0.490	24.5	LOS B	11.3	82.7	0.83	0.71	0.83	24.7
Approach		658	5.0	0.490	24.5	LOS B	11.3	82.7	0.83	0.71	0.83	24.7
West: RoadName												
11	T1	107	100.0	0.356	17.4	LOS B	2.7	34.7	0.86	0.69	0.86	35.2
Approach		107	100.0	0.356	17.4	LOS B	2.7	34.7	0.86	0.69	0.86	35.2
All Vehicles		2165	15.3	0.773	30.0	LOS C	22.0	153.9	0.91	0.81	0.96	23.0

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	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	19.8	LOS B	0.1	0.1	0.87	0.87
P2	East Full Crossing	53	25.7	LOS C	0.1	0.1	0.76	0.76
P3	North Full Crossing	53	19.2	LOS B	0.1	0.1	0.86	0.86
P4	West Full Crossing	53	23.5	LOS C	0.1	0.1	0.72	0.72
All Pedestrians		211	22.1	LOS C			0.80	0.80

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: 102 [Hunter and Marsden FU AM]

Intersection: Hunter Street and Marsden Street
Scenario Existing AM
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Marsden Street												
1	L2	94	5.0	0.611	17.8	LOS B	9.0	66.0	0.85	0.75	0.85	29.2
2	T1	821	5.0	0.611	13.2	LOS A	9.2	67.2	0.85	0.74	0.85	26.4
Approach		915	5.0	0.611	13.7	LOS A	9.2	67.2	0.85	0.74	0.85	26.7
East: Hunter Street												
4	L2	4	5.0	0.026	26.4	LOS B	0.1	0.8	0.90	0.63	0.90	15.7
5	T1	8	5.0	0.126	23.8	LOS B	0.5	3.8	0.94	0.68	0.94	20.4
6	R2	14	5.0	0.126	28.2	LOS B	0.5	3.8	0.94	0.68	0.94	15.7
Approach		26	5.0	0.126	26.5	LOS B	0.5	3.8	0.93	0.67	0.93	17.3
North: RoadName												
7	L2	32	5.0	0.439	9.5	LOS A	6.5	47.5	0.54	0.49	0.54	23.8
8	T1	497	5.0	0.439	4.9	LOS A	6.5	47.5	0.54	0.49	0.54	37.3
9	R2	98	5.0	0.216	11.5	LOS A	1.0	7.2	0.74	0.72	0.74	31.6
Approach		626	5.0	0.439	6.2	LOS A	6.5	47.5	0.57	0.52	0.57	35.2
West: Hunter Street												
10	L2	73	5.0	0.119	17.1	LOS B	1.2	9.1	0.72	0.71	0.72	27.1
11	T1	32	5.0	0.327	23.7	LOS B	1.6	11.4	0.95	0.73	0.95	20.7
12	R2	33	5.0	0.327	28.3	LOS B	1.6	11.4	0.95	0.73	0.95	21.9
Approach		137	5.0	0.327	21.3	LOS B	1.6	11.4	0.83	0.72	0.83	24.2
All Vehicles		1704	5.0	0.611	11.7	LOS A	9.2	67.2	0.74	0.66	0.74	28.7

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
P1	South Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
P2	East Full Crossing	53	7.9	LOS A	0.0	0.0	0.56	0.56
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
P4	West Full Crossing	53	16.0	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		211	15.7	LOS B			0.78	0.78

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: 202 [Hunter and Marsden FU PM]

Intersection: Hunter Street and Marsden Street
Scenario Existing AM
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Marsden Street												
1	L2	63	5.0	0.648	19.7	LOS B	9.3	67.6	0.89	0.79	0.91	27.9
2	T1	813	5.0	0.648	15.1	LOS B	9.4	68.5	0.89	0.78	0.91	24.9
Approach		876	5.0	0.648	15.4	LOS B	9.4	68.5	0.89	0.78	0.91	25.1
East: Hunter Street												
4	L2	21	5.0	0.117	28.1	LOS B	0.5	3.7	0.94	0.69	0.94	14.9
5	T1	25	5.0	0.262	23.6	LOS B	1.1	8.4	0.94	0.72	0.94	21.0
6	R2	22	5.0	0.262	27.8	LOS B	1.1	8.4	0.94	0.72	0.94	16.2
Approach		68	5.0	0.262	26.3	LOS B	1.1	8.4	0.94	0.71	0.94	17.6
North: RoadName												
7	L2	33	5.0	0.659	9.8	LOS A	8.1	59.0	0.57	0.52	0.57	23.6
8	T1	581	5.0	0.659	5.2	LOS A	8.1	59.0	0.57	0.52	0.57	36.8
9	R2	171	5.0	0.338	11.9	LOS A	1.8	13.0	0.79	0.75	0.79	31.3
Approach		784	5.0	0.659	6.9	LOS A	8.1	59.0	0.62	0.57	0.62	34.5
West: Hunter Street												
10	L2	66	5.0	0.097	15.5	LOS B	1.1	7.7	0.67	0.69	0.67	28.2
11	T1	11	5.0	0.228	23.3	LOS B	1.0	7.6	0.94	0.72	0.94	20.4
12	R2	33	5.0	0.228	27.9	LOS B	1.0	7.6	0.94	0.72	0.94	21.5
Approach		109	5.0	0.228	20.0	LOS B	1.1	7.7	0.78	0.70	0.78	25.1
All Vehicles		1838	5.0	0.659	12.5	LOS A	9.4	68.5	0.77	0.69	0.78	28.0

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	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
P2	East Full Crossing	53	7.9	LOS A	0.0	0.0	0.56	0.56
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
P4	West Full Crossing	53	17.7	LOS B	0.1	0.1	0.84	0.84
All Pedestrians		211	16.1	LOS B			0.79	0.79

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: 103 [Macquarie and Chruch FU AM]

Intersection: Macquarie Street and Church Street
Scenario: Existing AM
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 20 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Macquarie Street												
5	T1	459	5.0	0.285	3.3	LOS A	1.6	11.9	0.62	0.54	0.62	37.8
6	R2	75	5.0	0.285	6.5	LOS A	1.6	11.7	0.62	0.57	0.62	27.7
Approach		534	5.0	0.285	3.8	LOS A	1.6	11.9	0.62	0.54	0.62	36.5
All Vehicles		534	5.0	0.285	3.8	LOS A	1.6	11.9	0.62	0.54	0.62	36.5

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.
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
PD	Diagonal Crossing	53	4.9	LOS A	0.0	0.0	0.70	0.70
All Pedestrians		53	4.9	LOS A			0.70	0.70

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: 203 [Macquarie and Chruch FU PM]

Intersection: Macquarie Street and Church Street
Scenario: Existing AM
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 20 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Macquarie Street												
5	T1	600	5.0	0.375	3.5	LOS A	2.3	16.5	0.65	0.57	0.65	37.3
6	R2	102	5.0	0.375	6.7	LOS A	2.2	16.3	0.65	0.61	0.65	27.3
Approach		702	5.0	0.375	4.0	LOS A	2.3	16.5	0.65	0.58	0.65	35.9
All Vehicles		702	5.0	0.375	4.0	LOS A	2.3	16.5	0.65	0.58	0.65	35.9

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.
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
PD	Diagonal Crossing	53	4.9	LOS A	0.0	0.0	0.70	0.70
All Pedestrians		53	4.9	LOS A			0.70	0.70

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.

Appendix F

GTA SIDRA Outputs 2026 Scenario

Table 4.9: Parramatta CBD precinct intersection operation – AM peak hour

I.D	Intersection	2026 without the project				2026 with the project			
		Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
On-corridor									
25	Church Street/ George Street	0.58	24	88	B	0.37	9	60	A
26	Church Street/ Macquarie Street	0.32	14	49	A	0.42	18	44	B
30	Macquarie Street/ Smith Street	1.22	131	426	F	0.72	13	158	A
33	Macquarie Street/ Charles Street	0.76	20	90	B	0.51	19	30	B
34	Macquarie Street/ Harris Street	0.68	16	121	B	0.57	12	119	A
35	Harris Street/ George Street/ MacArthur Street	0.83	17	369	B	0.88	13	374	A
Off-corridor									
A15	O'Connell Street/ George Street	0.91	32	358	C	1.14	98	972	F
A16	O'Connell Street/ Macquarie Street	0.77	19	168	B	0.82	16	280	B
A18	George Street/ Marsden Street	0.82	28	156	B	0.99	56	276	D
A19	Macquarie Street/ Marsden Street	0.60	10	61	A	0.82	29	192	C
A20	Phillip Street/ Smith Street/ Wilde Avenue	0.83	33	260	C	0.95	40	195	C
A21	George Street/ Smith Street - Parramatta	0.82	35	150	C	2.17	49	207	D
A22	George Street/ Charles Street	0.54	14	42	A	0.84	26	143	B

Table 4.10: Parramatta CBD precinct intersection operation – PM peak hour

I.D	Intersection	2026 without the project				2026 with the project			
		Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
On-corridor									
25	Church Street/ George Street	0.47	26	65	B	0.45	10	59	A
26	Church Street/ Macquarie Street	0.44	8	74	A	0.29	23	23	B
30	Macquarie Street/ Smith Street	1.23	146	415	F	0.75	13	167	A
33	Macquarie Street/ Charles Street	0.67	18	63	B	0.26	16	26	B
34	Macquarie Street/ Harris Street	0.63	10	120	A	0.65	16	129	B
35	Harris Street/ George Street/ MacArthur Street	1.23	194	1381	F	1.10	123	833	F
Off-corridor									
A15	O'Connell Street/ George Street	0.89	22	311	B	1.61	411	2487	F
A16	O'Connell Street/ Macquarie Street	1.03	58	439	E	1.18	160	1598	F
A18	George Street/ Marsden Street	0.89	27	235	B	1.44	214	895	F
A19	Macquarie Street/ Marsden Street	0.90	24	310	B	1.01	74	491	F
A20	Phillip Street/ Smith Street/ Wilde Avenue	1.06	69	457	E	1.08	75	456	F
A21	George Street/ Smith Street	0.84	42	183	C	1.68	270	769	F
A22	George Street/ Charles Street	0.61	15	65	B	1.054	58	267	E

Compared with the 'without the project' scenario, there are two intersections that would improve performance in the peak periods. These intersections include:

- Macquarie Street/ Smith Street due to decreased traffic along Macquarie Street and re-distribution of Parramatta Square traffic, as well as the removal of the scramble crossing
- Church Street/ George Street due to removal of traffic along Church Street and removal of the scramble crossing.

Compared with the 'without the project' scenario, the remaining intersections would be affected by the project with significant impacts at the following intersections during peak periods:

- O'Connell Street/ George Street
- O'Connell Street/ Macquarie Street – PM peak only
- George Street/ Marsden Street
- Macquarie Street/ Marsden Street
- George Street/ Smith Street – PM peak only
- George Street/ Charles Street – PM peak only.

To minimise the impacts of the project, potential intersection improvements have been identified at some of the above intersections, as summarised in Table 4.11.

Table 4.11: Relevant intersections and recommended improvements – Parramatta CBD precinct

I.D.	Intersection	Recommended intersection improvements
A15	O'Connell Street/ George Street	- Remove pedestrian crossing on southern leg - Remove second right turn from south approach, converting lane two into a through only lane - Make left-turn from east continuous lane - Remove parking from George Street to provide two continuous traffic lanes in each direction
A18	George Street/ Marsden Street	- Ban right turn from Marsden Street on the north approach during the PM peak only - Remove parking from George Street to provide two continuous traffic lanes in each direction
A19	Macquarie Street/ Marsden Street	- Provide a right turn lane on north approach - Modify of traffic signal timing
A21	George Street/ Smith Street	- Ban right turn from Smith Street on the north approach during the PM peak only - Relocate bus stop on the west side of Smith Street, north of the intersection - Remove parking from George Street to provide two continuous traffic lanes in each direction
A22	George Street/ Charles Street	- Remove parking from George Street to provide two continuous traffic lanes in each direction

Table 4.12 and Table 4.13 present a summary of the expected operation of the above intersections with recommended improvements for the AM and PM peaks, respectively, with full results included in Appendix A of this report with maps showing the intersection operation included in Appendix B.

Table 4.12: Parramatta CBD precinct intersection operation with recommended improvements – AM

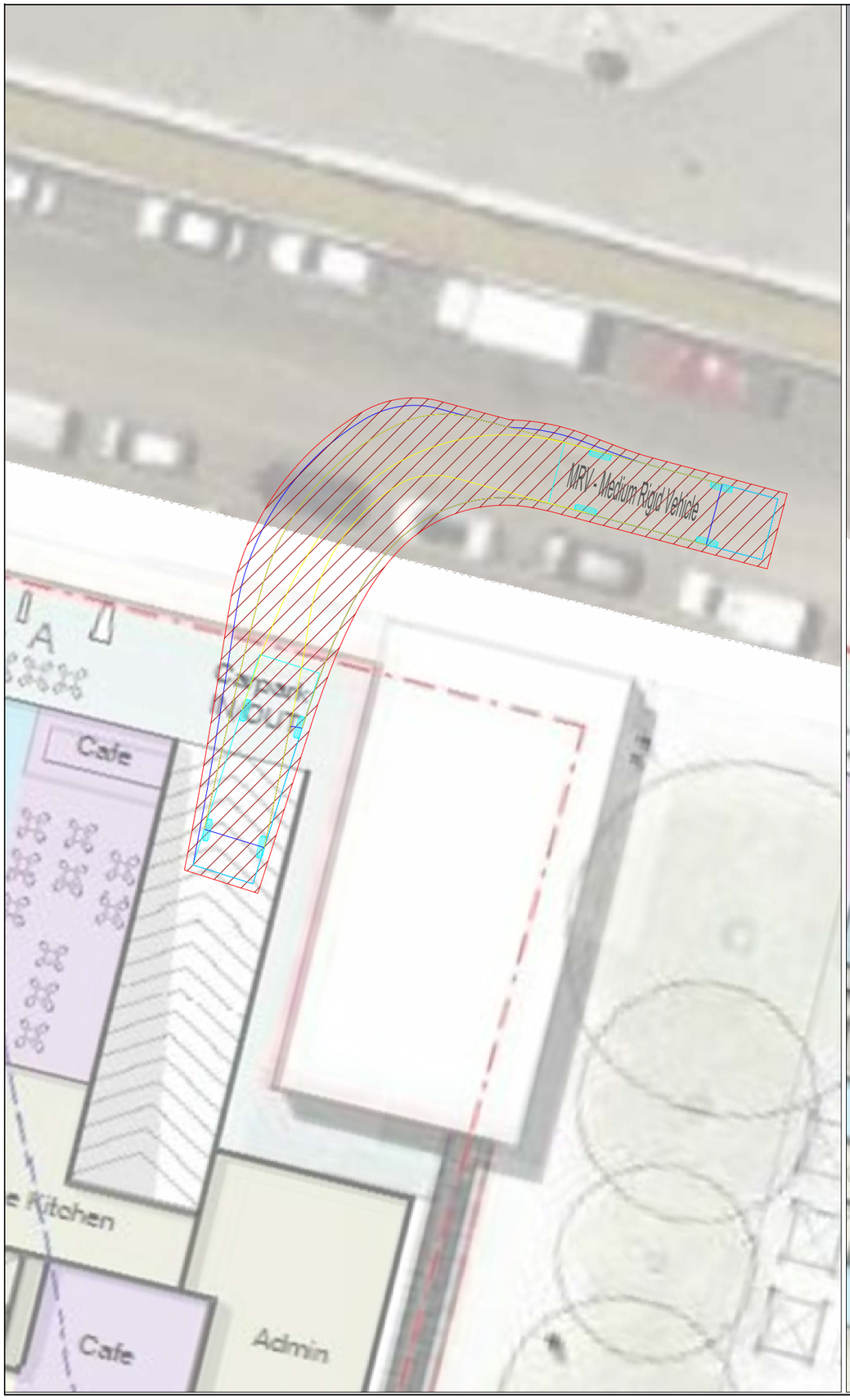
I.D.	Intersection	2026 without the project				2026 with the project				2026 with the project and improvements			
		Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
A15	O'Connell Street/ George Street	0.91	32	358	C	1.14	98	972	F	1.13	89	928	F
A18	George Street/ Marsden Street	0.82	28	156	B	0.99	56	276	D	0.91	32	146	C
A19	Macquarie Street/ Marsden Street	0.60	10	61	A	0.82	29	192	C	0.75	20	124	B
A21	George Street/ Smith Street	0.82	35	150	C	2.17	49	207	D	0.96	50	227	D
A22	George Street/ Charles Street	0.54	14	42	A	0.84	26	143	B	0.67	22	107	B

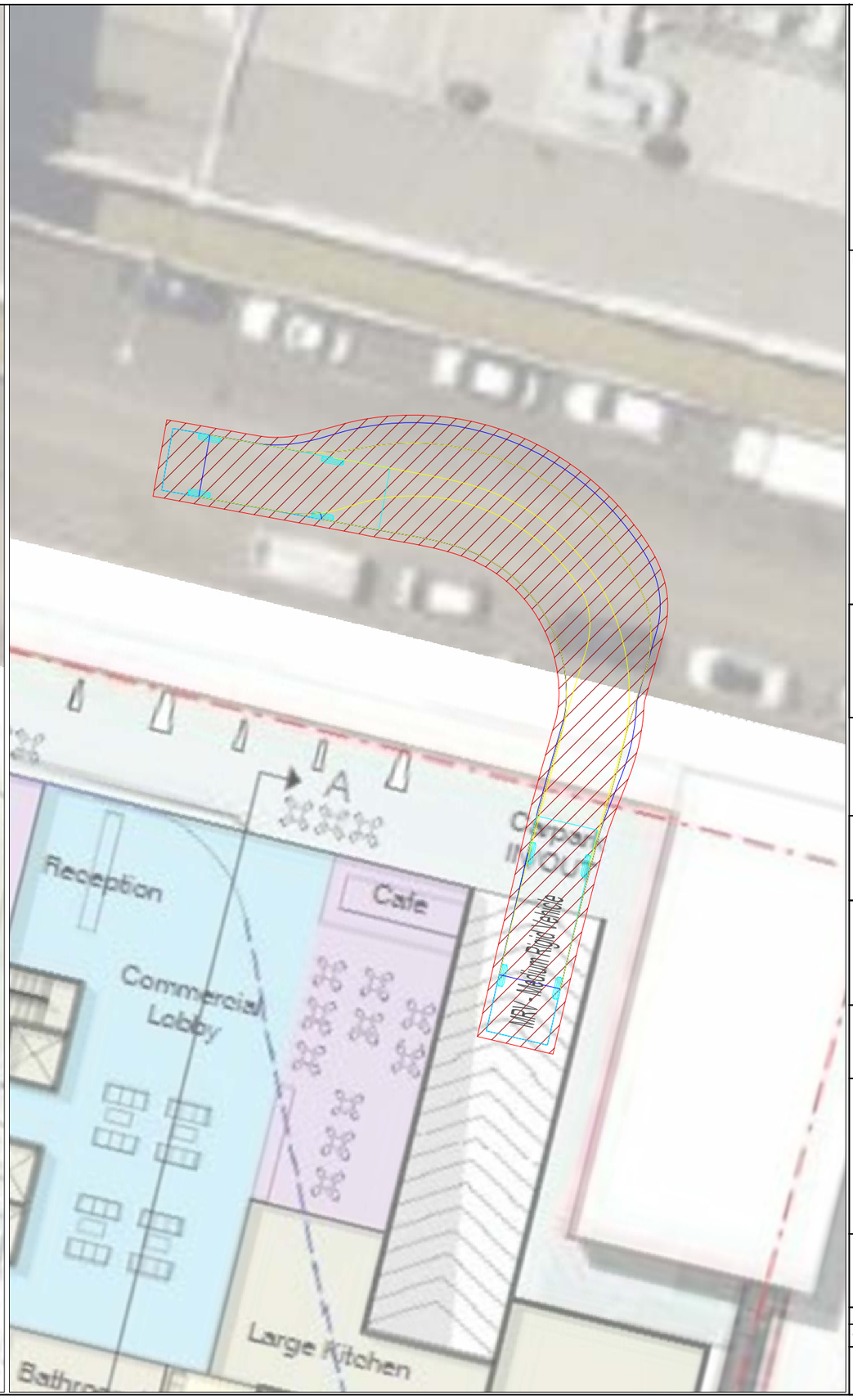
Table 4.13: Parramatta CBD precinct intersection operation with recommended improvements – PM peak hour

I.D.	Intersection	2026 without the project				2026 with the project				2026 with the project and improvements			
		Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service	Degree of saturation	Average delay (sec)	95th percentile queue (m)	Level of service
A15	O'Connell Street/ George Street	0.89	22	311	B	1.61	411	2487	F	1.42	143	1378	F
A18	George Street/ Marsden Street	0.89	27	235	B	1.44	214	895	F	0.95	28	173	B
A19	Macquarie Street/ Marsden Street	0.90	24	310	B	1.01	74	491	F	0.93	35	144	C
A21	George Street/ Smith Street	0.84	42	183	C	1.68	270	769	F	0.80	36	160	C
A22	George Street/ Charles Street	0.61	15	65	B	1.054	58	267	E	0.71	21	94	B

Appendix G

Swept Path Analysis





Notes

This drawing is prepared for information purposes only. It is not to be used for construction.

TRAFFIX is responsible for vehicle swept path diagrams and/or drawing mark-ups only. Base drawing prepared by others.

Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (*AS/NZS 2890.1-2004 Parking facilities - Off-street car parking*, and/or *AS 2890.2-2002 Parking facilities - Off-street commercial vehicle facilities*). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

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Proposed Access Swept Path Analysis
8.8m MRV Design Vehicle

drawn:	-	checked:	AK	date:	30-04-2018

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project no.	drawing phase.	drawing no.	rev