ATTACHMENT BOOKLET

LIVERPOOL LOCAL TRAFFIC COMMITTEE MEETING

16 JULY 2025

LIVERPOOL CITY COUNCIL

LIVERPOOL THE GREAT SOUTH WEST

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GBI 09 GEORGE STREET & MOORE STREET, LIVERPOOL CBD - PROPOSED IMPLEMENTATION OF STREETSCAPE WORKS FROM THE ADOPTED LIVERPOOL CITY CENTRE PUBLIC DOMAIN MASTER PLAN

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Traffic and Transport Impact Assessment
George Street and Moore Street Cycleways
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Cycleway Design for Moore Street and George Street
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Traffic and Transport Impact Assessment

George Street and Moore Street Cycleways

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1.0 Introduction

Liverpool City Council (LCC) engaged AECOM to develop a concept design for cycleways along Moore Street and George Street in the Liverpool CBD (the Project). This Traffic and Transport Impact Assessment report provides an assessment of the potential impacts of the Project on transport network.

The purpose of this report is to:

- Assess the existing traffic and transport conditions in and around the study area
- Evaluate the potential traffic generation and redistribution caused by the Project.
- Assess the impacts associated with operation of the Project.
- Recommend mitigation measures to manage impacts, if required.

This report is structured as follows:

Section 2.0 – Project description, which provides the strategic context and background, establishes the project vision and objectives, and describes the key features of the design

Section 3.0 - Existing conditions, which provides details of the road network, crash history, public transport services, active transport facilities and parking supply/demand

Section 4.0– Traffic Impact Assessment Methodology, which outlines the approach for evaluating traffic impacts on the road network. It details the modelling techniques employed, traffic survey methods, signal phasing strategies, traffic redistribution and diversion effects resulting from the Project, as well as the parameters used in the modelling assessment.

Section 5.0– Intersection operation and traffic impacts, which presents the forecast operational performance of study area intersections under both existing conditions and the proposed project layout.

Section 6.0 - Public transport impacts, highlighting the proposed changes to bus infrastructure and the associated impacts.

Section 7.0 Parking impacts, providing an assessment of the changes in on-street parking supply within the study area as a result of the Project.

Section 8.0 Conclusion and next steps: Sets out concluding summary points and next steps required.

2.0 Project description

2.1 Strategic context and background

Liverpool is located in Sydney's southwest and is emerging as the city's third CBD, positioned at the heart of major regional infrastructure investment. As a key metropolitan centre, Liverpool is undergoing significant urban transformation, with increasing population growth, development, and economic activity driving demand for enhanced transport and public domain infrastructure.

The Liverpool CBD Public Domain Master Plan (2020) provides a strategic framework for improving the city's streetscape, supporting a walkable, people-friendly environment through wider footpaths, dedicated cycling infrastructure, and upgraded public spaces. Additionally, Liverpool City Council's cycling strategy, as outlined in the Liverpool Bike Plan 2018-2023, reaffirms cycling as a valid and equal mode of transport, promoting it for both recreation and commuting to enhance connectivity, health, and sustainability. The plan identifies key cycling corridors and infrastructure priorities, ensuring Liverpool's network evolves to meet the needs of its growing population.

The George Street and Moore Street Cycleway Project aligns with these strategies, contributing to a safe, connected, and accessible active transport network within the CBD. LCC secured funding through the Get NSW Active program from Transport for NSW to develop a concept design for dedicated cycle facilities along these key corridors, reinforcing the NSW Government's commitment to promoting walking and cycling as preferred transport modes.

The Moore Street section of the cycleway serves as a key east-west link between Bigge Street and Copeland Street, connecting major destinations such as the University of Wollongong Liverpool campus, Macquarie Street pedestrian zone, and Liverpool's shopping precinct. It also integrates with Liverpool train station, local bus services, and the T-Way corridor, ensuring seamless multimodal access.

The George Street section forms a critical north-south connection between Scott Street and Copeland Street, linking significant civic, commercial, and cultural landmarks, including the Liverpool police station, courthouse, Westfield shopping centre, and the vibrant Little India precinct.

By delivering high-quality cycle infrastructure along two of Liverpool's most important corridors, this project plays a key role in realising Liverpool's long-term vision for an integrated, sustainable, and people-focused transport network.

An overview of the study area can be found in Figure 2-1.

Figure 2-1 Study area

2.2 Project vision and objectives

A Vision Workshop, conducted in partnership with LCC, was key to defining the project objectives and aligning the design approach with LCC's aspirations. The resulting vision for the Project was defined as follows:

"The vision for this project is to transform Liverpool's city centre into a more inclusive, accessible, and vibrant urban space. By delivering separated cycleways along George Street and Moore Street, the aim is to enable the safe movement of people, while building a stronger sense of community and connectivity.

This project will enable people to be prioritised by creating opportunities for increased tree canopy, greenery and seating to provide cool, comfortable spaces. These improvements aim to attract visitors and encourage longer stays in the CBD, supporting local businesses and community spaces.

The design will also accommodate private vehicle parking while promoting micromobility options to encourage more people to access the city. This approach supports a safe, attractive and vibrant CBD that is prepared for the planned future population of Liverpool."

The project objectives were developed in line with the design brief for the cycleways, while incorporating the broader placemaking ambitions for Liverpool CBD:

- **Develop a separated two-way cycleway** along George and Moore Streets within Liverpool CBD to enhance connectivity and accessibility for residents, workers, and visitors.
- **Improve safety** by creating a secure environment for micromobility users, encouraging greater uptake of active travel.
- **Integrate with the wider strategic cycleway network**, ensuring seamless connections and bolstering the region's active transport infrastructure.
- **Deliver a future-ready design** that accommodates Liverpool's anticipated population growth and evolving mobility demands.
- **Enhance the sense of place** by introducing improved amenities and fostering a welcoming, vibrant atmosphere for all users.

2.3 Key design features of the Project

The concept design plans for the project are provided in Appendix A. However, the key design features of the project are:

- New dedicated cycleway along George Street between Scott Street and Elizabeth Street, and between Campbell Street and Hume highway, providing safe and continuous cycling connectivity.
- New dedicated cycleway along Moore Street between Copeland Street and Bigge Street providing safe and continuous cycling connectivity.
- New shared path along George Street between Elizabeth Street and Campbell Street, providing a safe path of travel for all active modes within a constrained environment.
- Updates to Traffic Control Signal infrastructure for cyclists, including cycle lanterns at signalised intersections, cycle turn boxes and signal phasing to support safe cycle movement through intersections.
- Cycle parking included in each CBD block (excluded from residential areas).
- Streetscape enhancements with wayfinding, high-quality materials, and street furniture.

- Reallocation of one traffic lane (south of Elizabeth Street) to a dedicated cycleway, maintaining one lane for general traffic and buses.
- North of Elizabeth Street remains two-way with design adjustments to support multimodal access.
- Moore Street to be converted to one-way operation in a westbound direction for general traffic between George Street and Bathurst Street. Bus operations will continue to be bi-directional.
- Intersection layouts, pedestrian crossings, and traffic signals modified to support movement, reduce conflicts and prioritise safety.
- Peak-period clearways to maintain traffic flow in high-demand periods.
- Retains bus access along George Street and Moore Street, with space reallocation designed to support continued bus movements including in-lane and floating bus stop treatments and dedicated bus lanes.
- Timed parking strategy with peak-period clearways and off-peak loading/short-term parking to support businesses

3.0 Existing conditions

3.1 Road network

Figure 3-1 illustrates the location of the key roads within the Liverpool CBD.

Figure 3-1 Study area road network

3.1.1 George Street

George Street is a local road connecting Hume Highway in the north to Scott Street in the south. There are two lanes in each direction between Hume Highway and Elizabeth Street, and four lanes southbound between Elizabeth Street and Scott Street, with intermittent parking on both or one side. George Street provides direct access to businesses and shops through Liverpool CBD and also acts as a through road. There is a posted speed limit of 40km/h between Hume Highway and Campbell Street and 50km/h between Campbell Street to Scott Street.

3.1.2 Moore Street

Moore Street is a state road providing and east west connection between Flowerdale Road in the west to Bigge Street in the east. Moore Street provides two lanes in each direction between Bigge Street and Copeland Street, and one lane in each direction between Copeland Street and Flowerdale Street. There are intermittent bus lanes in both directions of Moore Street between Bigge Street and Copeland Street, and a short bus lane westbound to the west of Copeland Street. There is a posted speed limit of 50 km/h between Copeland Street and Bathurst Street and 40km/h between Bathurst Street and Bigge Street.

3.1.3 Surrounding road network

George Street and Moore Street connect to multiple roads within the Liverpool CBD, including:

- Bigge Street is a local road connecting adjacently to the eastern end of Moore Street. This road provides connections to Hume Highway to the north and provides access to Liverpool Station.
- Scott Street is a local road which connects adjacently to the southern end of George Street, providing local access to the A34 (Terminus Street/Newbridge Road).
- Elizabeth Street intersects with George Street east to west and provides direct access to Westfield Liverpool shopping centre.
- Macquarie Street is a local road running parallel to George Street and intersects with Moore Street; this point of intersection is referred to as the Macquarie Street T-way providing an area of bus rapid transit infrastructure.
- Hume Highway (Copeland Street/ A22) is a state road which surround Liverpool CBD. Hume Highway connects to the northern point of George Street and to the western end of Moore Street. the road provides further access north.

3.2 Crash history

Crash data from TfNSW indicates that overall Moore Street had 9 reported incidents within the project boundary, and George Street had 13 reported incidents. Minor/other injury was the most common degree of crash along Moore Street, whilst non-casualty (towaway) was most common on George Street.

Traffic incident data gathered from Transport for New South Wales was analysed for the years 2019 to 2023. Within the project boundaries, Moore Street recorded nine reported incidents, while George Street recorded 13.

On Moore Street, the most common crash severity involved minor or other injuries. In contrast, on George Street, non-casualty (towaway) incidents were the most frequently reported.

A summary of the data for Moore Street is in Table 3-1 and George Street in Table 3-2.

Table 3-1 Traffic incident data for Moore Street

Year	Degree of crash	Surface condition	RUM code	RUM description
2019	Moderate Injury	Dry	2	Ped far side
2019	Minor/Other Injury	Dry	0	Ped nearside
2020	Non-casualty (towaway)	Wet	73	Off road right => obj
2020	Minor/Other Injury	Wet	42	Leaving parking
2020	Minor/Other Injury	Dry	30	Rear end
2020	Non-casualty (towaway)	Dry	47	Emerging from drive
2021	Minor/Other Injury	Dry	0	Ped nearside
2022	Minor/Other Injury	Wet	10	Cross traffic
2023	Serious Injury	Dry	21	Right through

Table 3-2 Traffic incident data for George Street

Year	Degree of crash	Surface condition	RUM code	RUM description
2019	Non-casualty (towaway)	Dry	30	Rear end
2019	Serious Injury	Dry	30	Rear end
2019	Moderate Injury	Dry	81	Off left/rt bend=>obj
2019	Minor/Other Injury	Dry	30	Rear end
2019	Minor/Other Injury	Dry	9	Ped other
2020	Non-casualty (towaway)	Dry	34	Lane change right
2021	Moderate Injury	Dry	49	Other manoeuvring
2021	Non-casualty (towaway)	Wet	34	Lane change right
2022	Non-casualty (towaway)	Dry	71	Off road left => obj
2022	Minor/Other Injury	Wet	3	Ped on carriageway
2023	Moderate Injury	Dry	48	From footpath

2023	Moderate Injury	Dry	90	Fell in/from vehicle
2023	Non-casualty (towaway)	Dry	87	Off left/left bend=>obj

3.3 Public transport

Liverpool CBD benefits from frequent and accessible public transport options, all within walking distance of Liverpool and Warwick Farm Railway Stations. Liverpool Railway Station serves as a major transit hub, integrating rail and bus services alongside a taxi pick-up zone.

3.3.1 Bus services

The CBD is served by extensive bus coverage, with George Street accommodating seven bus routes and Moore Street serving as a critical corridor with 20 bus routes, as illustrated in Figure 3-2. Moore Street is strategically significant as part of the Liverpool to Parramatta Transitway and is set to support a future rapid transit corridor (T-Way), enhancing connectivity between Liverpool and Western Sydney Airport.

Northern routes connect to Warwick Farm, Cabramatta, and Parramatta, while eastern routes link to Burwood and Chipping Norton. Southern routes provide access to Holsworthy, Casula, and Campbelltown, and western services cover Carnes Hill and Bringelly.

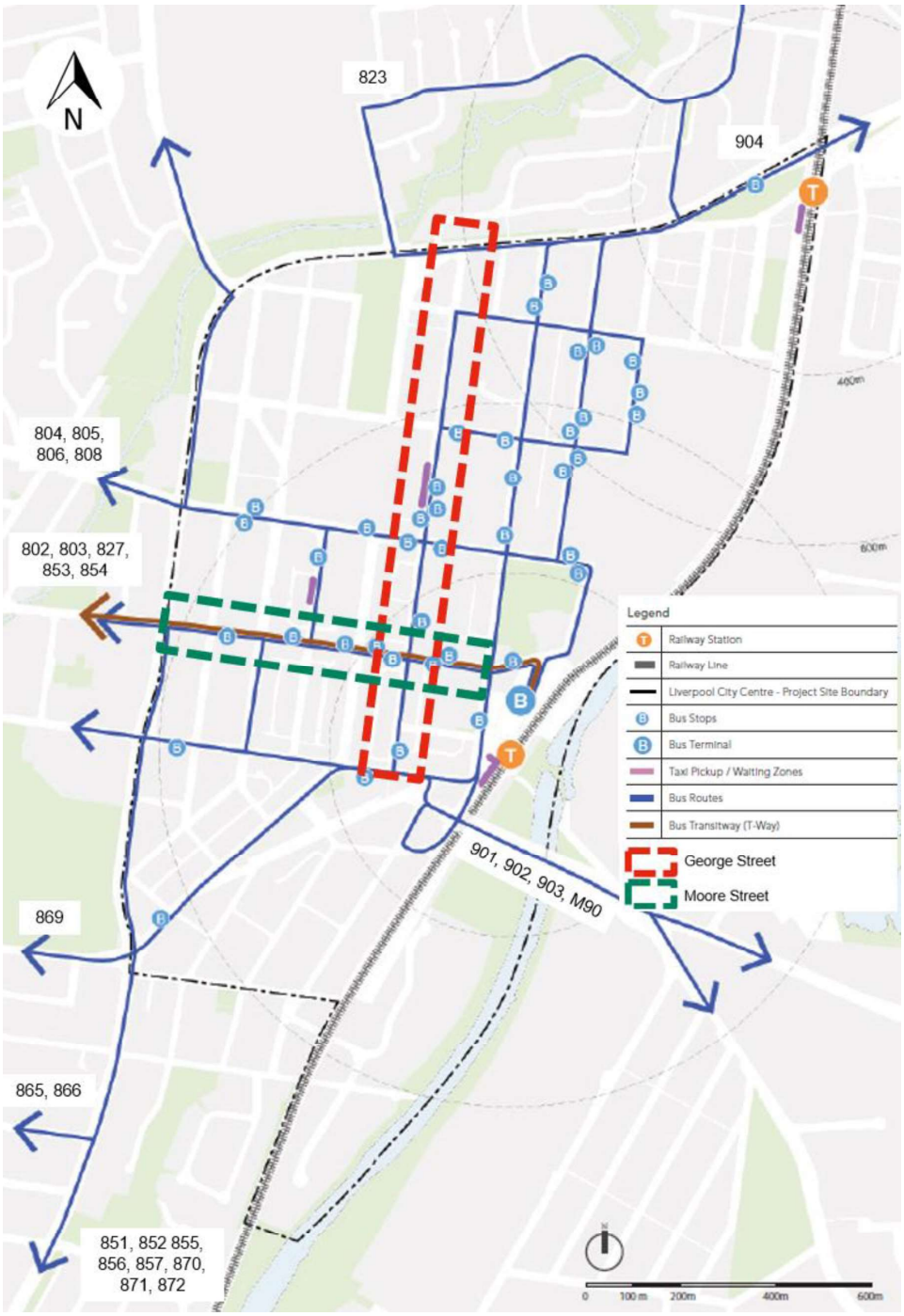


Figure 3-2 Transit overview in Liverpool CBD. Source: Liverpool City Council Masterplan

3.3.2 Train services

Liverpool has two train stations within proximity: Liverpool Railway Station and Warwick Farm Railway Station. Liverpool station serves as a major interchange, connecting passengers to regional and suburban train services, as well as linking with the bus network.

The T3 Bankstown Line and T2 Inner West & Leppington Line provide train services to Liverpool and Warwick Farm, forming a critical component of the public transport network in southwestern Sydney. The station is part of Sydney Trains' suburban network, with services operating at frequent intervals throughout the day, providing connectivity to key destinations such as the Sydney CBD, Parramatta, and Campbelltown.

Warwick Farm Station, located approximately one kilometre northeast of Liverpool, is also served by the T2 Inner West & Leppington Line. The station provides local connectivity to surrounding suburbs, with train frequencies varying throughout the day to accommodate peak and off-peak travel demand. The station is accessible via street-level entry and is in proximity to Warwick Farm Racecourse.

3.4 Active transport

3.4.1 Pedestrian infrastructure

There are footpaths along either side of George Street. The footpaths from 2 metres to 4.5 metres wide with sections of grass verges. Multiple crossing points with dropped kerbs are located along George Street including:

- Signalised pedestrian crossings at the intersections with; Railway Street, Moore Street, Elizabeth Street and Campbell Street
- Informal crossing points at the roundabout with Lachlan Street
- Continuous footpath treatment over; George Lane, Vic Reeves Service way, Dewsbury Lane, Hanwell Service way and Penny Lane
- Zebra crossings over George Street mid-way between Scott Street and Elizabeth Street outside the police station, and between Elizabeth Street and Campbell Street outside Westfield. It should be noted that the existing zebra crossing outside the police station is not compliant with current Transport for NSW standards as it spans two traffic lanes in the same direction.

There are footpaths along either side of Moore Street. The footpaths range from 1.5 metres to 4.5 metres wide, with sections of grass verges. Crossing points with dropped kerbs are located along Moore Street including:

- Signalised pedestrian crossings at the intersections with; Bathurst Street, Northumberland Street,
- Informal crossing points at the intersection with; Castlereagh Street, George Street,
- Continuous footpath treatment over; Crawford Lane and Bigge Street
- Pelican crossing at the intersection with Macquarie Street

3.4.2 Cycle infrastructure

There are multiple shared paths located throughout the study area as shown in Figure 3-3, however there is no cycle infrastructure on George Street or Moore Street. Connecting to George Street and Moore Street are shared paths on Elizabeth Street and Bigge Street.

The path on Elizabeth Street is generally between 3 to 4 metres wide. Some sections have lane markings and signage indicating it as a shared path. The shared path originates at Bigge Park and continues west through Mount Pritchard and Bonnyrigg to Cecil Park, providing multiple north and south connections along the route.

The shared path on Bigge Street is generally between 3.5 and 4 metres wide, with no lane markings or signage. The path originates at Scott Street in the south and ends at the northern ends at Elizabeth Street. To the north and south, the path continues beyond Bigge Street providing connections to Parramatta in the north and Glenfield in the south.

Figure 3-3 Cycle infrastructure in the study area. Source: Cycleway Finder

3.4.3 Cyclist movements

Strava data, presented in Figure 3-4, highlights key cycling activity patterns across Liverpool CBD, revealing several important trip attractors and movement corridors. Significant north-south activity is concentrated along Bigge Street, while east-west movements are prominent along Moore Street and Elizabeth Street.

High levels of cycling are also observed in the eastern part of the CBD, particularly along Moore Street near TAFE, as well as along Burnside Drive, Hart Street, and Remembrance Avenue. These routes provide connections to Warwick Farm, where the train station is located. Additionally, the Liverpool railway and bus station in the southeast of the city experiences substantial cycle traffic in its vicinity.

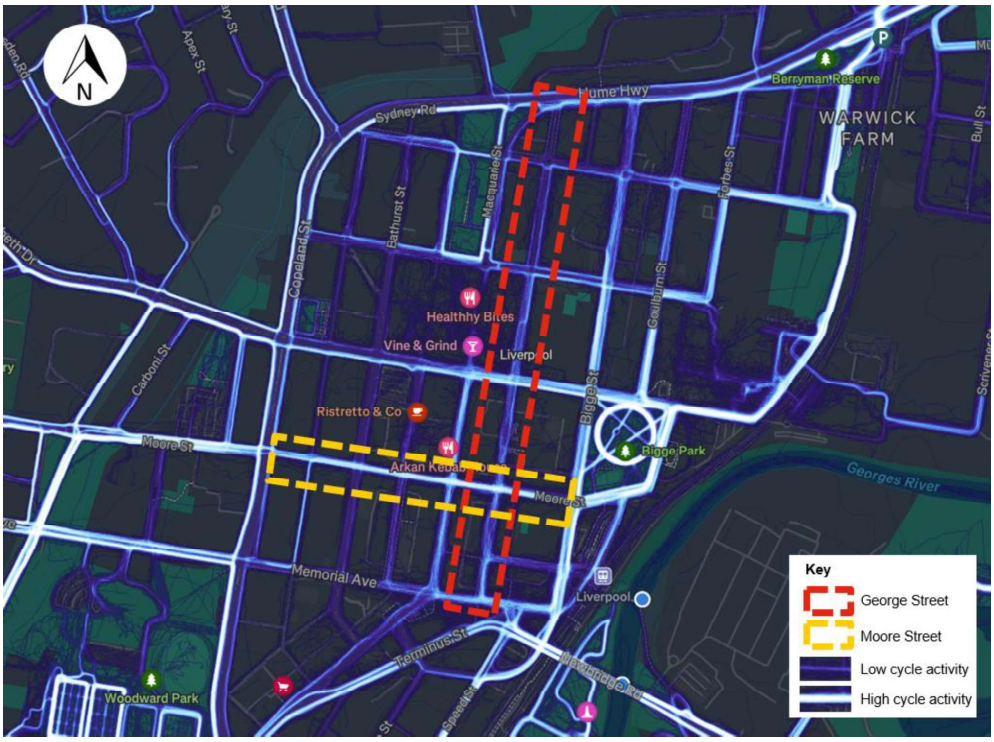


Figure 3-4 Strava data for Liverpool CBD and the surrounding area. Source: Strava

3.5 Parking supply & demand

This section provides an overview of the existing parking in the study area. Figure 3-5 sets out on street parking segments along George Street and Moore Street, and additional off-street parking locations in the surrounding area.

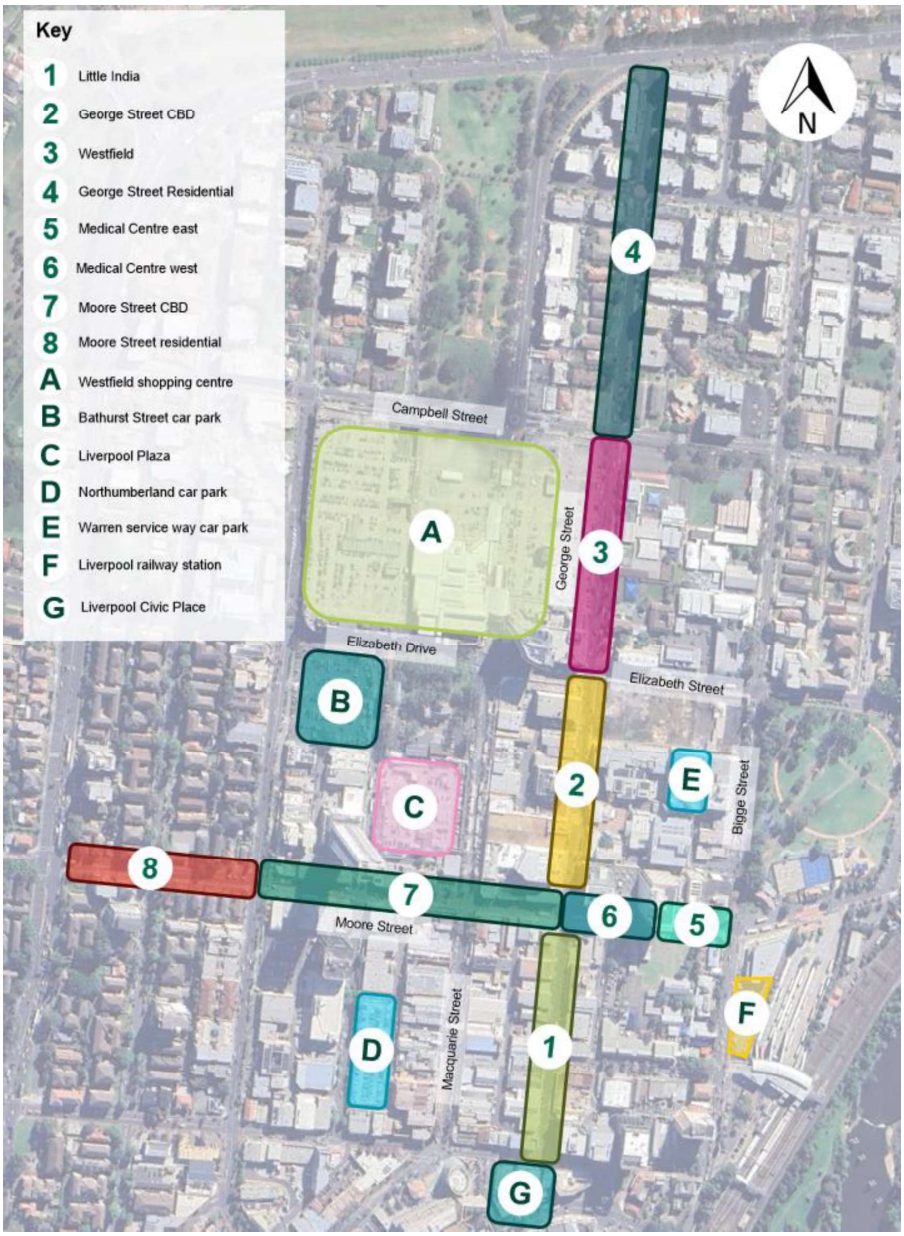


Figure 3-5 LCCC study area segments, and existing off-street cark parking locations

3.5.1 On-street parking

On-street parking is available throughout the Liverpool CBD, including the study area on George Street and Moore Street, serving as short-term parking options for businesses, shoppers, and residents. Demand for these spaces fluctuates based on peak commercial and retail hours. An overview of the existing on-street parking is presented in Table 3-3.

Table 3-3 On-street car parking in study area

Segment	Description	Number of spaces
George Street		
1	Little India (between Scott St & Moore St)	45
2	George St CBD (between Moore St & Elizabeht St)	37
3	Westfield (between Elizabeth St & Campbell St)	29
4	George St Residential (between Campbell St & Hume Highway)	70
Moore Street		
5	Medical Centre East (between Bigge St & Medical Centre)	14
6	Medical Centre West (between Medical Centre & George St)	6
7	Moore Street CBD (between George St & Bathurst St)	11
8	Moore Street Residential (between Bathurst St & Copeland St)	10

3.5.2 Off-street parking

Liverpool CBD features several off-street parking facilities that provide substantial vehicle capacity. Key locations and capacity are presented in Table 3-4.

Table 3-4 Main off-street car parks in Liverpool CBD

Segment	Car park	Number of spaces
A	Westfield Shopping Centre	3,498
B	Bathurst Street Car Park	240
C	Liverpool Plaza Shopping Centre	220
D	Northumberland Car Park	440
E	Warren Service way	640
F	Liverpool Railway Station	124
G	Liverpool Civic Place	150

3.5.3 Loading zones & taxi ranks

Liverpool CBD has designated loading zones and taxi ranks to facilitate operations and support local businesses. These zones are typically operational during business hours, ensuring convenient access for services and passenger vehicles.

Taxi ranks are provided at key locations in Liverpool to support passenger pick-up and drop-off, particularly in high-demand areas including Liverpool Station and Westfield Liverpool on George Street.

Loading zones including mail zones are located along George Street, near Westfield, offering space for deliveries and post pick-up.

4.0 Traffic impact assessment methodology

The proposal will introduce a two-way cycleway along George Street and Moore Street and will require changes to intersection layouts within the study area. The impacts of these changes to each intersection and the resulting traffic impacts will be set out in this section.

4.1 Traffic model

A network SIDRA model has been developed to assess the existing operational performance of intersections within the study area during the observed peak hours, with each peak modelled for a one-hour period. The network diagram is presented in Appendix B .

The model has been calibrated using intersection turning movement counts and validated against observed queue lengths and site observations. It has been used to evaluate the impact of a single proposed design option at each intersection on the performance of the broader network.

4.2 Traffic volumes

Traffic surveys collecting turning counts and queue lengths were undertaken on Thursday 21 November 2024 and Saturday 23 November 2024 between the hours of 12:00am-11:59pm. The weekday AM peak hour occurred between 08:15 - 09:15, the weekday PM peak hour occurred between 16:00 - 17:00 and the weekend peak hour occurred between 11:45 - 12:45. These peak hours have been used as a basis of the traffic modelling assessment.

4.3 Traffic signal phasing

The intersection phasing for the intersections have been extracted from SCATS data provided by Transport for NSW for the same dates as the traffic surveys were collected.

For all future intersection layouts, a user give cycle time of 100 seconds has been applied to the intersections to accommodate the changes made to the traffic signal phasing and intersection layouts as a result of the project. The exception to this is at the intersections of George Street/Elizabeth Street and George Street/Campbell Street, where the intersection layouts have not changed significantly as the cycleway terminates at a shared path and does not run through the intersections. Therefore, existing phase times have been used at these intersections in the future scenarios.

4.4 Intersection operation parameters

The operation of the intersection has been assessed using SIDRA INTERSECTION 9.1, a computer-based modelling package which calculates intersection performance.

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

The key outputs from SIDRA INTERSECTION are summarised in Table 4-1.

Table 4-1 SIDRA INTERSECTION modelling outputs

Output	Description
Degree of saturation (DoS)	Ratio of the arrival (demand) flow rate to the capacity of the approach or intersection during a given flow period. Where DoS is close to 1.00, the traffic demand is effectively equal to the capacity of the approach or intersection
95th percentile vehicle queue (metres)	A statistical value which represents the queuing experienced on an approach to an intersection
Average delay (seconds) and level of service (LoS)	Average delay is commonly used to assess the operational performance of intersections, with LoS used as an index.

A summary of the intersection LoS criteria is shown in Table 4-2. Common practice suggests that when intersection performance falls to LoS D, investigations should be initiated to determine if suitable remediation can be provided.

Table 4-2 LoS criteria for intersections

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

Source: Traffic Modelling Guidelines, Transport, 2013.

4.5 Traffic distribution and diversions

The proposed changes to the road network, as part of the Project, would require multiple traffic routes to be diverted onto alternative routes to accommodate the cycleway infrastructure. To reflect this, traffic has been manually redirected in the network onto the shortest alternative route, as shown in Figure 4-1.

The diverted traffic has been quantified and reflected in the network diagrams included in Appendix D. The impacts of these changes have been set out in section 5.0. Note that this assessment only considers diverted traffic through intersections included in the network study area. The impacts of diverted traffic has not been assessed for intersections that sit outside of modelled network.

The diversions are primarily due to the proposed one-way system along Moore Street and multiple associated banned movements onto Moore Street. The banned movements and resulting diversions reflected in the study area network intersections are shown in Figure 4-1 and are as follows:

- Through movement ban from Moore Street west to Moore Street east at the intersection of Moore Street and Bathurst Street – this would result in vehicles being redirected left onto Bathurst Street, followed by right onto Elizabeth Street, and finally right onto George Street to feed back into the network at the intersection of George Street and Moore Street
- Right turn ban from Bathurst Street south to Moore Street east at the intersection of Moore Street and Bathurst Street – this would result in vehicles being redirected straight through the intersection
- Left turn ban from Bathurst Street north to Moore Street east at the intersection of Moore Street and Bathurst Street – this would result in vehicles being redirected straight through the intersection
- Right turn ban from Northumberland Street south to Moore Street east at the intersection of Northumberland Street and Moore Street – this would result in vehicles being directed straight through the intersection
- Right turn ban from Macquarie Street south to Moore Street east at the intersection of Macquarie Street and Moore Street – this would result in vehicles being directed straight through the intersection onto Macquarie Street south, followed by left onto Scott Street, left onto Bigge Street, left onto Moore Street and feed back into the network at the intersection of Moore Street and George Street.

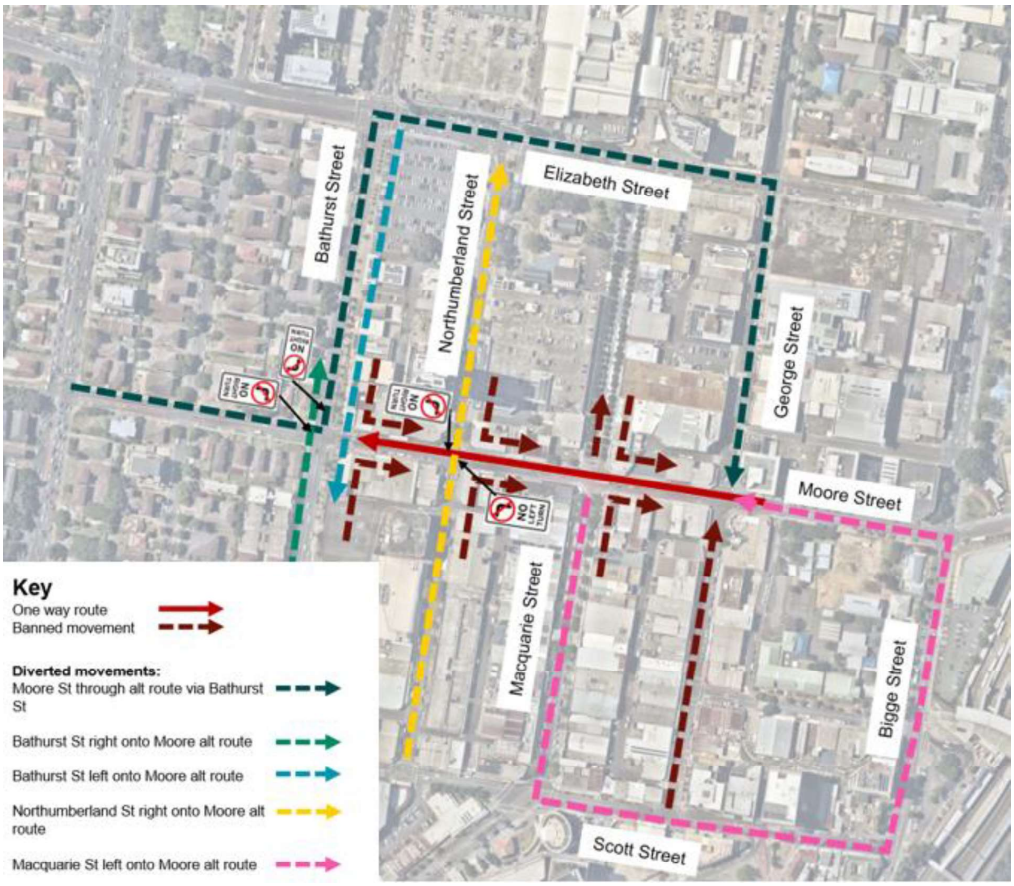


Figure 4-1 Diverted traffic through the modelled network

5.0 Intersection operation and traffic impacts

This section describes the network performance of the existing and proposed intersection layouts. The SIDRA layouts and movement summaries for each intersection and scenario are presented in Appendix D.

5.1 Moore Street and Castlereagh Street

Changes to the intersection would include the following:

- Add a cycleway to northern footpath on Moore Street west approach
- Add a bus lane to the Moore Street west approach and remove one traffic lane
- Add a cycleway to the northern footpath on the Moore Street east exit
- Add a bus lane to the Moore Street east approach, remove one traffic lane and restrict traffic turning right
- Remove any weekend parking from both Moore Street arms of the intersection

Table 5-1 summarises the operation of the Moore Street and Castlereagh Street intersection with the existing layout vs the proposed layout during weekday AM and PM peak hour and the weekend peak hour.

Table 5-1 Moore Street and Castlereagh Street intersection performance

Intersection layout	Peak hour	DoS	Average delays (seconds)	95th percentile queue (metres)	Level of Service (LoS)
Existing layout	AM	0.075	3.3	2.1	LOS A
	PM	0.159	3.5	4.5	LOS A
	Weekend	0.073	3.0	1.8	LOS A
Proposed layout	AM	0.121	2.8	3.2	LOS A
	PM	0.231	3.8	6.7	LOS B
	Weekend	0.149	2.4	2.9	LOS A

With the existing layout, the Moore Street and Castlereagh Street intersection currently operates well at a LOS A during all peaks. The model indicates minimal queueing and no notable delays on any approaches in any peaks.

With the proposed layout, the intersection continues to operate at a LOS A in the AM and weekend peak and drops to a LOS B in the PM peak, however, remains operating at a good level. Delays remain at a similar level to the existing layout; however, queues do increase slightly but overall remain minimal.

5.2 Moore Street and Bathurst Street

Changes to the intersection would include the following:

- Add a cycleway to the northern footpath on the Moore Street west approach
- Restrict the traffic through movement from the Moore Street West approach and allow traffic left turn only
- Add a cycleway to the Moore Street east exit outside lane and remove one general traffic lane
- Remove weekend parking from both Moore Street arms of the intersection
- Remove weekend parking on the Bathurst Street south approach and Bathurst Street north exit in the AM peak only

Table 5-2 summarises the operation of the Moore Street and Bathurst Street intersection with the existing layout vs the proposed layout during weekday AM and PM peak hour and the weekend peak hour.

Table 5-2 Moore Street and Bathurst Street intersection performance

Intersection layout	Peak hour	DoS	Average delays (seconds)	95th percentile queue (metres)	Level of Service (LoS)
Existing layout	AM	0.525	16.1	68.7	LOS B
	PM	0.774	23.0	113.7	LOS B
	Weekend	0.657	20.5	79.3	LOS B
Proposed layout	AM	0.393	21.2	76.7	LOS B
	PM	0.583	26.4	116.9	LOS B
	Weekend	0.529	25.8	97.6	LOS B

With the existing layout, the Moore Street and Bathurst Street intersection currently operates well at a LOS B in all peak periods. The model indicates delays on all approaches are within good operational range.

There is some queueing on all approaches in all peaks, however in the PM peak on the Bathurst Street south approach through movement and right turn queues reach 113.7 metres, however this shorter than the approach distance of 240 metres.

With the proposed layout, the intersection operates well at a LOS B within all peaks. The Moore Street east approach right turn experiences delays in all peaks, which reaches 58.2 seconds in the weekend peak, indicating the approach is operating near capacity. The Bathurst Street south approach through movement worsens slightly in PM peak to 116.9 metres, however again this is less than the approach distance.

5.3 Moore Street and Northumberland Street

Changes to the intersection would include the following:

- Add a cycleway to the Moore Street west approach and remove one traffic lane and the traffic through movement
- Add a cycleway to the Moore Street east exit and remove one traffic lane
- Remove one traffic lane from the Northumberland Street south approach and remove right turn movements
- Remove weekend parking from both Moore Street arms of the intersection

Table 5-3 summarises the operation of the Moore Street and Northumberland Street intersection with the existing layout vs the proposed layout during weekday AM and PM peak hour and the weekend peak hour.

Table 5-3 Moore Street and Northumberland Street intersection performance

Intersection layout	Peak hour	DoS	Average delays (seconds)	95th percentile queue (metres)	Level of Service (LoS)
Existing layout	AM	0.310	14.1	28.9	LOS A
	PM	0.473	16.9	54.5	LOS B
	Weekend	0.409	15.7	37.5	LOS B
Proposed layout	AM	0.252	29.4	38.7	LOS C
	PM	0.412	29.2	68.0	LOS C
	Weekend	0.347	29.9	57.6	LOS C

With the existing layout, the Moore Street and Northumberland Street intersection currently operates well at a LOS A in the AM peak and LOS B in the PM and weekend peak. The longest queues can be seen on Moore Stret east through and right turn which reach 54.5 in the PM peak, however, are lower than the approach distance of 90 metres. Delays are all within a good operating level.

With the proposed layout, the intersection degrades slightly in operation, with all peaks operating at a LOS C. The worst delays can be seen on Moore Street west through movement at 37.5 seconds, however the approach is operating at a satisfactory level. Queues are the worst in the PM peak, similar to the existing on Moore Street east through movement and right turn at 68.0 metres, however, again remain lower than the approach distance of 90 metres.

5.4 Moore Street and Macquarie Street

Changes to the intersection would include the following:

- Add a cycleway to the Moore Street west approach, remove the traffic lane and the right turn movement
- Add a cycleway to the Moore Street east exit and remove the traffic lane
- Remove the right turn movement from the Macquarie Street south approach
- Remove the weekend parking from the Moore Street west approach

Table 5-4 summarises the operation of the Moore Street and Macquarie Street intersection with the existing layout vs the proposed layout during weekday AM and PM peak hour and the weekend peak hour.

Table 5-4 Moore Street and Macquarie Street intersection performance

Intersection layout	Peak hour	DoS	Average delays (seconds)	95th percentile queue (metres)	Level of Service (LoS)
Existing layout	AM	0.295	21.5	34.7	LOS B
	PM	0.501	23.8	54.8	LOS B
	Weekend	0.972	29.3	42.5	LOS C
Proposed layout	AM	0.204	20.6	33.4	LOS B
	PM	0.273	20.8	49.0	LOS B
	Weekend	0.252	23.5	40.4	LOS C

With the existing layout the Moore Street and Macquarie Street intersection operates at a LOS B in the AM and PM peak, however at a LOS C in the weekend peak. In the weekend peak all approaches show delays, however the Moore Street west approach right turn is the worst performing with a delay of 52.7

seconds. The worst queueing can be seen on Moore Street east in the PM, with the through movement reaching 54.8 metres, however this does not exceed the approach distance of 80 metres.

With the proposed layout, the model indicates that the intersection operates at a LOS B in all peaks, which is an improved in the weekend peak from LOS C in the exiting layout. The model indicates that the proposed layout shows an improvement in delays and queue compared to the existing layout.

5.5 George Street and Moore Street

Changes to the intersection would include the following:

- Add a cycleway way on the Moore Street west approach, remove one traffic lane and the right turn movement
- Add a cycleway to the Moore Street east exit and remove one traffic lane
- Add a cycleway on the George Street north approach and remove two traffic lanes
- Add a cycleway on the George Street south approach and remove two traffic lanes
- Remove parking on George Street with the exception of some spaces in the weekend peak

Table 5-5 summarises the operation of the George Street and Moore Street intersection with the existing layout vs the proposed layout during weekday AM and PM peak hour and the weekend peak hour.

Table 5-5 George Street and Moore Street intersection performance

Intersection layout	Peak hour	DoS	Average delays (seconds)	95th percentile queue (metres)	Level of Service (LoS)
Existing layout	AM	0.327	14.9	31.9	B
	PM	0.421	19.1	52.4	B
	Weekend	0.252	14.8	27.3	B
Proposed layout	AM	0.215	17.1	37.8	B
	PM	0.321	15.4	57.8	B
	Weekend	0.332	17.1	58.5	B

With the existing layout, the George Street and Moore Street intersection currently operates well at a LOS B in all peaks. Queues are generally not notable on all approaches in comparison to approach distances, and delays are low on all approaches.

With the proposed layout, the model outputs indicate that the intersection would continue to operate at a LOS B in all peaks. Delays do worsen with the proposed layout, in particular on the Moore Street east approach left turn with delays reaching 42.2 seconds in the weekend peak. The model indicates an increase in queueing; however all queues remain below the approach distances.

5.6 George Street and Railway Street

Changes to the intersection would include the following:

- Add a cycleway to the George Street north approach and remove one traffic lane
- Add a cycleway to the George Street south exit and remove one traffic lane
- Remove all parking from both George Street arms of the intersection in the AM and PM peak and allow parking to occur during off-peak hours.
- Remove one turning lane from Railway Street east

Table 5-6 summarises the operation of the George Street and Railway Street intersection with the existing layout vs the proposed layout during weekday AM and PM peak hour and the weekend peak hour.

Table 5-6 George Street and Railway Street intersection performance

Intersection layout	Peak hour	DoS	Average delays (seconds)	95th percentile queue (metres)	Level of Service (LoS)
Existing layout	AM	0.250	20.3	28.6	LOS A
	PM	0.356	21.1	57.2	LOS A
	Weekend	0.248	19.8	37.5	LOS B
Proposed layout	AM	0.206	14.7	38.5	LOS B
	PM	0.302	13.2	57.2	LOS A
	Weekend	0.363	15.1	57.8	LOS A

With the existing layout, the intersection operates well with a LOS A during both the AM and PM peaks, and a LOS B in the weekend peak. Queues are relatively short across all periods and are well within available approach lengths, with delays remaining low.

With the proposed layout, the model outputs indicate continued good performance, achieving a LOS A in both the PM and weekend peaks, and a LOS B in the AM peak. Delays reduce slightly in the AM peak, though there is a minor increase in queue lengths during the weekend. All queues remain within the available approach distances.

5.7 George Street and Elizabeth Street

Changes to the intersection would include the following:

- Remove one approach lane from the George Street north approach
- Add a cycleway to the western side of the George Street southern approach, remove two short lanes, remove all parking in the AM and PM peak and allow parking to occur during off-peak hours.

Table 5-7 summarises the operation of the George Street and Elizabeth Street intersection with the existing layout vs the proposed layout during weekday AM and PM peak hour and the weekend peak hour.

Table 5-7 George Street and Elizabeth Street intersection performance

Intersection layout	Peak hour	DoS	Average delays (seconds)	95th percentile queue (metres)	Level of Service (LoS)
Existing layout	AM	0.685	20.6	90.5	B
	PM	0.870	28.8	143.9	C
	Weekend	0.925	33.4	93.1	C
Proposed layout	AM	0.821	20.4	130.4	B
	PM	0.996	38.5	263.0	C
	Weekend	1.017	48.2	181.8	D

With the existing layout, the intersection operates moderately well with a LOS B in the AM peak and LOS C during the PM and weekend peaks. Delays and queues are notable, particularly in the PM peak where delays reach 28.8 seconds and queues extend to 143.9 metres, though they generally remain within acceptable limits.

With the proposed layout, the model outputs indicate a degradation in performance, with LOS deteriorating to D during the weekend peak and approaching saturation (DoS > 1.0). This is primarily due to increased delays and queue lengths on the northern leg of George Street, where the reduction in through lanes—introduced to accommodate the new cycleway while retaining on-street parking—has constrained capacity. Despite the reduced performance, this outcome was considered acceptable during the design phase as a means to calm traffic within the Liverpool CBD, and overall intersection LoS remains within an acceptable performance of LoS D. There are opportunities to improve the performance at this intersection through changes to the phase times to allocate more green time to George Street to clear the queues, however this will need to be done in consultation with Transport for NSW during the approvals process.

5.8 George Street and Campbell Street

Changes to the intersection would include the following:

- Remove one approach lane and one exit lane from George Street north
- Add one short exit lane to George Street south

Table 5-7summarises the operation of the George Street and Campbell Street intersection with the existing layout vs the proposed layout during weekday AM and PM peak hour and the weekend peak hour.

Table 5-8 George Street and Campbell Street intersection performance

Intersection layout	Peak hour	DoS	Average delays (seconds)	95th percentile queue (metres)	Level of Service (LoS)
Existing layout	AM	0.451	21.3	55.6	B
	PM	0.519	23.4	54.9	B
	Weekend	0.476	20.5	46.4	B
Proposed layout	AM	0.455	20.4	56.4	B
	PM	0.561	22.1	71.7	B
	Weekend	0.477	20.4	46.4	B

With the existing layout, the intersection operates efficiently across all periods with a consistent LOS B. Delays and queue lengths remain moderate and well within the available approach distances, indicating reliable performance.

With the proposed layout, the model outputs indicate that the intersection would continue to operate at a LOS B during all peaks, with only minor variations in delays and queue lengths. As the cycleway does not pass through the intersection on-road, the intersection layout remains largely unchanged. As such, only minor impacts are observed due to upstream changes, and overall intersection performance is expected to remain stable.

6.0 Public transport impacts – Bus services

Bus operations have been carefully considered in the concept design to maintain network functionality along George Street and Moore Street. Maintaining the integrity of existing bus services was a key requirement identified through early and ongoing consultation with Transport for NSW and Transit Systems. As a result, all existing bus routes, stops, and turning movements have been retained in line with current operational arrangements, ensuring no disruption to established service patterns.

A key enhancement proposed as part of the design is the introduction of an eastbound contraflow bus lane on Moore Street. Under this arrangement, general traffic is restricted from using this section of the corridor, enabling a dedicated and uninterrupted route for eastbound bus services. This treatment represents a significant upgrade in bus priority and has been supported by traffic modelling. The modelling indicates that the proposed contraflow arrangement will operate efficiently within the wider network, helping to alleviate delays, improve journey time reliability, and enhance the overall performance of eastbound services through the city centre.

Furthermore, the design incorporates three distinct types of bus stop treatments, each applied contextually based on space availability, pedestrian activity, and operational requirements.

6.1 Kerbside bus stops

There are a number of kerbside bus stops in the study area that will remain unimpacted by the Project. Buses will continue to pull up to the kerbside to board and alight passengers are per existing conditions. These bus stops are:

- George Street before Scott Street
- Moore Street opposite Liverpool Presbyterian Church
- Macquarie T-Way (WB)
- Moore Street before Macquarie Street
- Moore Street at Crawford Lane

6.2 In lane bus stops

There are three locations where in lane bus stops are proposed on George Street. These bus stops are:

- Club Liverpool, George Street
- George Street opposite Westfield Liverpool
- Westfield Liverpool, George Street

The conversion of kerbside indented bus stops to in-lane bus stops may result in general traffic queuing behind stationary buses, particularly during peak periods. This queuing has the potential to extend back through upstream intersections, notably at the George Street bus stop near Westfield Liverpool, which is located approximately 50 metres from the preceding intersection. In such cases, short-term delays and reduced intersection efficiency may occur.

However, dwell times for buses at these stops are typically short, meaning any resulting queues are expected to dissipate quickly once the bus departs. From an operational perspective, the in-lane stop configuration eliminates the need for buses to merge back into traffic, thereby improving bus egress efficiency and minimising delays to bus services. This configuration also supports improved schedule adherence and may enhance bus stop accessibility by allowing better alignment with kerbside infrastructure.

No significant adverse impacts on bus users are anticipated, and the proposed configuration is expected to benefit overall network efficiency for public transport

6.3 Floating bus stops

There are two locations where floating bus stops are proposed on Moore Street. These bus stops are:

- Moore Street at Northumberland Street
- Macquarie T-Way (EB)

The proposed introduction of two floating bus stops along a corridor with a single dedicated bus lane—where general traffic is not permitted—has implications for bus flow and operational efficiency. While floating bus stops can enhance safety and accessibility for cyclists and pedestrians by providing physical separation between the bus boarding area and cycleway, they may result in operational delays for transit services.

In this configuration, any bus stopped for passenger boarding or alighting would obstruct following buses in the dedicated lane, as no overtaking opportunity is available. This may particularly impact high-frequency services, where buses operating closely together could experience cascading delays if held behind a stationary vehicle. The extent of this impact would depend on stop dwell times, headways, and route reliability.

7.0 Parking Impacts

To facilitate the new cycleway, existing on-street parking along George Street and Moore Street will be impacted. This section provides an overview of existing parking conditions in Liverpool CBD and assesses the potential impacts of these changes as a result of the Project. It should be noted that Liverpool City Council has determined the existing parking space numbers by assuming a standard length of six metres per space, with the total available kerbside length divided accordingly. However, this approach does not consider the design requirements set out in Australian Standard 2890.5, which specifies different dimensions for restricted, unrestricted, and middle spaces.

7.1 George Street

The proposed parking changes on George Street introduce adjustments to better support traffic flow while maintaining access for general and specialty vehicle users. The total number of parking spaces will increase from 181 to 194, however the number of all-day parking spaces for general traffic will decrease due to the introduction of clearways.

For general traffic, the existing total is 163 spaces, reducing to 159 spaces in the proposed arrangement. However, this includes 40 new clearway spaces (21 in Little India and 19 in the CBD) that are only available during off-peak periods. When these clearway spaces are excluded, the number of all-day general traffic parking spaces reduces from 163 to 119, representing a net loss of 44 spaces available for general use throughout the day.

Conversely, the number of spaces allocated to specialty vehicles (Mail Zone, Taxi Zone, and Police Only) will remain largely unchanged, decreasing from 18 existing spaces to 17 proposed, due to the reduction of one Taxi Zone space. Notably, accessible parking is proposed to be removed entirely, with the loss of three dedicated bays in the CBD.

A breakdown of the proposed parking arrangements by precinct on George Street are presented in Table 7-1

Table 7-1 Comparison of on-street parking numbers on George Street

Segment	Parking Restriction	Existing	Proposed
(1) Little India	1P Parking	45	20
	Time Restricted Parking (Clearway)	0	21
(2) George Street CBD	1P Parking	19	12
	Time Restricted Parking (Clearway)	0	19
	1P Time Restricted Parking (Bus Zone)	4	0
	Accessible Parking	3	0
	Police Only Parking	11	11
(3) Westfield	Mail Zone	1	1
	Taxi Zone	6	5
	1P Parking	7	12
	1P Time Restricted Parking (School)	11	10
	1/4P Time Restricted Parking (School)	4	7
(4) George Street Residential	Unrestricted	70	66
Total		**181**	**194**

7.2 Moore Street

The removal of other parking spaces, particularly time-restricted and general parking in the Medical Centre and CBD segments, aligns with Council's broader strategy to improve bus movements, reduce congestion, and support sustainable transport options along Moore Street.

The proposed changes along Moore Street result in a significant reduction in on-street parking. The total number of parking spaces will decrease from 41 to just 4, with the majority of existing bays removed across all segments to accommodate the cycleway and maintain bus operations. This aligns with Council's broader strategy to improve bus movements, reduce congestion, and support sustainable transport options along Moore Street.

Parking for general traffic and permit holders will be substantially impacted, with four new 1P parking spaces proposed outside of the medical centre.

A breakdown of the proposed parking arrangements by precinct on George Street are presented in Table 7-2

Table 7-2 Comparison of on-street parking numbers on Moore Street

Segment	Parking Restriction	Existing	Proposed
(5) Moore Street Medical Centre East	Council Permit Holders Exempt Parking	2	0
	1/4P Parking	1	0
	Accessible Parking	2	0
	1P Time Restricted Parking (Bus Zone)	11	0
(6) Moore Street Medical Centre West	Work Zone Parking	2	0
	Loading Zone Parking	1	0
	Accessible Parking	1	0
	1/2P Parking	2	0
	1P Parking	0	4
(7) Moore Street CBD	1/2P Time Restricted Parking (Bus Zone)	5	0
	2P Time Restricted Parking (Clearway)	6	0
(8) Moore Street Residential	Time Restricted Parking (Clearway)	10	0
Total		**41**	**4**

7.3 Parking summary

Overall, the combined adjustments result in a net reduction of 24 parking spaces across both corridors, reflecting a deliberate policy shift towards improved transport efficiency and multimodal accessibility. Alternative locations for parking are present within the Liverpool CBD area as discussed in section 3.5, which describes that there are over 5,000 parking spaces available in off-street car parks within close proximity to the CBD.

8.0 Conclusion and next steps

The proposed Liverpool CBD cycleway concept design delivers significant active transport benefits through the introduction of safe, separated cycling infrastructure along key corridors. The design balances multimodal access within constrained urban environments and integrates improvements to pedestrian and cycling infrastructure, traffic signal operations, streetscape quality, and parking arrangements.

Overall, the network performance modelling indicates that the proposed changes are manageable and generally retain acceptable levels of service across all key intersections. While some intersections experience a slight degradation in performance, these changes remain within the threshold of acceptable operational conditions, particularly when viewed against the broader benefits of safer and more inclusive infrastructure. The most notable operational constraint occurs at the intersection of George Street and Elizabeth Street where weekend peak performance drops to LOS D due to lane reduction on the northern leg of George Street, with queues expected during all peak hours modelled. However, this was a considered design decision to promote lower vehicle speeds and enhance pedestrian and cyclist safety. Potential signal phasing adjustments may be explored in consultation with Transport for NSW to mitigate these impacts.

The intersection of Moore Street and Northumberland Street also experiences a slight drop to LOS C across all peaks; however, queues remain below the available approach distances and the intersection continues to function within satisfactory parameters. At all other intersections, performance is generally maintained.

Bus operations have been carefully considered in the concept design to maintain network functionality along George and Moore Streets. All existing routes, stops, and turning movements have been retained, reflecting ongoing engagement with Transport for NSW and Transit Systems. A key improvement is the dedicated eastbound contraflow bus lane on Moore Street, expected to improve journey time reliability and network efficiency. The design also introduces three context-sensitive bus stop types—kerbside, in-lane, and floating—selected to balance operational needs, accessibility, and urban constraints. While some operational trade-offs exist, particularly with in-lane stops, the overall approach is expected to deliver a net benefit to bus service performance and reliability in the city centre.

The proposed design results in a net change to on-street parking across George and Moore Streets, balancing local access needs with transport network priorities. On George Street, the total number of parking spaces increases slightly from 181 to 186. However, this includes the introduction of 45 time-restricted (Clearway) spaces, reducing permanent spaces to 141. This shift is aimed at supporting peak-hour traffic flow while still accommodating parking demand during off-peak periods. Key provisions such as the Mail Zone, Police-Only bays, and increased school pick-up/drop-off spaces (from 11 to 16) have been retained or enhanced to meet community and service needs.

Conversely, Moore Street experiences a significant reduction in parking, from 41 spaces to just four. This change removes all temporary (Clearway and Bus Zone) parking and limits provision to essential spaces for the medical centre. The reduction supports Council's strategic objectives to prioritise efficient bus operations, reduce congestion, and promote sustainable transport. Overall, the combined adjustments result in a net reduction of 32 parking spaces across both corridors, reflecting a deliberate policy shift towards improved transport efficiency and multimodal accessibility.

8.1 Next Steps

Following this report, the proposed concept design will proceed to public exhibition and community consultation. Key stakeholders, including residents, businesses, councillors, and Transport for NSW, will have the opportunity to provide feedback and raise considerations that may inform future design refinements.

In parallel, the Traffic and Transport Impact Assessment and Traffic Control Signal Plan design package has been prepared and will be submitted to Transport for NSW to obtain Agreement in Principle (AiP). This is a critical milestone prior to advancing to detailed design, where further modelling, infrastructure coordination, and refinement of signal phasing and lane arrangements will occur.

The project will continue to align with broader strategic objectives, providing safer, greener, and more accessible streets for all users in Liverpool's growing city centre.

Appendix A

Design Plans

Appendix B

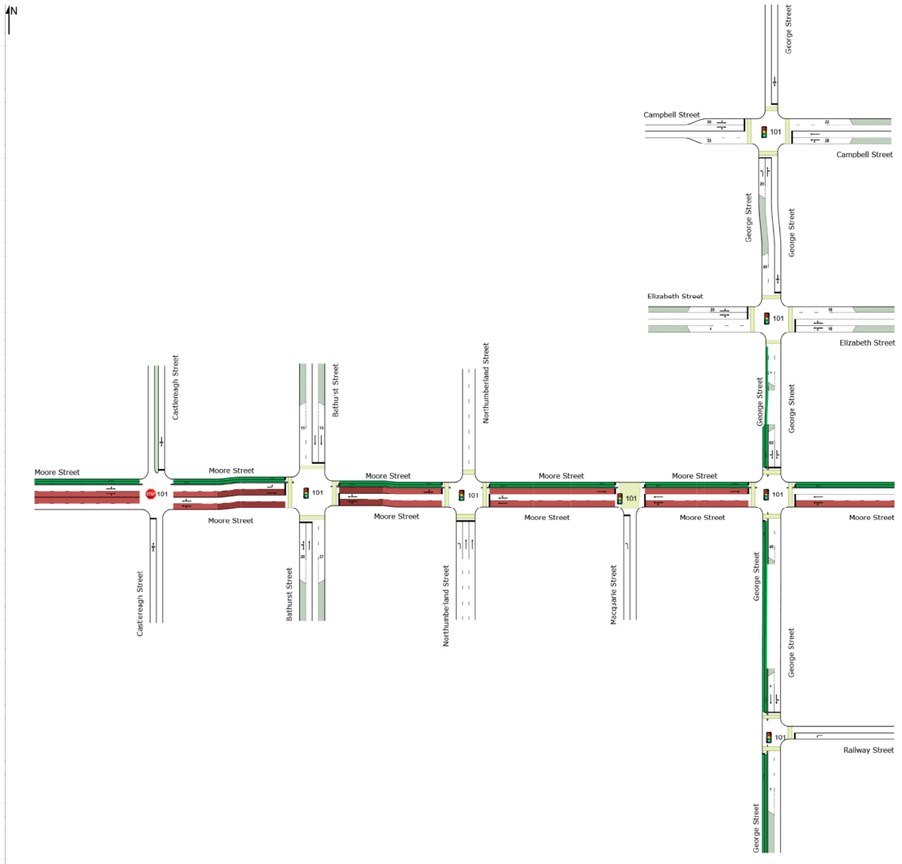
Network Diagram

NETWORK LAYOUT

Network: N101 [WE Peak (Network Folder: With changes)]

New Network
Network Category: (None)

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



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101	NA	2822 Moore Street / Northumberland Street WE
101	NA	877 Moore Street / Macquarie Street WE
101	NA	1482 George Street / Moore Street WE
101	NA	1017 George Street / Railway Street WE
101	NA	1004 George Street / Elizabeth Street WE
101	NA	Moore Street / Castlereagh Street WE
101	NA	2869 George Street / Campbell Street WE

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NETWORK LAYOUT

Network: N101 [AM Peak (Network Folder: Existing)]

New Network
Network Category: (None)

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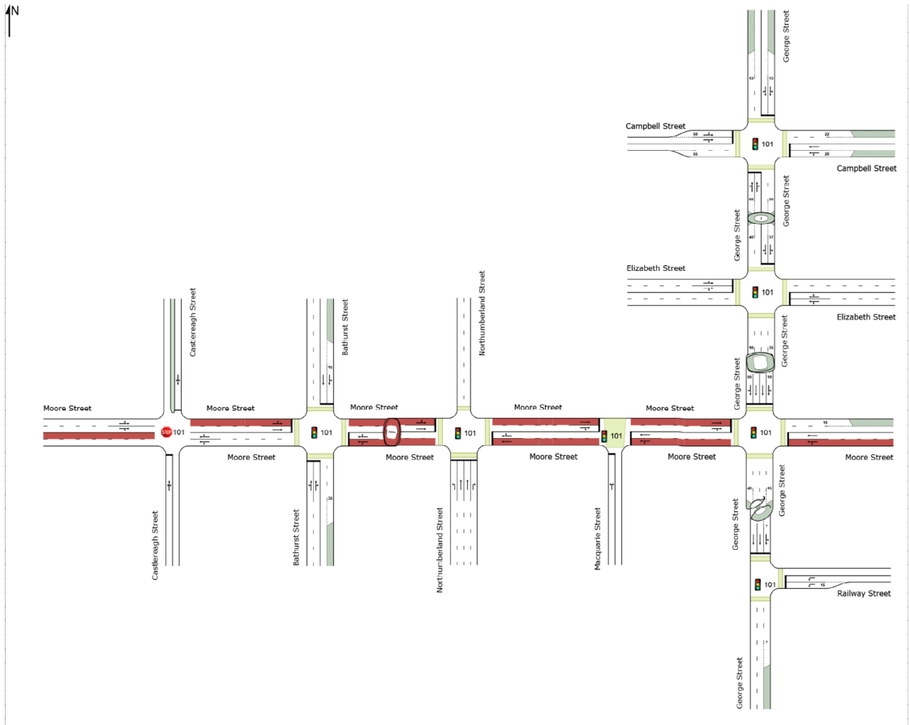

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101	NA	1482 George Street / Moore Street AM
101	NA	1017 George Street / Railway Street AM
101	NA	2869 George Street / Campbell Street AM
101	NA	Moore Street / Castlereagh Street AM
101	NA	3315 Moore Street / Bathurst Street AM
101	NA	2822 Moore Street / Northumberland Street AM
101	NA	877 Moore Street / Macquarie Street AM

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New Network
Network Category: (None)

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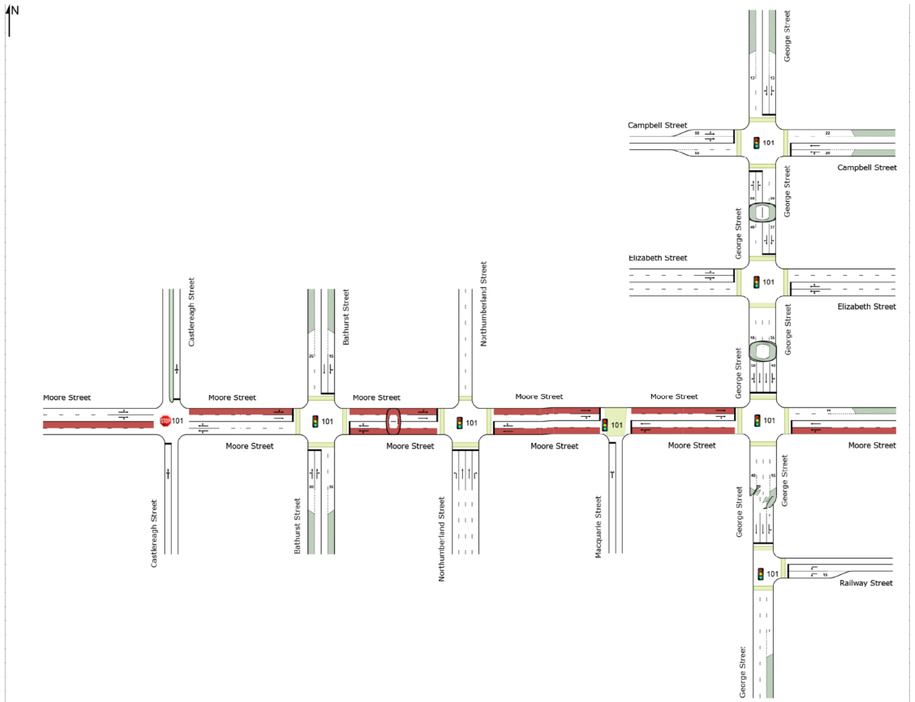

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101	NA	1482 George Street / Moore Street PM
101	NA	1017 George Street / Railway Street PM
101	NA	2869 George Street / Campbell Street PM
101	NA	Moore Street / Castlereagh Street PM
101	NA	3315 Moore Street / Bathurst Street PM
101	NA	2822 Moore Street / Northumberland Street PM
101	NA	877 Moore Street / Macquarie Street PM

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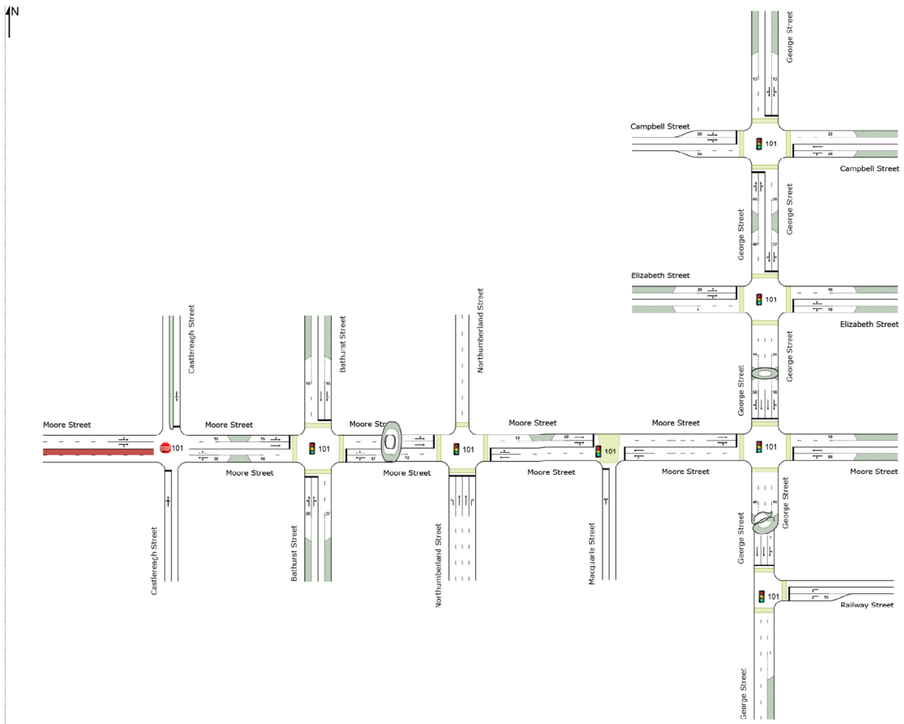
NETWORK LAYOUT

Network: N101 [WE Peak (Network Folder: Existing)]

New Network
Network Category: (None)

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



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101	NA	1482 George Street / Moore Street WE
101	NA	1017 George Street / Railway Street WE
101	NA	2869 George Street / Campbell Street WE
101	NA	Moore Street / Castlereagh Street WE
101	NA	3315 Moore Street / Bathurst Street WE
101	NA	2822 Moore Street / Northumberland Street WE
101	NA	877 Moore Street / Macquarie Street WE

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NETWORK LAYOUT

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New Network
Network Category: (None)

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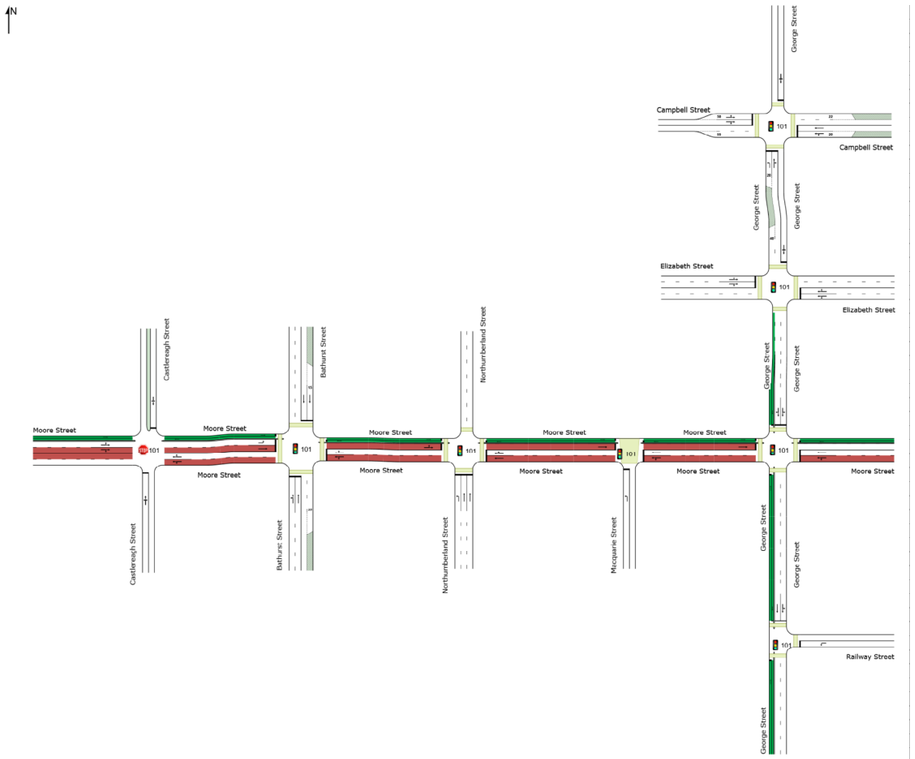

SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
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101	NA	2822 Moore Street / Northumberland Street AM
101	NA	877 Moore Street / Macquarie Street AM
101	NA	1482 George Street / Moore Street AM
101	NA	1017 George Street / Railway Street AM
101	NA	1004 George Street / Elizabeth Street AM
101	NA	Moore Street / Castlereagh Street AM
101	NA	2869 George Street / Campbell Street AM

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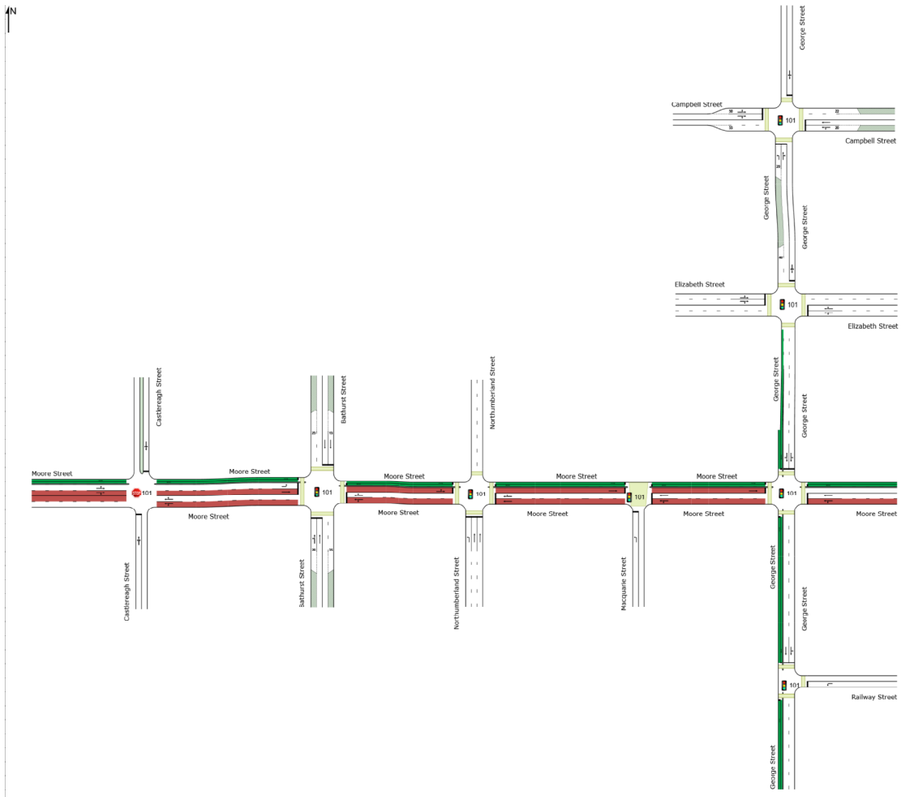
NETWORK LAYOUT

Network: N101 [PM Peak (Network Folder: With changes)]

New Network
Network Category: (None)

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



SITES IN NETWORK

Site ID	CCG ID	Site Name
101	NA	3315 Moore Street / Bathurst Street PM
101	NA	2822 Moore Street / Northumberland Street PM
101	NA	877 Moore Street / Macquarie Street PM
101	NA	1482 George Street / Moore Street PM
101	NA	1017 George Street / Railway Street PM
101	NA	1004 George Street / Elizabeth Street PM
101	NA	Moore Street / Castlereagh Street PM
101	NA	2869 George Street / Campbell Street PM

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Appendix C

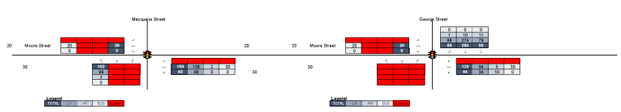
Network Traffic Distribution with Diversions

AECOM

AM Network Diagram Existing
Revision A 9 March 2023

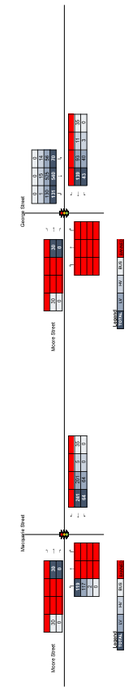
AECOM

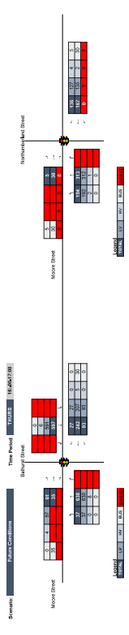
Scenario: Future Conditions
Time Period: AM Peak 08:15AM-09:15AM
Bathurst Street
Moore Street
Northumberland Street
Moore Street
Layout
Traffic Flow
Delay
LOS


Macquarie Street
Moore Street
George Street
Moore Street
Layout
Traffic Flow
Delay
LOS

AECOM

PM Network Diagram Existing
Revision A 9 March 2023





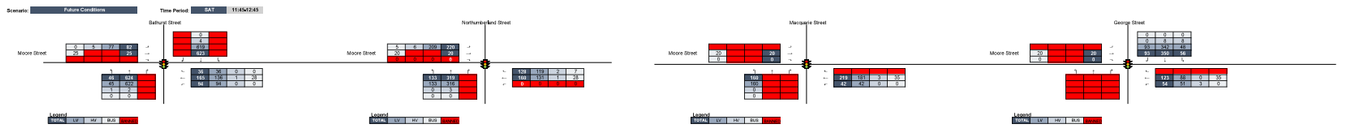
AECOM

PM Network Diagram Future
Revision A 9 March 2023

AECOM

WE Network Diagram Existing
Revision A 9 March 2023

AECOM


Scenario: Future Conditions
Time Period: SAT 11:45#12:45
Bathurst Street
Moore Street
Northumberland Street
Macquarie Street
George Street
Legend
Name LV HV BUS Delay

Appendix D

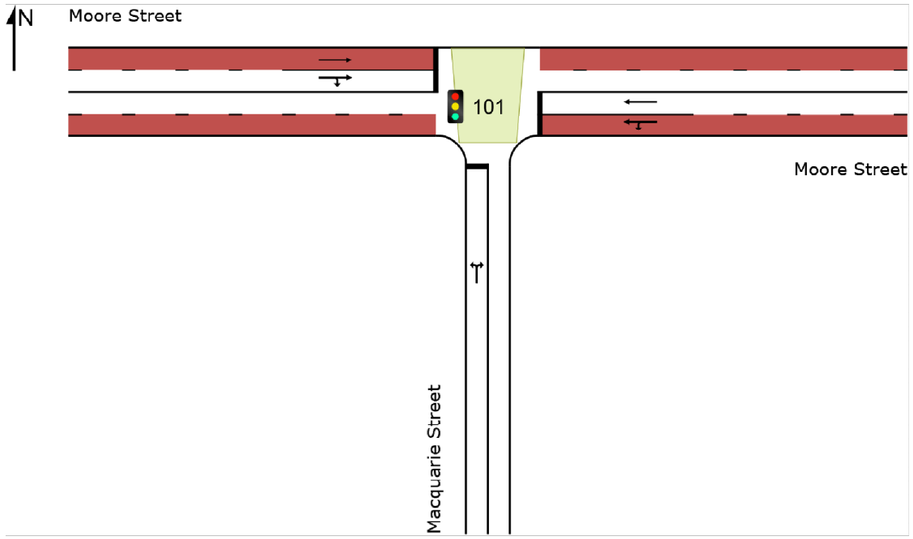
SIDRA Outputs (Layouts and movement summaries)

SITE LAYOUT

Site: 101 [877 Moore Street / Macquarie Street AM (Site Folder: Existing)]

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

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



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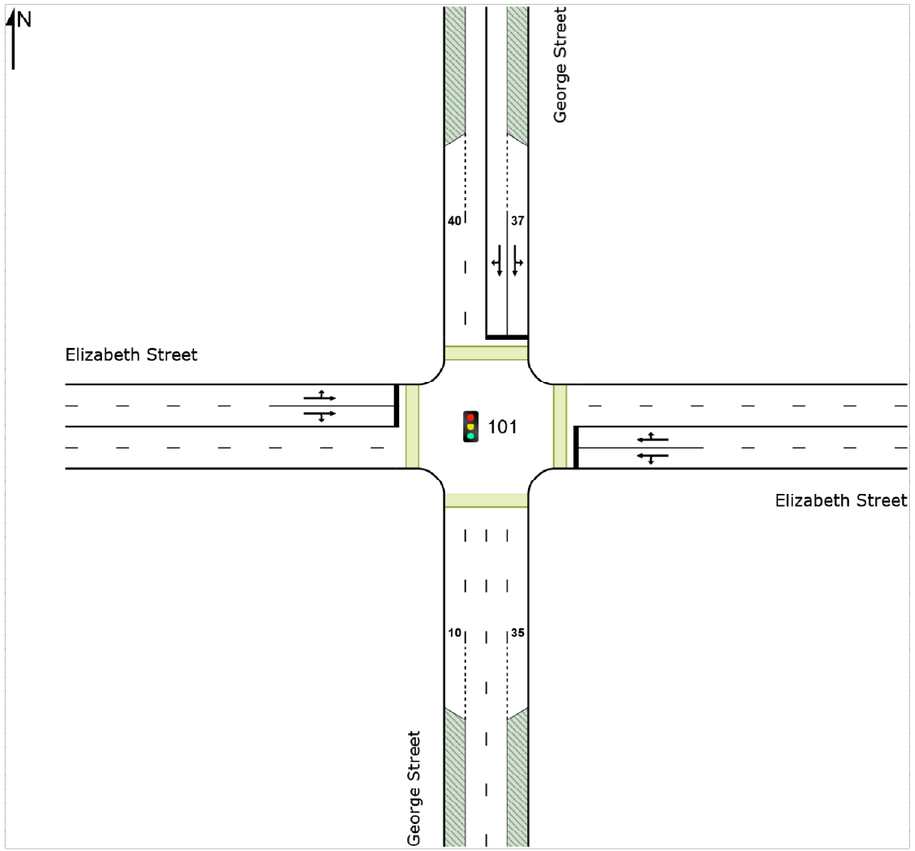
SITE LAYOUT

Site: 101 [1004 George Street / Elizabeth Street AM (Site Folder: Existing)]

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

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



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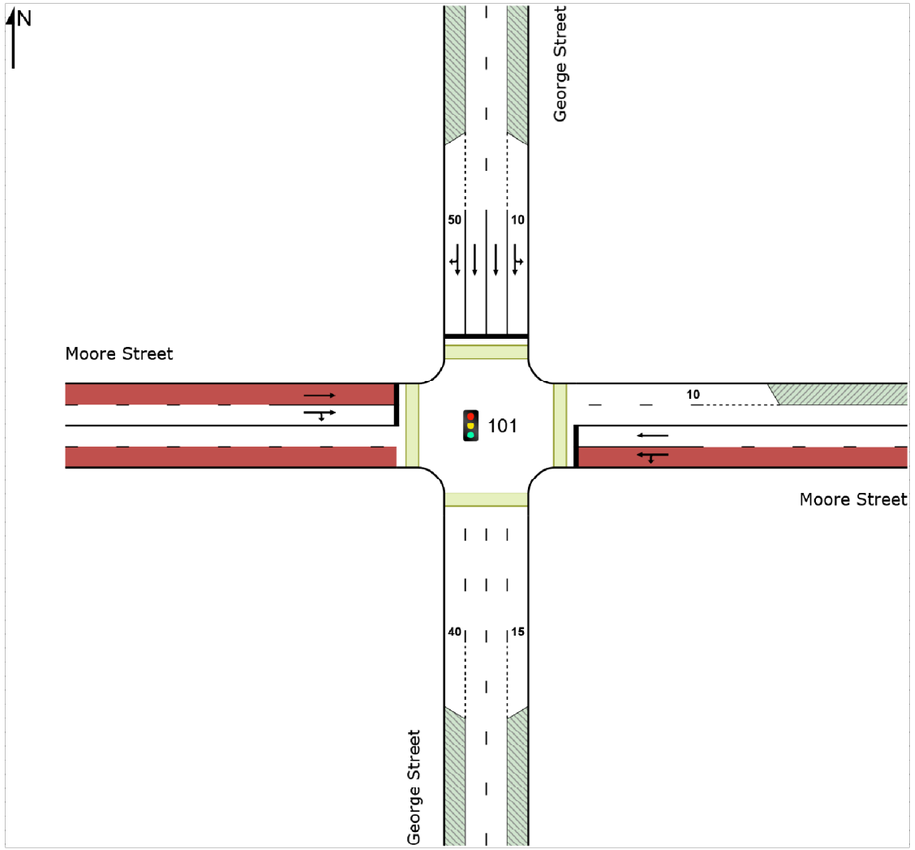
SITE LAYOUT

Site: 101 [1482 George Street / Moore Street AM (Site Folder: Existing)]

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

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



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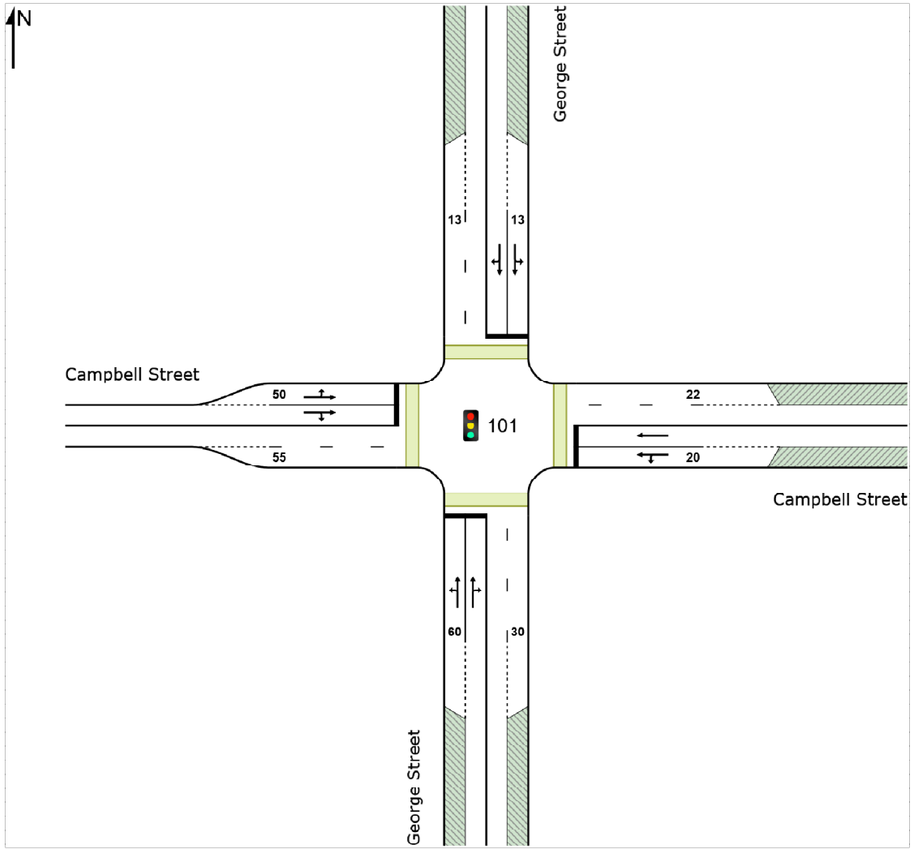
SITE LAYOUT

Site: 101 [2869 George Street / Campbell Street AM (Site Folder: Existing)]

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

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



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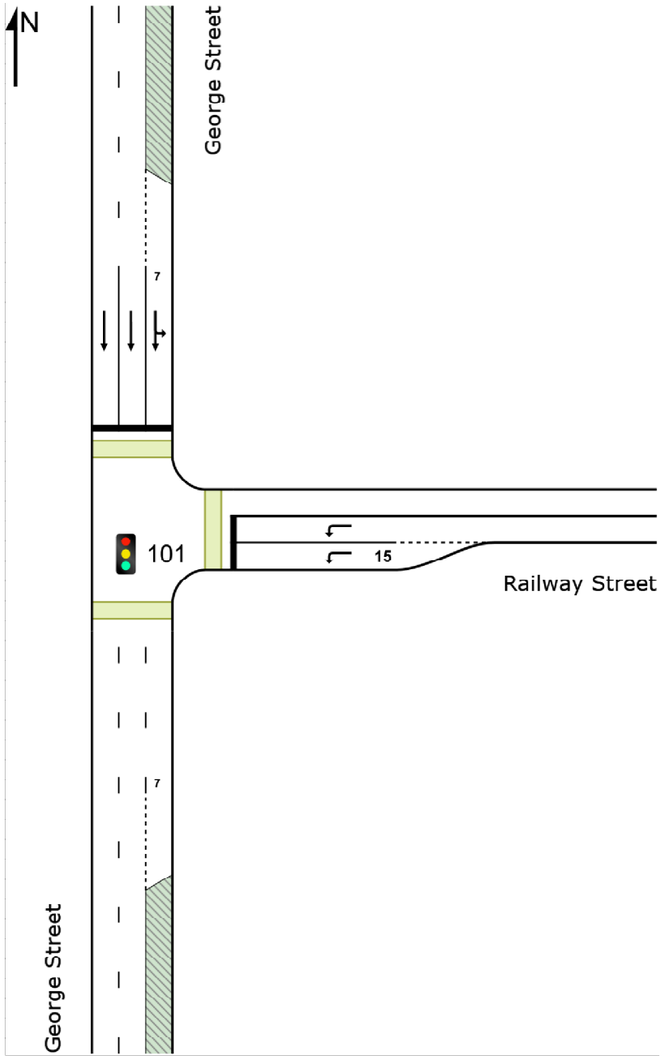
SITE LAYOUT

Site: 101 [1017 George Street / Railway Street AM (Site Folder: Existing)]

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

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



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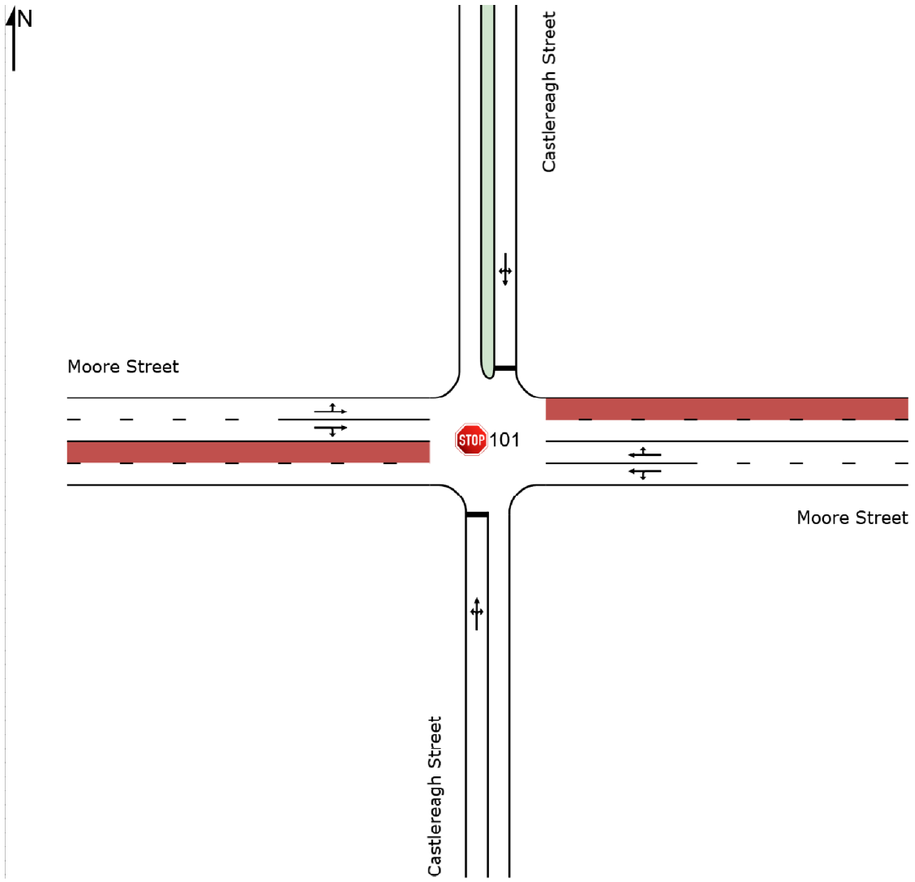
SITE LAYOUT

Site: 101 [Moore Street / Castlereagh Street AM (Site Folder: Existing)]

New Site
Site Category: (None)
Stop (Two-Way)

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



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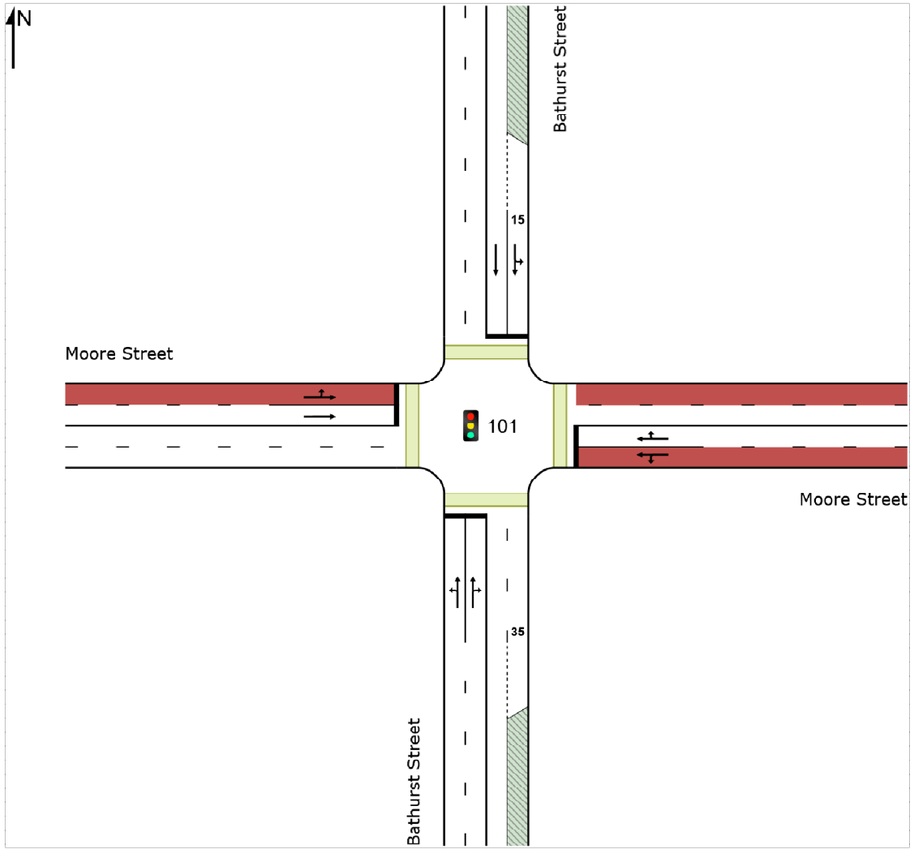
SITE LAYOUT

Site: 101 [3315 Moore Street / Bathurst Street AM (Site Folder: Existing)]

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

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



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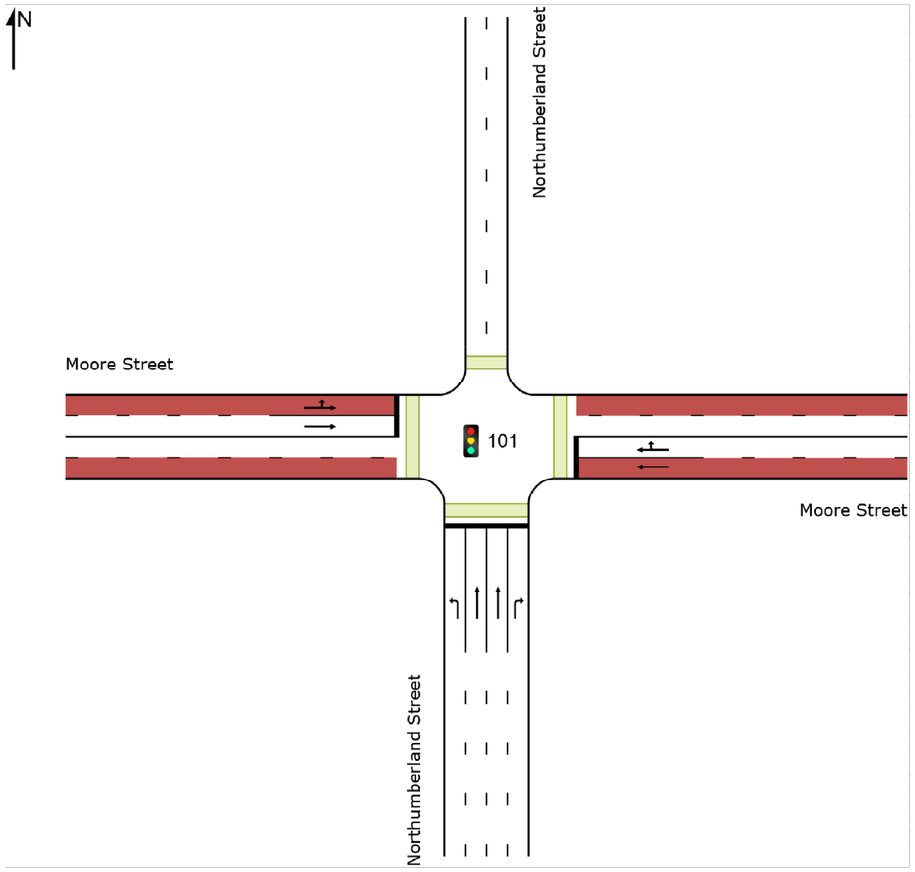
SITE LAYOUT

Site: 101 [2822 Moore Street / Northumberland Street AM (Site Folder: Existing)]

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

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



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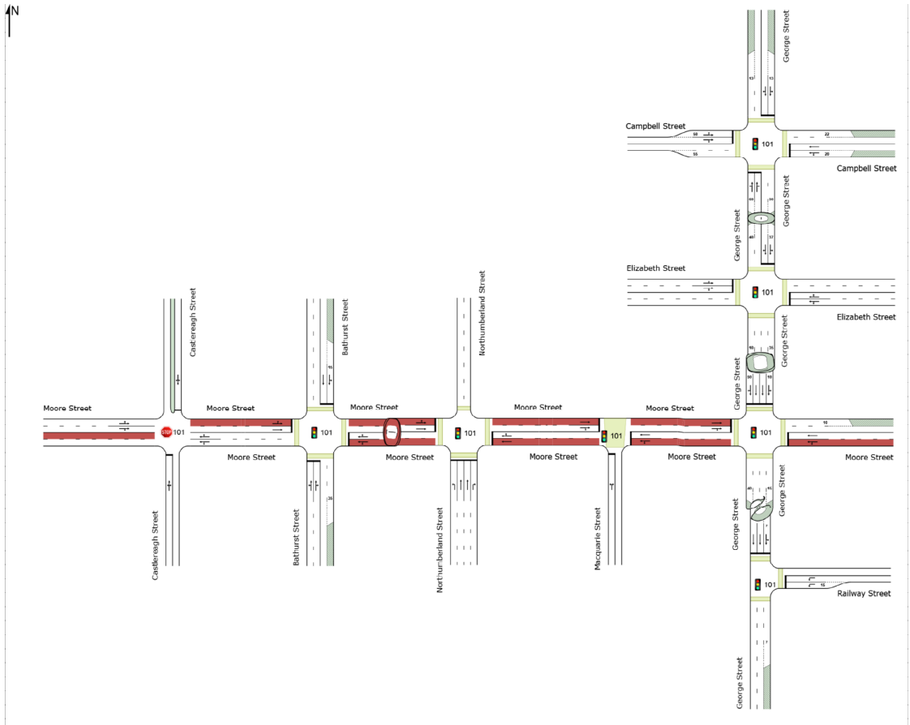
Project: C:\Users\Gabi.Mcerlane\Downloads\20250128_LCC_model v3 (1).sip9

NETWORK LAYOUT

Network: N101 [AM Peak (Network Folder: Existing)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	1004 George Street / Elizabeth Street AM
101	NA	1482 George Street / Moore Street AM
101	NA	1017 George Street / Railway Street AM
101	NA	2869 George Street / Campbell Street AM
101	NA	Moore Street / Castlereagh Street AM
101	NA	3315 Moore Street / Bathurst Street AM
101	NA	2822 Moore Street / Northumberland Street AM
101	NA	877 Moore Street / Macquarie Street AM

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Project: C:\Users\Gabi.Mcerlane\Downloads\20250128_LCC_model v3 (1).sip9

MOVEMENT SUMMARY

Site: 101 [1004 George Street / Elizabeth Street AM (Site Folder: Existing)]

Network: N101 [AM Peak (Network Folder: Existing)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Elizabeth Street														
7	L2	80	7.9	80	7.9	0.212	14.7	LOS B	4.7	34.8	0.55	0.54	0.55	22.4
8	T1	147	4.3	147	4.3	* 0.212	11.2	LOS A	4.7	34.8	0.55	0.55	0.55	25.8
9	R2	83	2.5	83	2.5	0.212	17.6	LOS B	2.5	17.6	0.59	0.65	0.59	19.5
Approach		311	4.7	311	4.7	0.212	13.8	LOS A	4.7	34.8	0.56	0.57	0.56	23.4
North: George Street														
4	L2	52	2.0	52	2.0	0.183	39.3	LOS C	3.0	21.6	0.82	0.69	0.82	21.7
5	T1	259	5.3	259	5.3	* 0.685	40.6	LOS C	12.5	90.5	0.94	0.82	0.96	16.1
6	R2	82	0.0	82	0.0	0.685	44.6	LOS D	12.5	90.5	0.96	0.84	0.99	18.5
Approach		393	3.8	393	3.8	0.685	41.2	LOS C	12.5	90.5	0.93	0.81	0.95	17.5
West: Elizabeth Street														
1	L2	236	0.4	236	0.4	0.348	12.6	LOS A	8.4	61.1	0.53	0.59	0.53	17.8
2	T1	296	10.3	296	10.3	0.348	9.6	LOS A	8.4	61.1	0.55	0.60	0.55	26.7
3	R2	139	2.3	139	2.3	* 0.348	13.9	LOS A	6.2	45.7	0.57	0.60	0.57	17.0
Approach		671	5.2	671	5.2	0.348	11.6	LOS A	8.4	61.1	0.54	0.60	0.54	22.8
All Vehicles		1374	4.7	1374	4.7	0.685	20.6	LOS B	12.5	90.5	0.66	0.65	0.66	20.5

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04
East: Elizabeth Street											
P2	Full	1	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04
North: George Street											
P3	Full	1	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04
West: Elizabeth Street											
P4	Full	1	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04
All Pedestrians		4	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04

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: 101 [1482 George Street / Moore Street AM (Site Folder: Existing)] **Network: N101 [AM Peak (Network Folder: Existing)]**

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

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Moore Street														
7	L2	46	22.7	46	22.7	0.092	19.4	LOS B	1.0	8.1	0.73	0.68	0.73	18.1
8	T1	136	27.1	136	27.1	* 0.259	16.9	LOS B	3.0	26.2	0.78	0.63	0.78	19.4
Approach		182	26.0	182	26.0	0.259	17.5	LOS B	3.0	26.2	0.77	0.64	0.77	19.0
North: George Street														
4	L2	95	12.2	95	12.2	0.145	18.2	LOS B	1.8	14.2	0.69	0.69	0.69	27.1
5	T1	299	3.5	299	3.5	* 0.214	14.3	LOS A	3.1	22.4	0.71	0.58	0.71	25.2
6	R2	73	1.4	73	1.4	0.103	16.4	LOS B	1.4	9.7	0.67	0.68	0.67	23.2
Approach		466	5.0	466	5.0	0.214	15.4	LOS B	3.1	22.4	0.70	0.61	0.70	25.4
West: Moore Street														
2	T1	163	16.8	163	16.8	0.327	10.0	LOS A	4.1	31.9	0.70	0.60	0.70	26.5
3	R2	59	7.1	59	7.1	* 0.327	15.9	LOS B	4.1	31.9	0.70	0.61	0.70	16.8
Approach		222	14.2	222	14.2	0.327	11.6	LOS A	4.1	31.9	0.70	0.60	0.70	24.8
All Vehicles		871	11.7	871	11.7	0.327	14.9	LOS B	4.1	31.9	0.71	0.62	0.71	24.1

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
East: Moore Street											
P2	Full	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
North: George Street											
P3	Full	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
West: Moore Street											
P4	Full	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
All Pedestrians		4	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12

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: 101 [1017 George Street / Railway Street AM (Site Folder: Existing)] **Network: N101 [AM Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Railway Street														
7	L2	120	4.4	120	4.4	*0.250	36.3	LOS C	2.1	15.0	0.93	0.74	0.93	15.4
Approach		120	4.4	120	4.4	0.250	36.3	LOS C	2.1	15.0	0.93	0.74	0.93	15.4
North: George Street														
4	L2	111	0.0	111	0.0	0.091	13.7	LOS A	1.5	10.3	0.39	0.59	0.39	29.9
5	T1	294	8.6	294	8.6	*0.207	16.2	LOS B	3.8	28.6	0.65	0.53	0.65	24.3
Approach		404	6.3	404	6.3	0.207	15.5	LOS B	3.8	28.6	0.58	0.55	0.58	25.9
All Vehicles		524	5.8	524	5.8	0.250	20.3	LOS B	3.8	28.6	0.66	0.59	0.66	22.4

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
East: Railway Street											
P2	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
North: George Street											
P3	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
All Pedestrians		3	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08

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: 101 [2869 George Street / Campbell Street AM (Site Folder: Existing)]

Network: N101 [AM Peak (Network Folder: Existing)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
1	L2	97	1.1	97	1.1	0.108	15.7	LOS B	2.0	14.3	0.57	0.65	0.57	26.2
2	T1	84	0.0	84	0.0	0.208	18.9	LOS B	3.3	23.1	0.74	0.63	0.74	27.3
3	R2	34	6.3	34	6.3	0.208	25.5	LOS B	3.3	23.1	0.74	0.63	0.74	25.3
Approach		215	1.5	215	1.5	0.208	18.5	LOS B	3.3	23.1	0.66	0.64	0.66	26.6
East: Campbell Street														
7	L2	98	12.9	98	12.9	0.159	26.6	LOS B	2.6	20.2	0.71	0.70	0.71	16.7
8	T1	226	0.0	226	0.0	* 0.356	24.1	LOS B	6.5	45.5	0.78	0.65	0.78	21.7
Approach		324	3.9	324	3.9	0.356	24.9	LOS B	6.5	45.5	0.76	0.66	0.76	20.4
North: George Street														
4	L2	16	0.0	16	0.0	0.080	27.5	LOS B	1.4	9.9	0.69	0.57	0.69	26.1
5	T1	174	0.0	174	0.0	* 0.320	25.4	LOS B	5.0	35.1	0.75	0.64	0.75	21.2
6	R2	42	0.0	42	0.0	0.320	31.4	LOS C	5.0	35.1	0.76	0.66	0.76	23.5
Approach		232	0.0	232	0.0	0.320	26.6	LOS B	5.0	35.1	0.74	0.64	0.74	22.1
West: Campbell Street														
1	L2	91	0.0	91	0.0	0.100	14.1	LOS A	1.9	13.3	0.54	0.63	0.54	27.0
2	T1	178	0.0	178	0.0	0.451	13.7	LOS A	7.9	55.6	0.76	0.68	0.76	23.1
3	R2	120	1.8	120	1.8	* 0.451	22.9	LOS B	7.9	55.6	0.76	0.68	0.76	14.1
Approach		388	0.5	388	0.5	0.451	16.6	LOS B	7.9	55.6	0.71	0.67	0.71	22.2
All Vehicles		1159	1.5	1159	1.5	0.451	21.3	LOS B	7.9	55.6	0.72	0.66	0.72	22.7

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
East: Campbell Street											
P2	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
North: George Street											
P3	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: Campbell Street											
P4	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

All Pedestrians	4	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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: 101 [Moore Street / Castlereagh Street AM (Site Folder: Existing)]

Network: N101 [AM Peak (Network Folder: Existing)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Castlereagh Street														
1	L2	6	0.0	6	0.0	0.075	8.0	LOS A	0.3	2.1	0.44	0.87	0.44	34.6
2	T1	26	0.0	26	0.0	0.075	10.4	LOS A	0.3	2.1	0.44	0.87	0.44	38.2
3	R2	16	0.0	16	0.0	0.075	10.9	LOS A	0.3	2.1	0.44	0.87	0.44	33.1
Approach		48	0.0	48	0.0	0.075	10.3	LOS A	0.3	2.1	0.44	0.87	0.44	36.6
East: Moore Street														
4	L2	18	0.0	18	0.0	0.056	4.6	LOS A	0.0	0.0	0.00	0.11	0.00	44.4
5	T1	99	35.1	99	35.1	0.056	0.0	LOS A	0.2	1.6	0.05	0.18	0.05	43.8
6	R2	51	4.2	51	4.2	0.056	5.5	LOS A	0.2	1.6	0.21	0.38	0.21	40.2
Approach		167	22.0	167	22.0	0.056	2.1	NA	0.2	1.6	0.09	0.23	0.09	42.3
North: Castlereagh Street														
7	L2	12	0.0	12	0.0	0.051	7.4	LOS A	0.2	1.2	0.01	0.99	0.01	35.9
8	T1	21	0.0	21	0.0	0.051	7.6	LOS A	0.2	1.2	0.01	0.99	0.01	39.8
9	R2	5	0.0	5	0.0	0.051	7.4	LOS A	0.2	1.2	0.01	0.99	0.01	36.7
Approach		38	0.0	38	0.0	0.051	7.5	LOS A	0.2	1.2	0.01	0.99	0.01	38.6
West: Moore Street														
10	L2	13	0.0	13	0.0	0.046	4.6	LOS A	0.0	0.0	0.00	0.09	0.00	44.7
11	T1	112	40.6	112	40.6	0.046	0.0	LOS A	0.1	1.1	0.06	0.14	0.06	41.0
12	R2	19	0.0	19	0.0	0.046	5.5	LOS A	0.1	1.1	0.13	0.19	0.13	42.7
Approach		143	31.6	143	31.6	0.046	1.1	NA	0.1	1.1	0.06	0.14	0.06	42.2
All Vehicles		397	20.7	397	20.7	0.075	3.3	NA	0.3	2.1	0.12	0.35	0.12	40.5

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

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MOVEMENT SUMMARY

Site: 101 [3315 Moore Street / Bathurst Street AM (Site Folder: Existing)] **Network: N101 [AM Peak (Network Folder: Existing)]**

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

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Bathurst Street														
1	L2	37	0.0	37	0.0	* 0.525	19.0	LOS B	9.6	68.7	0.77	0.68	0.77	29.0
2	T1	724	2.9	724	2.9	0.525	13.0	LOS A	9.6	68.7	0.78	0.69	0.78	35.9
3	R2	49	0.0	49	0.0	0.525	26.1	LOS B	8.1	57.9	0.80	0.70	0.80	27.6
Approach		811	2.6	811	2.6	0.525	14.1	LOS A	9.6	68.7	0.78	0.69	0.78	35.3
East: Moore Street														
4	L2	53	2.0	53	2.0	0.091	19.1	LOS B	1.1	7.8	0.73	0.68	0.73	26.0
5	T1	93	27.3	93	27.3	* 0.213	14.7	LOS B	2.4	20.0	0.74	0.62	0.74	15.0
6	R2	21	0.0	21	0.0	0.213	20.4	LOS B	2.4	20.0	0.74	0.62	0.74	27.9
Approach		166	15.8	166	15.8	0.213	16.8	LOS B	2.4	20.0	0.74	0.64	0.74	21.9
North: Bathurst Street														
7	L2	83	0.0	83	0.0	0.133	21.8	LOS B	1.9	13.2	0.63	0.66	0.63	27.8
8	T1	399	1.3	399	1.3	0.500	18.6	LOS B	7.9	56.0	0.75	0.65	0.75	36.8
Approach		482	1.1	482	1.1	0.500	19.1	LOS B	7.9	56.0	0.73	0.65	0.73	35.7
West: Moore Street														
10	L2	22	0.0	22	0.0	0.038	19.9	LOS B	0.4	3.1	0.72	0.67	0.72	26.7
11	T1	115	33.9	115	33.9	0.205	16.4	LOS B	2.4	21.7	0.74	0.65	0.74	16.0
Approach		137	28.5	137	28.5	0.205	17.0	LOS B	2.4	21.7	0.73	0.65	0.73	18.9
All Vehicles		1596	5.7	1596	5.7	0.525	16.1	LOS B	9.6	68.7	0.76	0.67	0.76	33.4

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Bathurst Street											
P1	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
East: Moore Street											
P2	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
North: Bathurst Street											
P3	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
West: Moore Street											
P4	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

All Pedestrians	211	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

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: 101 [2822 Moore Street / Northumberland Street AM (Site Folder: Existing)] **Network: N101 [AM Peak (Network Folder: Existing)]**

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

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Northumberland Street														
1	L2	58	5.5	58	5.5	0.139	23.6	LOS B	1.4	10.1	0.83	0.71	0.83	19.8
2	T1	200	2.6	200	2.6	* 0.196	18.8	LOS B	2.3	16.6	0.81	0.64	0.81	28.3
3	R2	33	0.0	33	0.0	0.075	23.2	LOS B	0.8	5.3	0.81	0.69	0.81	19.7
Approach		291	2.9	291	2.9	0.196	20.2	LOS B	2.3	16.6	0.81	0.66	0.81	26.2
East: Moore Street														
5	T1	105	23.0	105	23.0	* 0.310	8.2	LOS A	3.6	28.9	0.61	0.61	0.61	18.4
6	R2	105	12.0	105	12.0	0.310	13.7	LOS A	3.6	28.9	0.61	0.61	0.61	28.6
Approach		211	17.5	211	17.5	0.310	11.0	LOS A	3.6	28.9	0.61	0.61	0.61	25.4
West: Moore Street														
10	L2	117	10.8	117	10.8	0.137	11.6	LOS A	1.8	13.9	0.55	0.65	0.55	28.5
11	T1	127	21.5	127	21.5	0.138	7.6	LOS A	1.9	15.4	0.53	0.43	0.53	22.3
Approach		244	16.4	244	16.4	0.138	9.5	LOS A	1.9	15.4	0.54	0.54	0.54	26.7
All Vehicles		745	11.4	745	11.4	0.310	14.1	LOS A	3.6	28.9	0.67	0.60	0.67	26.1

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Northumberland Street											
P1	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
East: Moore Street											
P2	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
North: Northumberland Street											
P3	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
West: Moore Street											
P4	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		211	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

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: 101 [877 Moore Street / Macquarie Street AM (Site Folder: Existing)] **Network: N101 [AM Peak (Network Folder: Existing)]**

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

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Macquarie Street														
1	L2	33	6.5	33	6.5	0.295	26.3	LOS B	2.8	20.0	0.89	0.75	0.89	17.8
3	R2	75	1.4	75	1.4	* 0.295	26.4	LOS B	2.8	20.0	0.89	0.75	0.89	17.8
Approach		107	2.9	107	2.9	0.295	26.4	LOS B	2.8	20.0	0.89	0.75	0.89	17.8
East: Moore Street														
4	L2	51	0.0	51	0.0	0.099	20.8	LOS B	1.1	8.1	0.77	0.69	0.77	22.6
5	T1	178	19.5	178	19.5	0.360	19.1	LOS B	4.3	34.7	0.84	0.69	0.84	11.9
Approach		228	15.2	228	15.2	0.360	19.4	LOS B	4.3	34.7	0.83	0.69	0.83	15.6
West: Moore Street														
11	T1	120	21.9	120	21.9	0.395	19.3	LOS B	4.0	31.8	0.86	0.72	0.86	12.0
12	R2	40	2.6	40	2.6	* 0.395	26.6	LOS B	4.0	31.8	0.86	0.72	0.86	22.5
Approach		160	17.1	160	17.1	0.395	21.1	LOS B	4.0	31.8	0.86	0.72	0.86	15.8
All Vehicles		496	13.2	496	13.2	0.395	21.5	LOS B	4.3	34.7	0.85	0.71	0.85	16.3

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Pedestrian Movements (Diagonal)											
PD	Diagonal	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

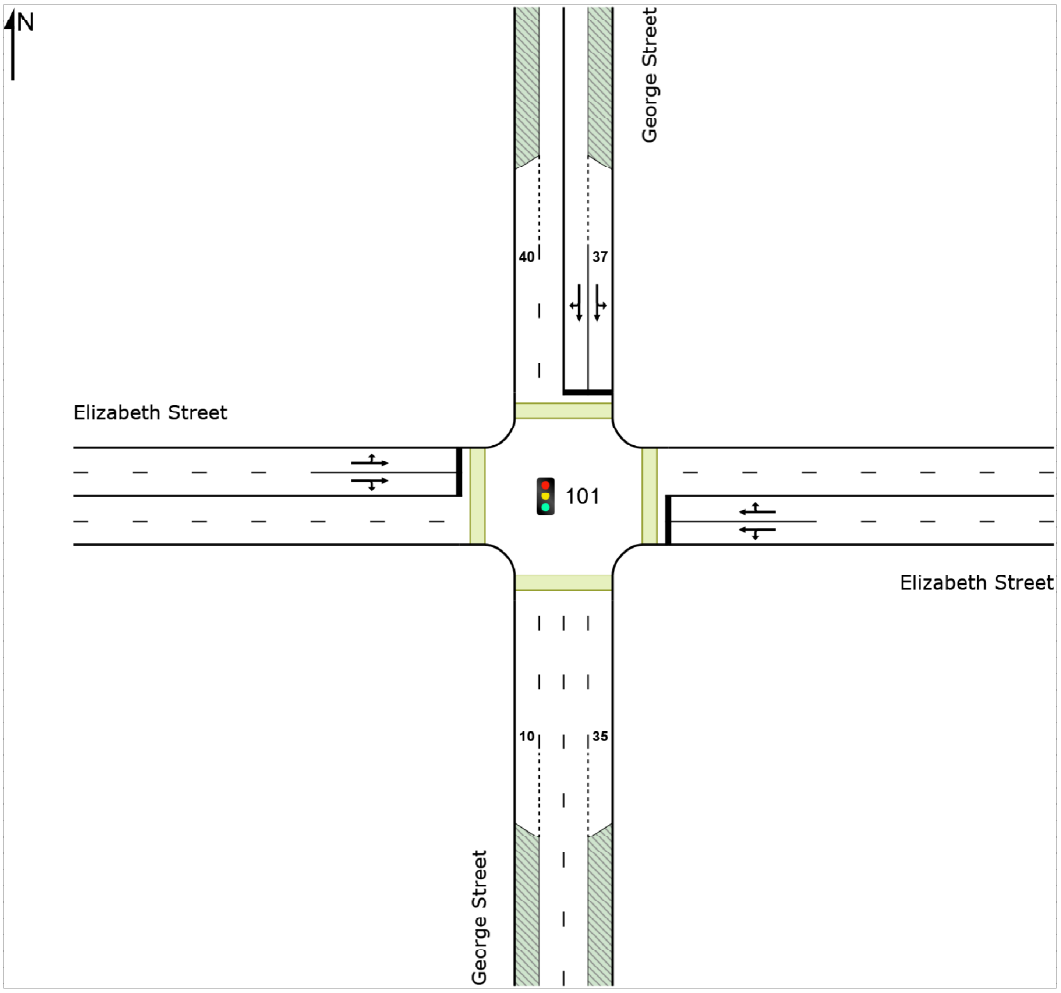
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 101 [1004 George Street / Elizabeth Street PM (Site Folder: Existing)]

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

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



SITE LAYOUT

Site: 101 [1482 George Street / Moore Street PM (Site Folder: Existing)]

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

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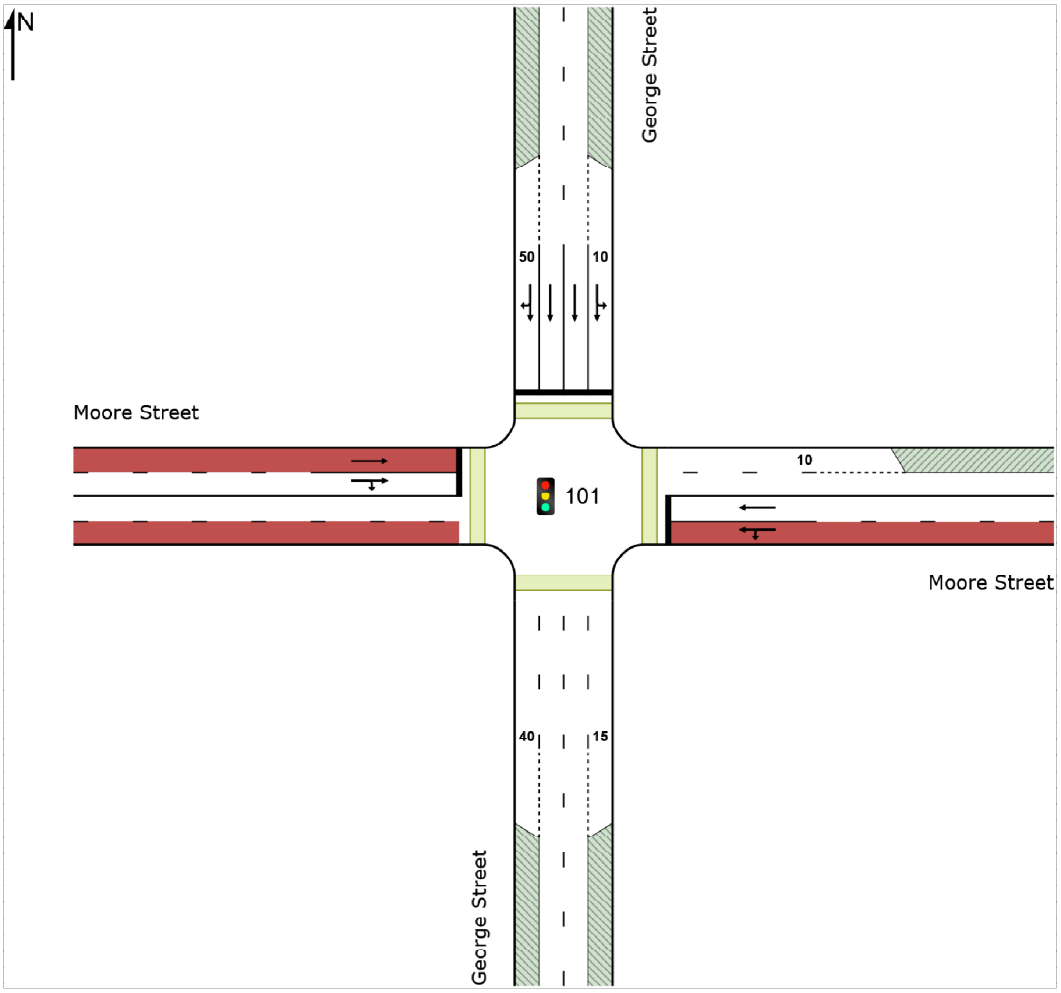
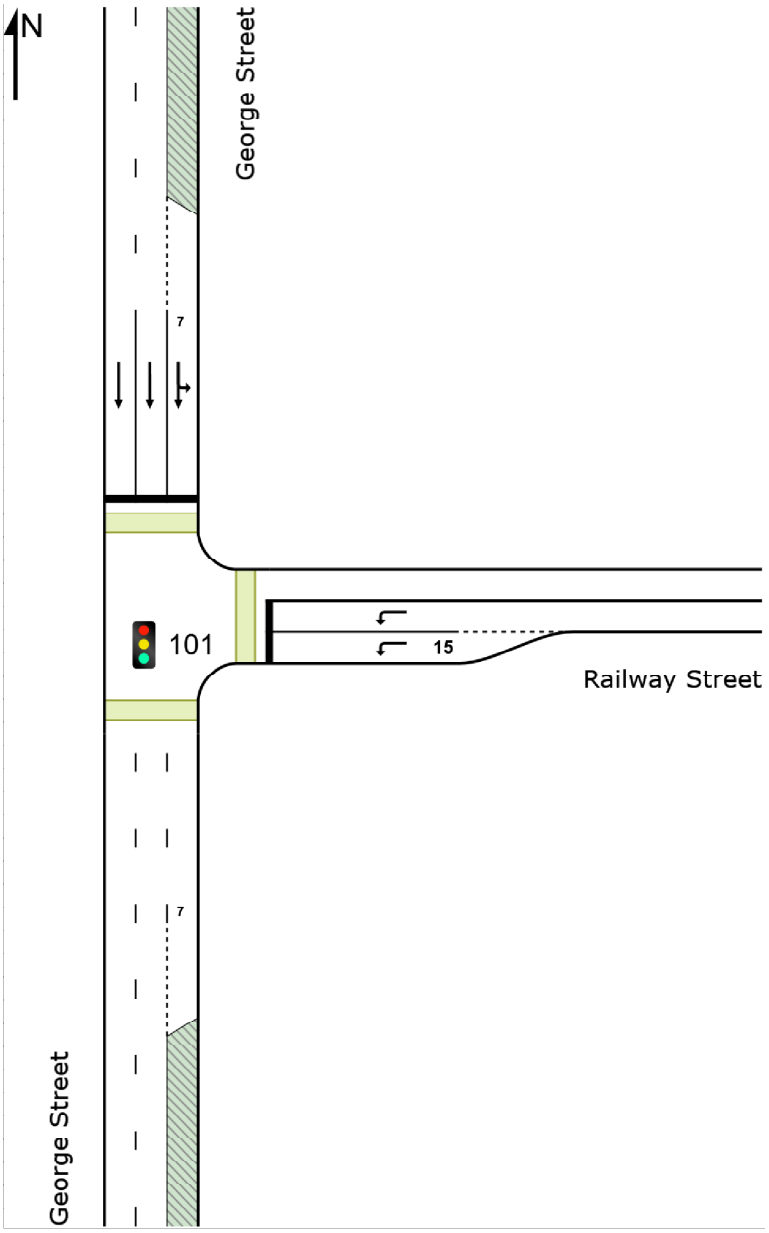


SITE LAYOUT

Site: 101 [1017 George Street / Railway Street PM (Site Folder: Existing)]

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

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

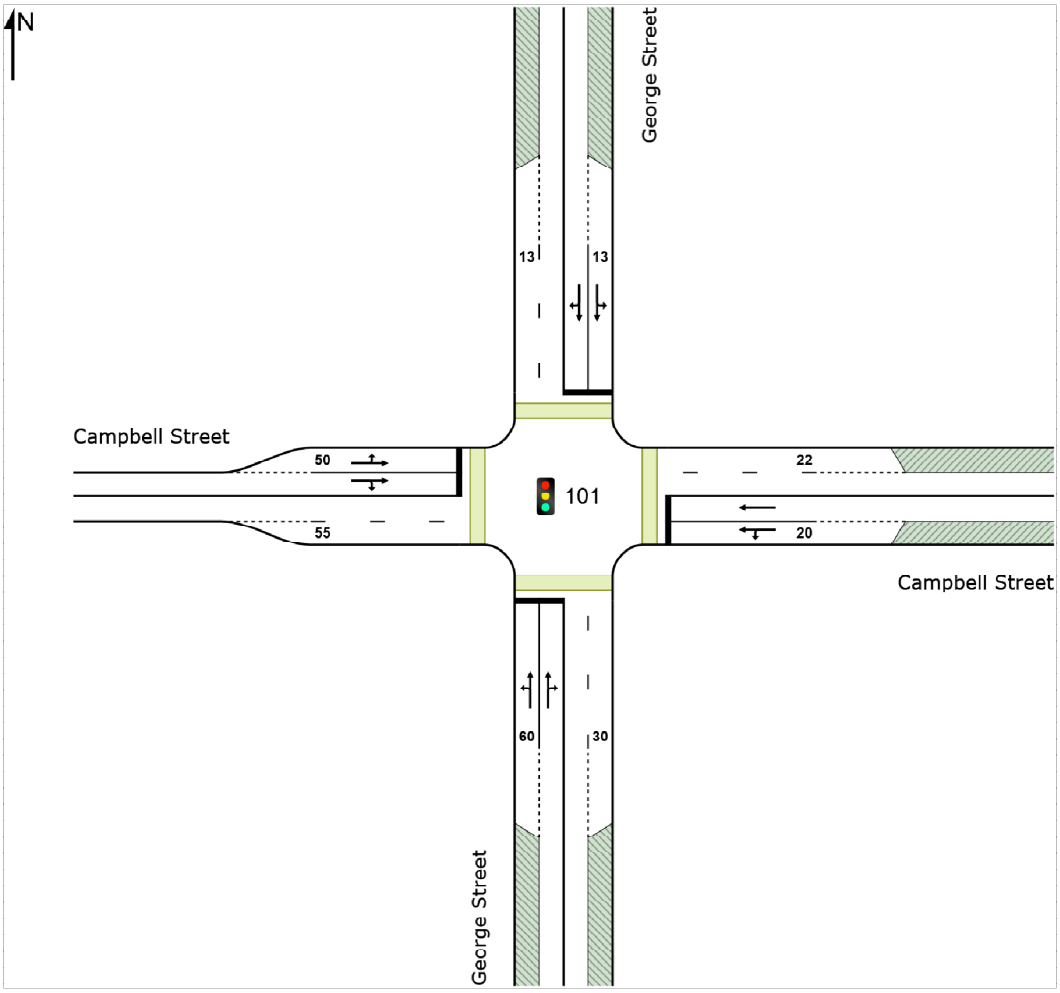


SITE LAYOUT

Site: 101 [2869 George Street / Campbell Street PM (Site Folder: Existing)]

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

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

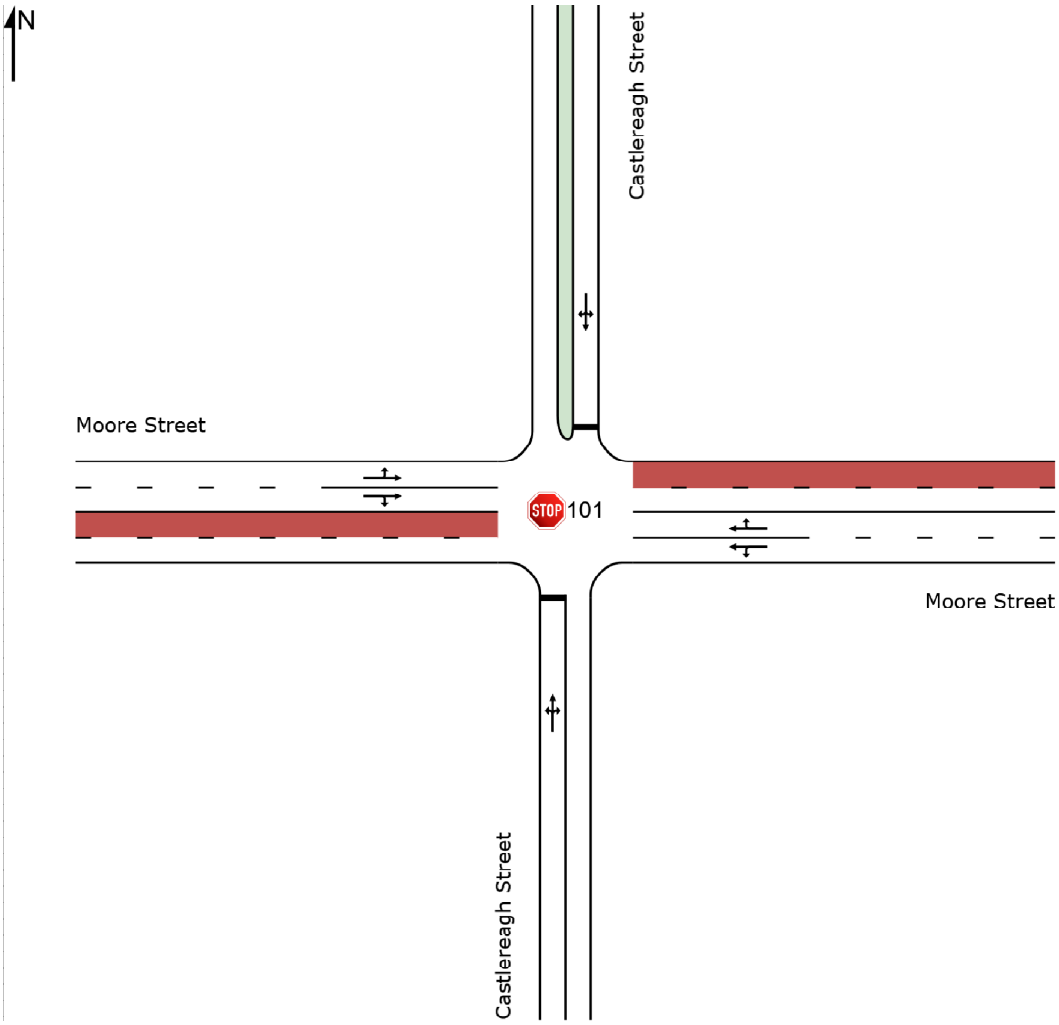


SITE LAYOUT

Site: 101 [Moore Street / Castlereagh Street PM (Site Folder: Existing)]

New Site
Site Category: (None)
Stop (Two-Way)

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



SITE LAYOUT

Site: 101 [2822 Moore Street / Northumberland Street PM (Site Folder: Existing)]

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

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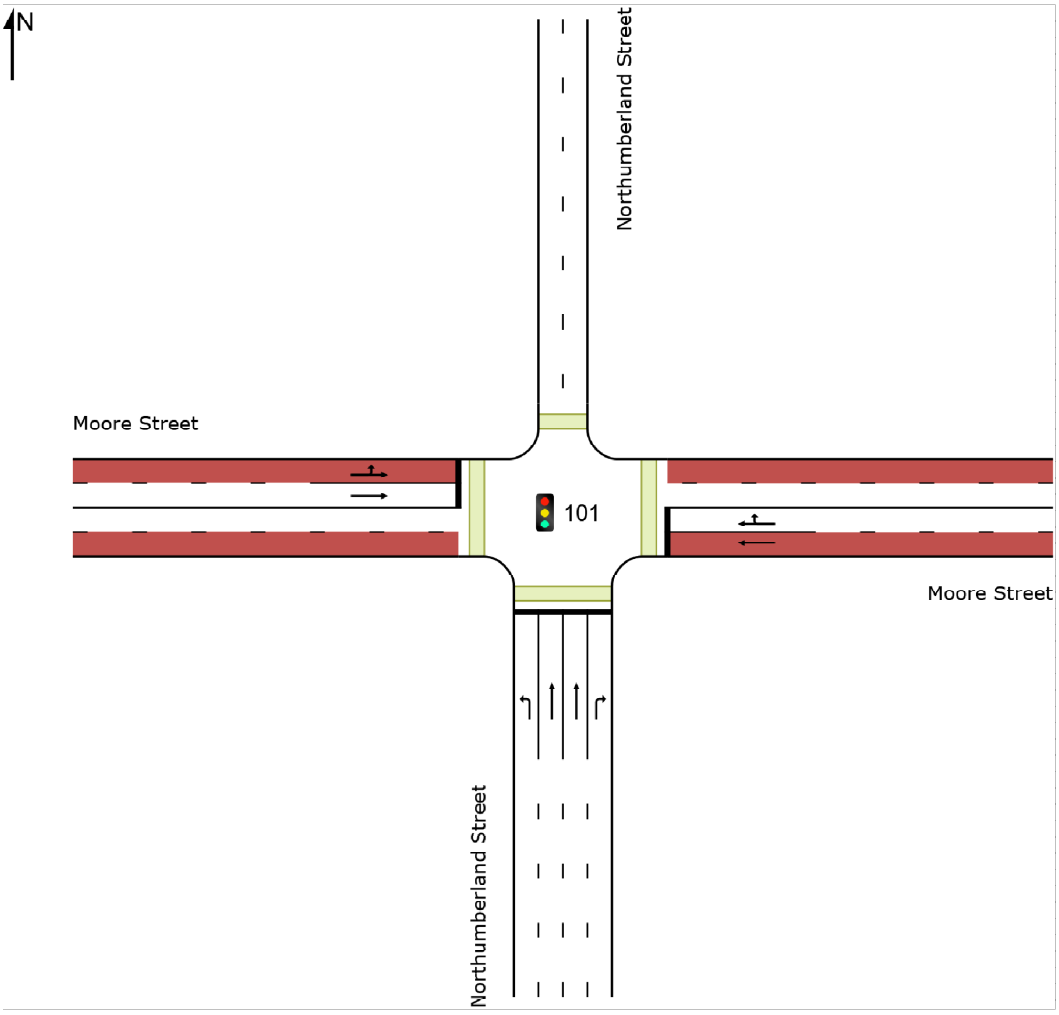

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SITE LAYOUT

Site: 101 [3315 Moore Street / Bathurst Street PM (Site Folder: Existing)]

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

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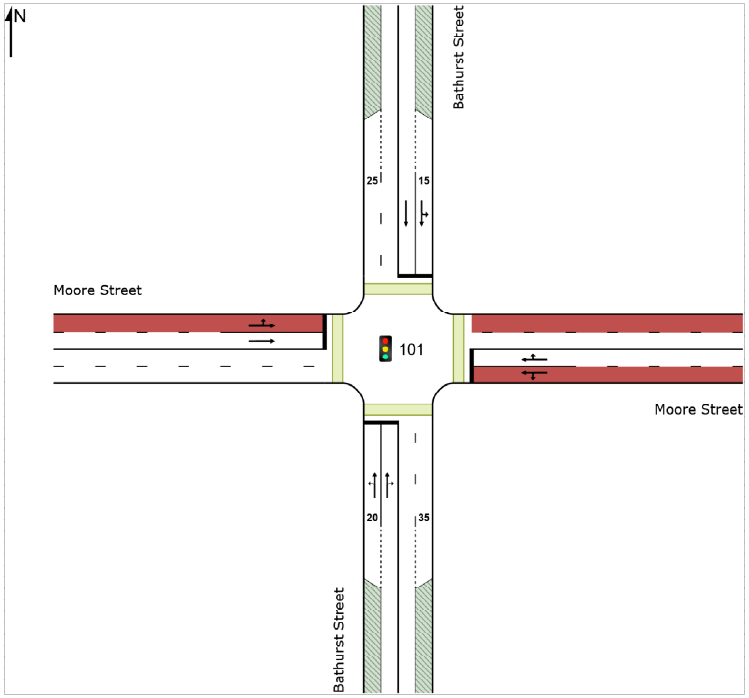

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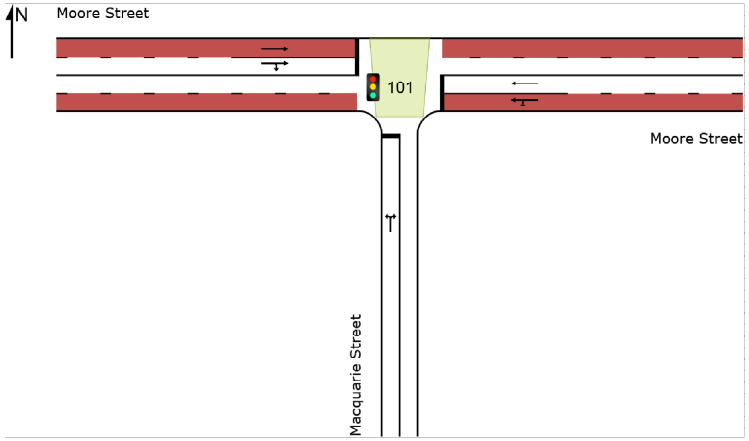
SITE LAYOUT

Site: 101 [877 Moore Street / Macquarie Street PM (Site Folder: Existing)]

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

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



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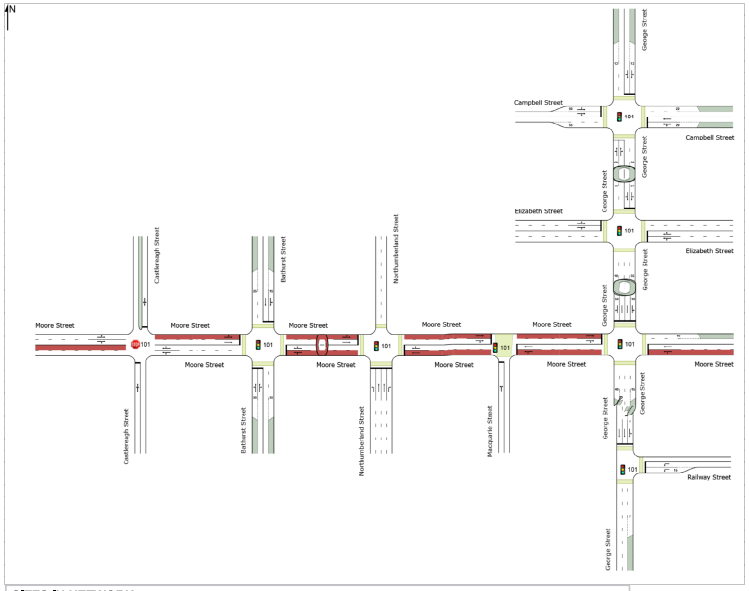
NETWORK LAYOUT

Network: N101 [PM Peak (Network Folder: Existing)]

New Network
Network Category: (None)

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



SITES IN NETWORK

Site ID	CCG ID	Site Name
101	NA	1004 George Street / Elizabeth Street PM
101	NA	1482 George Street / Moore Street PM
101	NA	1017 George Street / Railway Street PM
101	NA	2869 George Street / Campbell Street PM
101	NA	Moore Street / Castlereagh Street PM
101	NA	3315 Moore Street / Bathurst Street PM
101	NA	2822 Moore Street / Northumberland Street PM
101	NA	877 Moore Street / Macquarie Street PM

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MOVEMENT SUMMARY

Site: 101 [1004 George Street / Elizabeth Street PM (Site Folder: Existing)] **Network: N101 [PM Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Elizabeth Street														
7	L2	87	13.3	87	13.3	0.427	22.3	LOS B	9.0	65.9	0.77	0.69	0.77	17.9
8	T1	246	2.6	246	2.6	*0.427	18.8	LOS B	9.0	65.9	0.78	0.69	0.78	21.5
9	R2	129	3.3	129	3.3	0.427	29.5	LOS C	4.8	34.3	0.85	0.76	0.85	14.4
Approach		463	4.8	463	4.8	0.427	22.4	LOS B	9.0	65.9	0.80	0.71	0.80	18.8
North: George Street														
4	L2	41	5.1	41	5.1	0.232	36.8	LOS C	4.0	28.7	0.78	0.66	0.78	24.3
5	T1	435	3.9	435	3.9	*0.870	46.0	LOS D	20.0	143.9	0.95	0.98	1.16	15.8
6	R2	111	1.0	111	1.0	0.870	52.6	LOS D	20.0	143.9	1.00	1.07	1.26	17.4
Approach		586	3.4	586	3.4	0.870	46.6	LOS D	20.0	143.9	0.95	0.98	1.15	16.7
West: Elizabeth Street														
1	L2	211	0.5	211	0.5	0.347	14.7	LOS B	7.5	55.3	0.61	0.64	0.61	16.1
2	T1	152	14.6	152	14.6	0.347	11.3	LOS A	7.5	55.3	0.63	0.65	0.63	25.2
3	R2	145	2.2	145	2.2	*0.347	16.3	LOS B	3.7	26.6	0.74	0.71	0.74	14.3
Approach		507	5.2	507	5.2	0.347	14.1	LOS A	7.5	55.3	0.65	0.66	0.65	19.3
All Vehicles		1557	4.4	1557	4.4	0.870	28.8	LOS C	20.0	143.9	0.81	0.80	0.88	17.8

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
East: Elizabeth Street											
P2	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
North: George Street											
P3	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: Elizabeth Street											
P4	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians		4	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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: 101 [1482 George Street / Moore Street PM (Site Folder: Existing)] **Network: N101 [PM Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 65 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Moore Street														
7	L2	45	7.0	45	7.0	0.083	20.8	LOS B	1.0	7.7	0.74	0.68	0.74	17.3
8	T1	146	33.1	146	33.1	*0.296	18.9	LOS B	3.6	32.6	0.80	0.65	0.80	18.2
Approach		192	26.9	192	26.9	0.296	19.4	LOS B	3.6	32.6	0.79	0.66	0.79	18.0
North: George Street														
4	L2	74	20.0	74	20.0	0.118	26.1	LOS B	1.5	12.5	0.68	0.68	0.68	26.7
5	T1	568	2.8	568	2.8	*0.421	19.9	LOS B	7.3	52.4	0.78	0.66	0.78	23.6
6	R2	138	0.8	138	0.8	0.194	18.0	LOS B	2.9	20.7	0.70	0.71	0.70	22.3
Approach		780	4.0	780	4.0	0.421	20.1	LOS B	7.3	52.4	0.76	0.67	0.76	23.8
West: Moore Street														
2	T1	86	41.5	86	41.5	0.275	10.6	LOS A	3.2	26.7	0.71	0.64	0.71	24.6
3	R2	76	0.0	76	0.0	*0.275	17.3	LOS B	3.2	26.7	0.71	0.64	0.71	14.8
Approach		162	22.1	162	22.1	0.275	13.7	LOS A	3.2	26.7	0.71	0.64	0.71	21.2
All Vehicles		1134	10.5	1134	10.5	0.421	19.1	LOS B	7.3	52.4	0.76	0.66	0.76	22.6

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	26.8	LOS C	0.0	0.0	0.91	0.91	180.6	200.0	1.11
East: Moore Street											
P2	Full	1	26.8	LOS C	0.0	0.0	0.91	0.91	180.6	200.0	1.11
North: George Street											
P3	Full	1	26.8	LOS C	0.0	0.0	0.91	0.91	180.6	200.0	1.11
West: Moore Street											
P4	Full	1	26.8	LOS C	0.0	0.0	0.91	0.91	180.6	200.0	1.11
All Pedestrians		4	26.8	LOS C	0.0	0.0	0.91	0.91	180.6	200.0	1.11

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: 101 [1017 George Street / Railway Street PM (Site Folder: Existing)] **Network: N101 [PM Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Railway Street														
7	L2	138	2.3	138	2.3	*0.274	38.1	LOS C	2.5	17.9	0.94	0.75	0.94	15.0
Approach		138	2.3	138	2.3	0.274	38.1	LOS C	2.5	17.9	0.94	0.75	0.94	15.0
North: George Street														
4	L2	142	0.7	142	0.7	0.128	16.9	LOS B	1.9	13.2	0.36	0.59	0.36	30.4
5	T1	547	3.3	547	3.3	*0.356	17.9	LOS B	8.0	57.2	0.67	0.57	0.67	24.0
Approach		689	2.7	689	2.7	0.356	17.7	LOS B	8.0	57.2	0.61	0.58	0.61	25.4
All Vehicles		827	2.7	827	2.7	0.356	21.1	LOS B	8.0	57.2	0.66	0.60	0.66	22.7

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
East: Railway Street											
P2	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
North: George Street											
P3	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians		3	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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: 101 [2869 George Street / Campbell Street PM (Site Folder: Existing)] **Network: N101 [PM Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
1	L2	120	0.9	120	0.9	0.113	12.1	LOS A	2.1	14.8	0.48	0.63	0.48	28.4
2	T1	103	0.0	103	0.0	0.213	15.1	LOS B	3.5	25.2	0.68	0.60	0.68	28.9
3	R2	36	11.8	36	11.8	0.213	23.7	LOS B	3.5	25.2	0.68	0.60	0.68	26.8
Approach		259	2.0	259	2.0	0.213	14.9	LOS B	3.5	25.2	0.59	0.61	0.59	28.4
East: Campbell Street														
7	L2	87	19.3	87	19.3	0.195	32.6	LOS C	2.7	21.7	0.80	0.72	0.80	14.5
8	T1	192	0.5	192	0.5	*0.393	29.7	LOS C	6.2	43.4	0.86	0.71	0.86	19.3
Approach		279	6.4	279	6.4	0.393	30.6	LOS C	6.2	43.4	0.84	0.71	0.84	17.9
North: George Street														
4	L2	4	0.0	4	0.0	0.101	24.9	LOS B	2.0	13.8	0.61	0.49	0.61	28.7
5	T1	297	0.7	297	0.7	*0.405	23.5	LOS B	7.0	49.3	0.69	0.60	0.69	23.5
6	R2	48	0.0	48	0.0	0.405	31.2	LOS C	7.0	49.3	0.73	0.64	0.73	25.2
Approach		349	0.6	349	0.6	0.405	24.6	LOS B	7.0	49.3	0.70	0.60	0.70	23.8
West: Campbell Street														
1	L2	119	0.0	119	0.0	0.155	19.2	LOS B	2.9	20.4	0.66	0.69	0.66	24.2
2	T1	121	0.0	121	0.0	0.519	19.5	LOS B	7.8	54.9	0.88	0.76	0.88	19.7
3	R2	126	0.0	126	0.0	*0.519	29.5	LOS C	7.8	54.9	0.88	0.76	0.88	11.1
Approach		366	0.0	366	0.0	0.519	22.9	LOS B	7.8	54.9	0.81	0.74	0.81	19.1
All Vehicles		1254	2.0	1254	2.0	0.519	23.4	LOS B	7.8	54.9	0.74	0.67	0.74	22.2

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
East: Campbell Street											
P2	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
North: George Street											
P3	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: Campbell Street											
P4	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

All Pedestrians	4	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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: 101 [Moore Street / Castlereagh Street PM (Site Folder: Existing)] **Network: N101 [PM Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Castlereagh Street														
1	L2	9	0.0	9	0.0	0.099	8.7	LOS A	0.4	2.9	0.51	0.91	0.51	33.5
2	T1	25	0.0	25	0.0	0.099	11.1	LOS A	0.4	2.9	0.51	0.91	0.51	37.2
3	R2	19	22.2	19	22.2	0.099	14.6	LOS B	0.4	2.9	0.51	0.91	0.51	31.7
Approach		54	7.8	54	7.8	0.099	11.9	LOS A	0.4	2.9	0.51	0.91	0.51	35.2
East: Moore Street														
4	L2	12	0.0	12	0.0	0.092	4.6	LOS A	0.0	0.0	0.00	0.04	0.00	45.8
5	T1	240	14.9	240	14.9	0.092	0.0	LOS A	0.3	2.2	0.04	0.11	0.04	46.3
6	R2	57	1.9	57	1.9	0.092	5.3	LOS A	0.3	2.2	0.12	0.24	0.12	42.6
Approach		308	11.9	308	11.9	0.092	1.1	NA	0.3	2.2	0.05	0.13	0.05	45.2
North: Castlereagh Street														
7	L2	19	0.0	19	0.0	0.159	7.4	LOS A	0.6	4.5	0.02	0.99	0.02	35.8
8	T1	36	2.9	36	2.9	0.159	7.8	LOS A	0.6	4.5	0.02	0.99	0.02	39.6
9	R2	42	0.0	42	0.0	0.159	7.6	LOS A	0.6	4.5	0.02	0.99	0.02	36.6
Approach		97	1.1	97	1.1	0.159	7.7	LOS A	0.6	4.5	0.02	0.99	0.02	37.9
West: Moore Street														
10	L2	18	0.0	18	0.0	0.031	4.6	LOS A	0.0	0.0	0.00	0.20	0.00	42.4
11	T1	56	60.4	56	60.4	0.031	0.0	LOS A	0.1	1.1	0.11	0.24	0.11	35.7
12	R2	15	7.1	15	7.1	0.031	6.6	LOS A	0.1	1.1	0.24	0.28	0.24	40.7
Approach		88	39.3	88	39.3	0.031	2.0	NA	0.1	1.1	0.11	0.24	0.11	39.4
All Vehicles		547	14.0	547	14.0	0.159	3.5	NA	0.6	4.5	0.10	0.38	0.10	40.8

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

MOVEMENT SUMMARY

Site: 101 [3315 Moore Street / Bathurst Street PM (Site Folder: Existing)] **Network: N101 [PM Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 65 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Bathurst Street														
1	L2	39	0.0	39	0.0	0.179	24.5	LOS B	2.9	20.8	0.59	0.54	0.59	31.4
2	T1	645	1.3	645	1.3	*0.774	26.1	LOS B	16.1	113.7	0.84	0.81	0.92	33.4
3	R2	26	0.0	26	0.0	0.774	47.8	LOS D	16.1	113.7	0.90	0.88	1.00	24.4
Approach		711	1.2	711	1.2	0.774	26.8	LOS B	16.1	113.7	0.83	0.80	0.90	33.1
East: Moore Street														
4	L2	98	0.0	98	0.0	0.180	22.2	LOS B	2.4	16.5	0.78	0.72	0.78	24.5
5	T1	255	14.5	255	14.5	*0.517	19.6	LOS B	7.5	58.4	0.86	0.74	0.86	12.9
6	R2	28	0.0	28	0.0	0.517	24.8	LOS B	7.5	58.4	0.86	0.74	0.86	25.5
Approach		381	9.7	381	9.7	0.517	20.7	LOS B	7.5	58.4	0.84	0.73	0.84	18.3
North: Bathurst Street														
7	L2	76	0.0	76	0.0	0.163	23.2	LOS B	2.6	18.6	0.60	0.60	0.60	29.6
8	T1	553	1.1	553	1.1	0.610	20.4	LOS B	11.2	78.9	0.75	0.67	0.75	36.7
Approach		628	1.0	628	1.0	0.610	20.7	LOS B	11.2	78.9	0.74	0.66	0.74	36.1
West: Moore Street														
10	L2	16	0.0	16	0.0	0.029	22.3	LOS B	0.4	2.5	0.74	0.66	0.74	25.4
11	T1	85	48.1	85	48.1	0.178	18.8	LOS B	2.0	19.7	0.75	0.65	0.75	14.5
Approach		101	40.6	101	40.6	0.178	19.4	LOS B	2.0	19.7	0.75	0.65	0.75	17.3
All Vehicles		1821	5.1	1821	5.1	0.774	23.0	LOS B	16.1	113.7	0.79	0.73	0.82	31.1

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Bathurst Street											
P1	Full	53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11
East: Moore Street											
P2	Full	53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11
North: Bathurst Street											
P3	Full	53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11
West: Moore Street											
P4	Full	53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11

All Pedestrians	211	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11

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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Project: C:\Users\Gabi.Mcerlane\Downloads\20250128_LCC_model v3 (1).sip9

MOVEMENT SUMMARY

Site: 101 [2822 Moore Street / Northumberland Street PM (Site Folder: Existing)] **Network: N101 [PM Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 65 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Northumberland Street														
1	L2	204	1.0	204	1.0	*0.379	23.6	LOS B	5.3	37.3	0.84	0.77	0.84	19.8
2	T1	278	0.4	278	0.4	0.221	17.5	LOS B	3.3	22.9	0.77	0.62	0.77	28.8
3	R2	52	0.0	52	0.0	0.095	21.8	LOS B	1.2	8.4	0.76	0.69	0.76	20.4
Approach		534	0.6	534	0.6	0.379	20.2	LOS B	5.3	37.3	0.79	0.68	0.79	25.2
East: Moore Street														
5	T1	177	19.6	177	19.6	0.473	11.6	LOS A	7.0	54.5	0.72	0.68	0.72	15.8
6	R2	143	6.6	143	6.6	*0.473	17.4	LOS B	7.0	54.5	0.72	0.69	0.72	26.7
Approach		320	13.8	320	13.8	0.473	14.2	LOS A	7.0	54.5	0.72	0.68	0.72	22.5
West: Moore Street														
10	L2	102	5.2	102	5.2	0.125	13.6	LOS A	1.8	13.4	0.59	0.66	0.59	27.3
11	T1	85	42.0	85	42.0	0.125	9.6	LOS A	1.8	13.4	0.56	0.45	0.56	20.0
Approach		187	21.9	187	21.9	0.125	11.8	LOS A	1.8	13.6	0.58	0.56	0.58	25.4
All Vehicles		1041	8.5	1041	8.5	0.473	16.9	LOS B	7.0	54.5	0.73	0.66	0.73	24.6

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Northumberland Street											
P1	Full	53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11
East: Moore Street											
P2	Full	53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11
North: Northumberland Street											
P3	Full	53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11
West: Moore Street											
P4	Full	53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11
All Pedestrians		211	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11

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: 101 [877 Moore Street / Macquarie Street PM (Site Folder: Existing)] **Network: N101 [PM Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 65 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Macquarie Street														
1	L2	65	1.6	65	1.6	0.296	26.3	LOS B	3.4	24.0	0.87	0.75	0.87	17.8
3	R2	60	1.8	60	1.8	*0.296	26.4	LOS B	3.4	24.0	0.87	0.75	0.87	17.8
Approach		125	1.7	125	1.7	0.296	26.4	LOS B	3.4	24.0	0.87	0.75	0.87	17.8
East: Moore Street														
4	L2	67	0.0	67	0.0	0.127	21.9	LOS B	1.6	11.5	0.77	0.70	0.77	22.1
5	T1	255	16.9	255	16.9	0.493	21.1	LOS B	6.8	54.8	0.88	0.73	0.88	11.1
Approach		322	13.4	322	13.4	0.493	21.2	LOS B	6.8	54.8	0.85	0.73	0.85	14.6
West: Moore Street														
11	T1	59	60.7	59	60.7	0.501	21.5	LOS B	4.0	34.4	0.92	0.77	0.92	9.9
12	R2	78	0.0	78	0.0	*0.501	32.2	LOS C	4.0	34.4	0.93	0.77	0.93	19.8
Approach		137	26.2	137	26.2	0.501	27.6	LOS B	4.0	34.4	0.92	0.77	0.92	16.6
All Vehicles		584	13.9	584	13.9	0.501	23.8	LOS B	6.8	54.8	0.87	0.74	0.87	16.0

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Pedestrian Movements (Diagonal)											
PD	Diagonal	53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11
All Pedestrians		53	26.8	LOS C	0.1	0.1	0.91	0.91	180.7	200.0	1.11

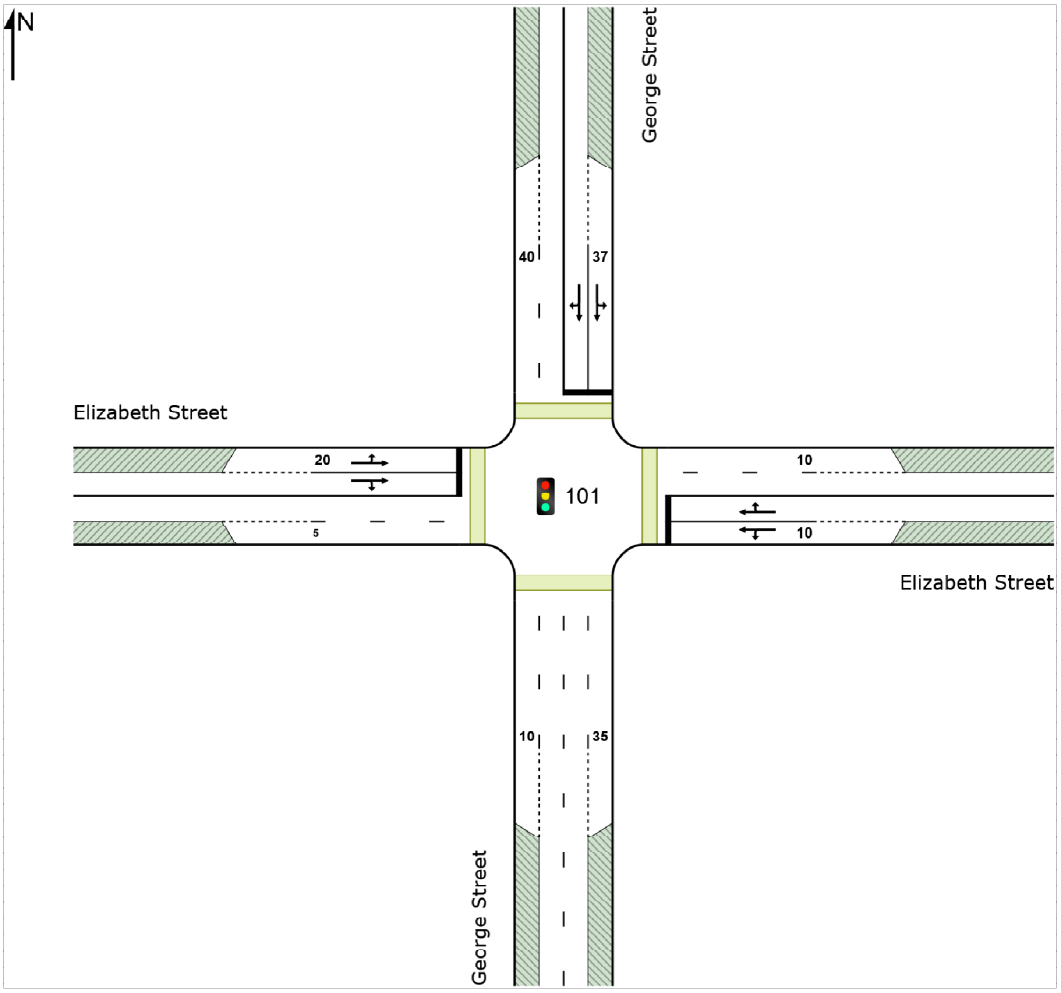
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 101 [1004 George Street / Elizabeth Street WE (Site Folder: Existing)]

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

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

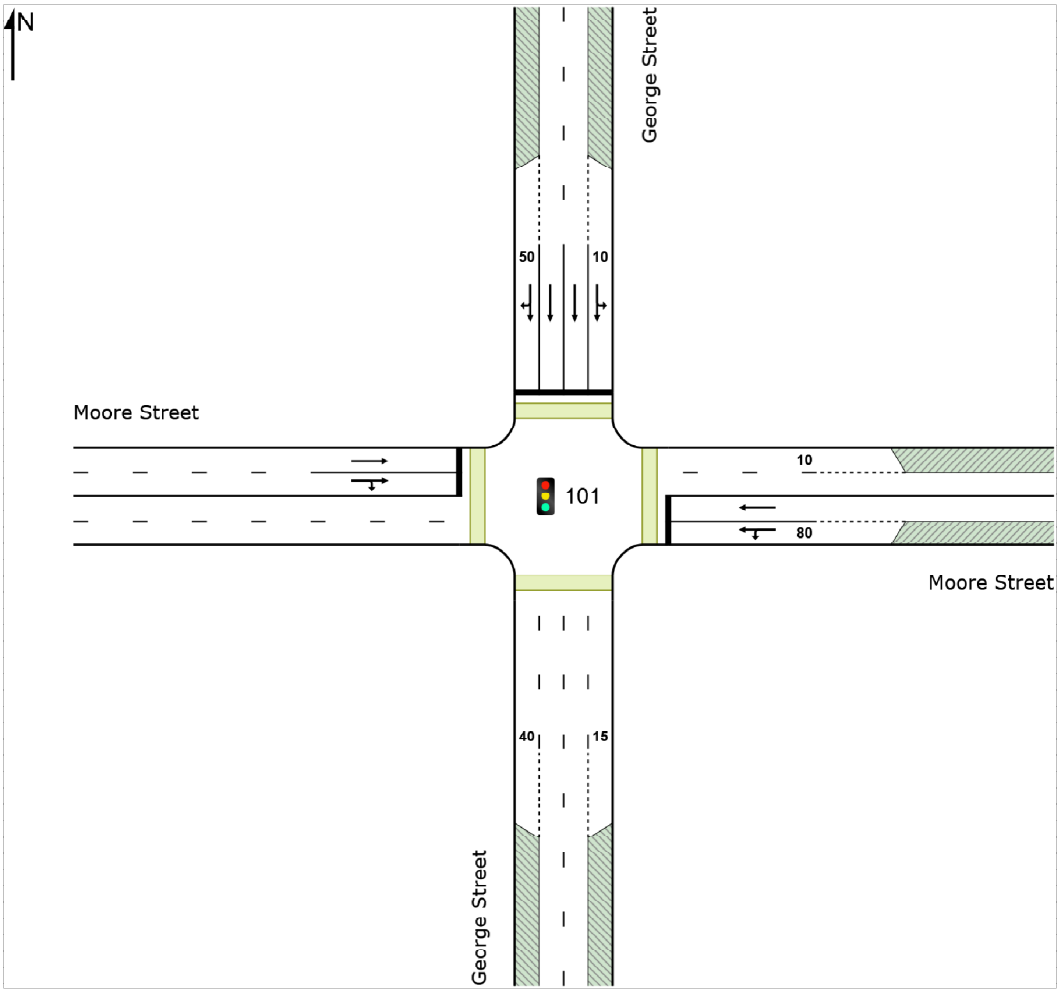


SITE LAYOUT

Site: 101 [1482 George Street / Moore Street WE (Site Folder: Existing)]

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

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

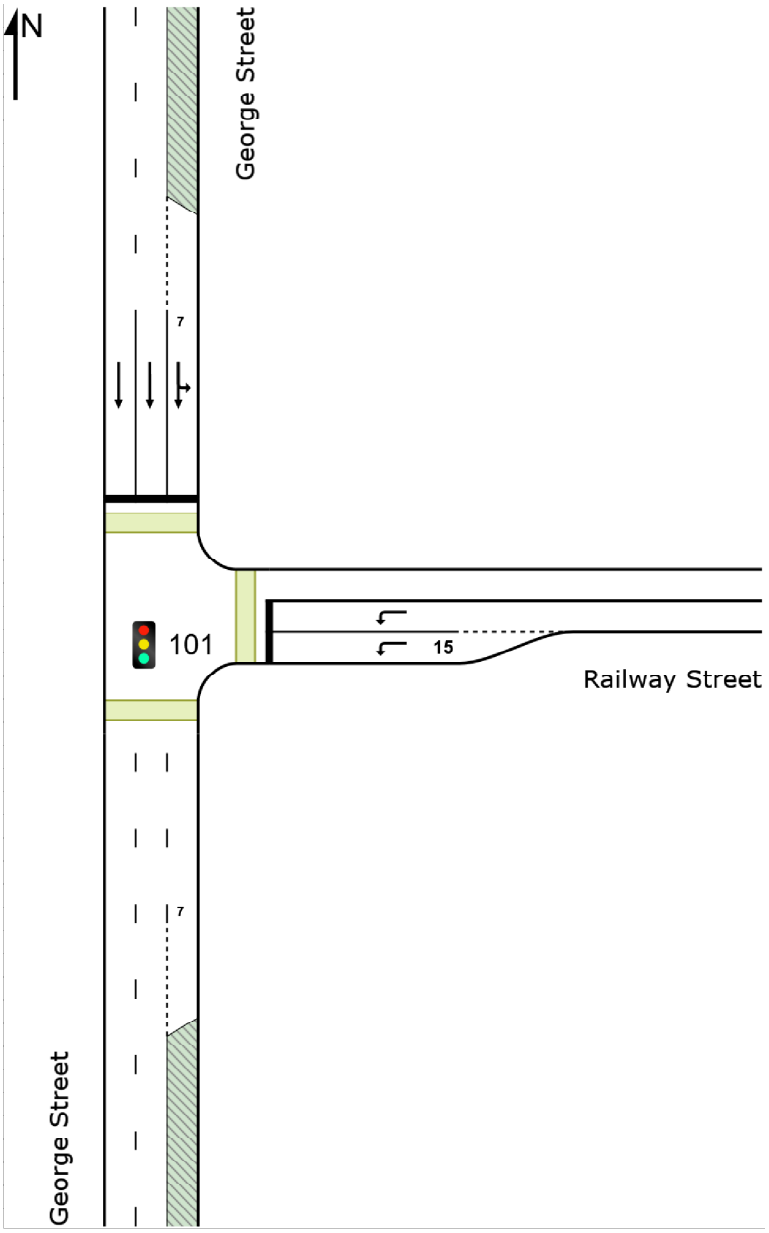


SITE LAYOUT

Site: 101 [1017 George Street / Railway Street WE (Site Folder: Existing)]

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

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

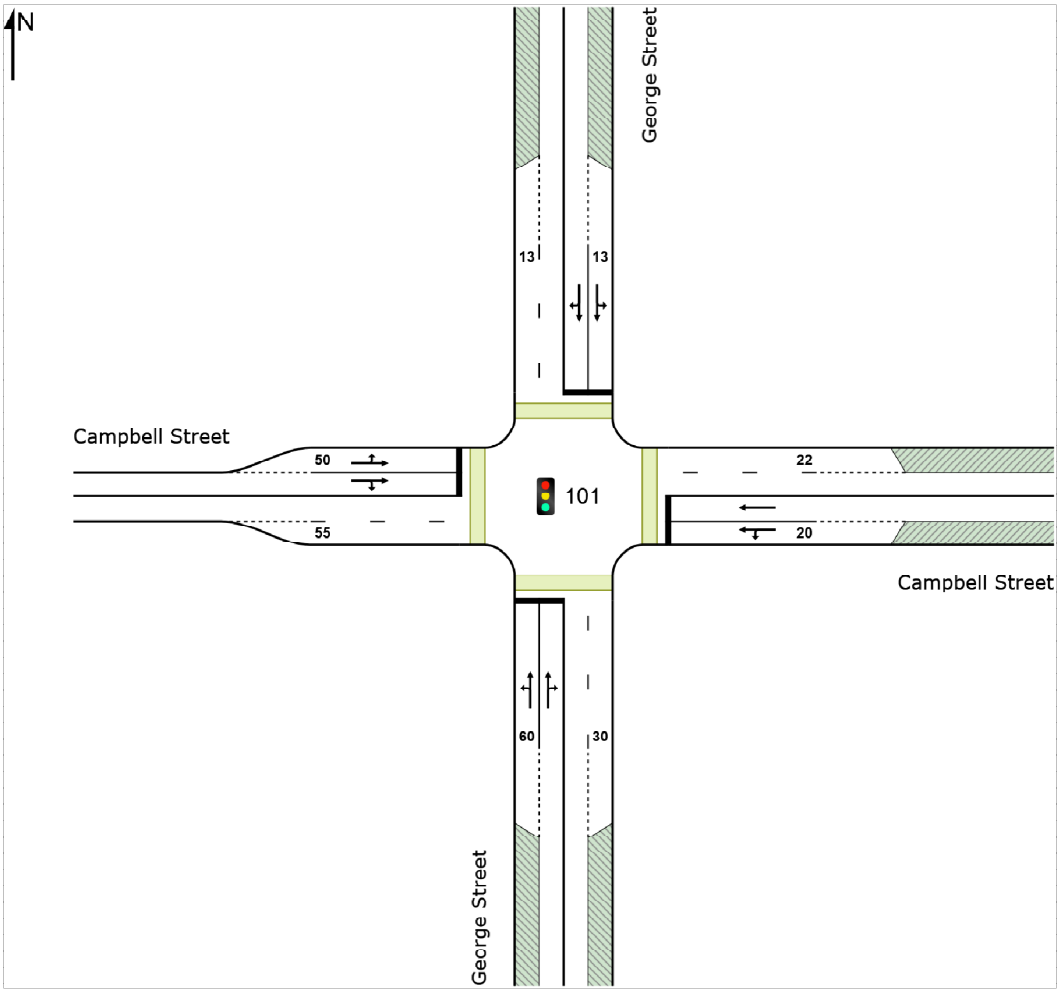


SITE LAYOUT

Site: 101 [2869 George Street / Campbell Street WE (Site Folder: Existing)]

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

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

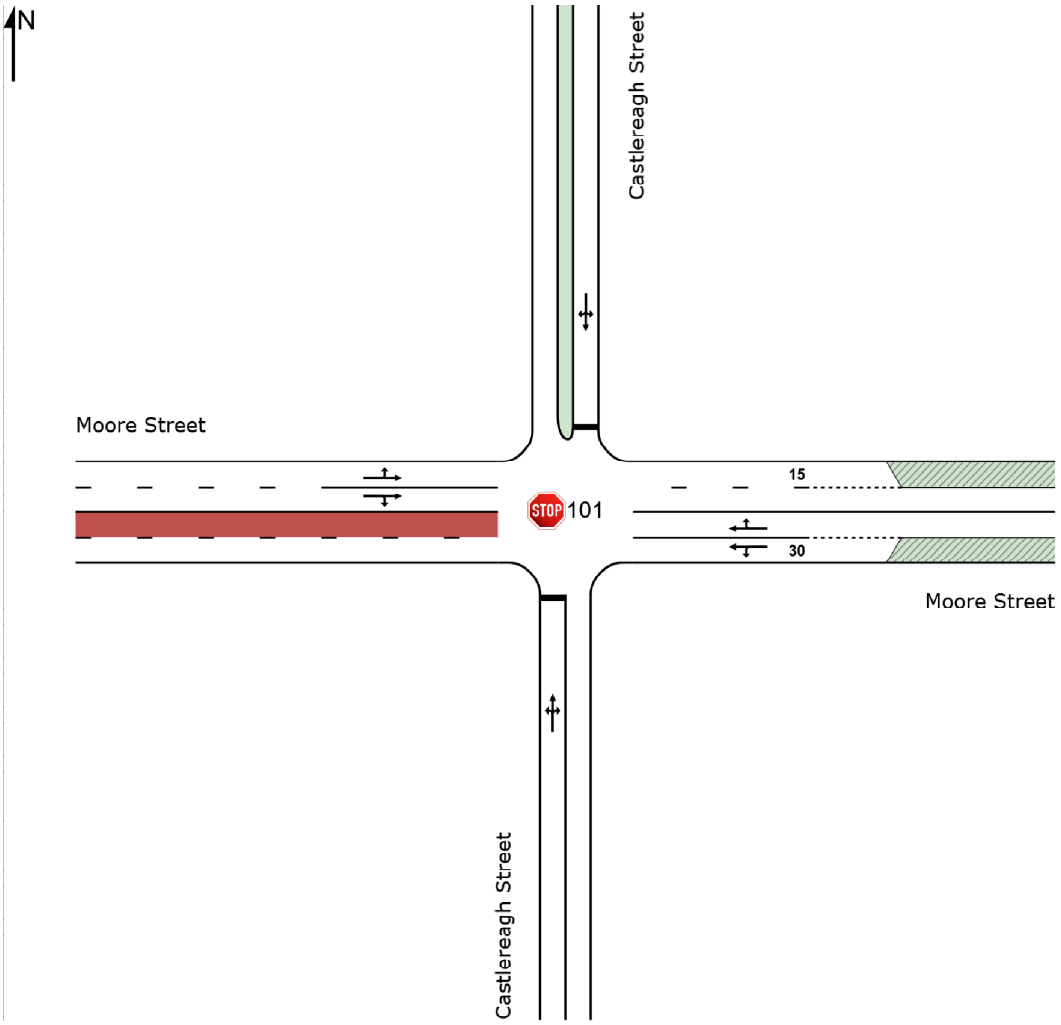


SITE LAYOUT

Site: 101 [Moore Street / Castlereagh Street WE (Site Folder: Existing)]

New Site
Site Category: (None)
Stop (Two-Way)

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

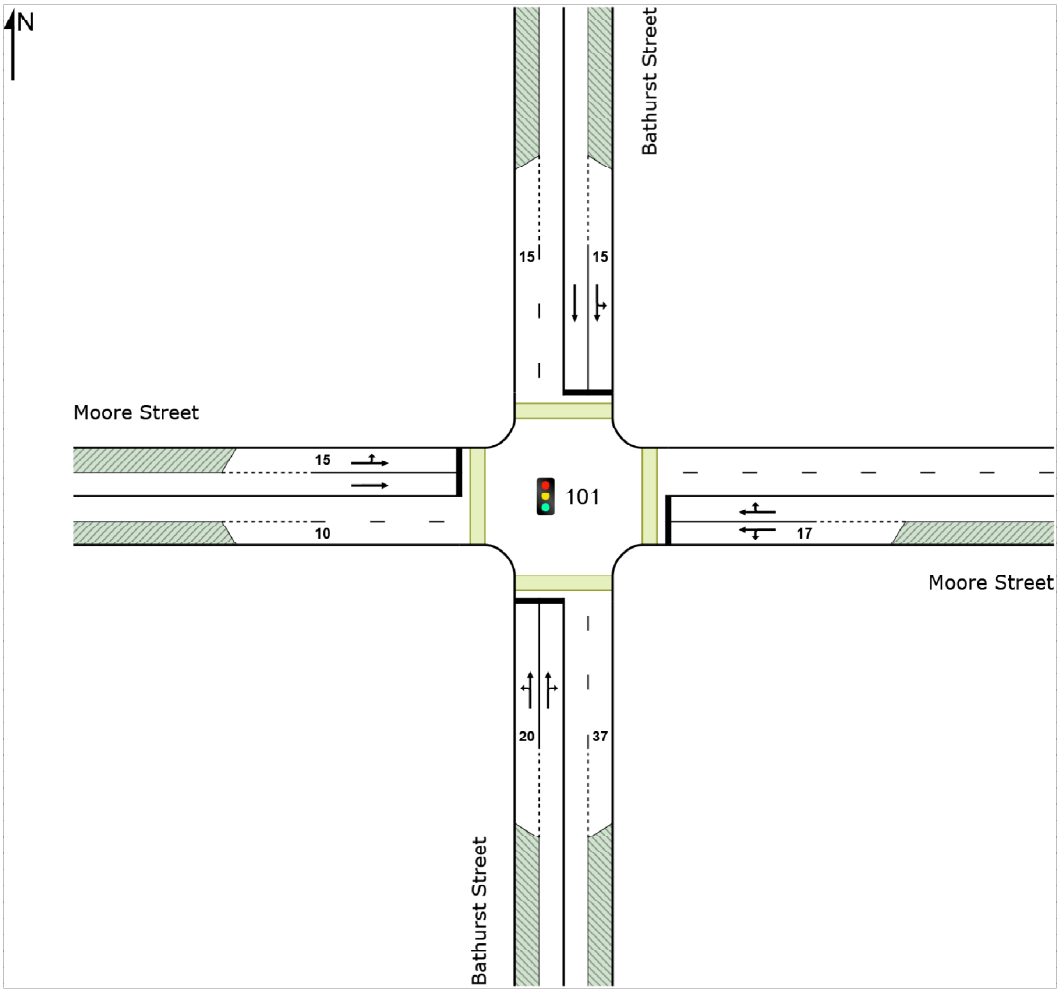


SITE LAYOUT

Site: 101 [3315 Moore Street / Bathurst Street WE (Site Folder: Existing)]

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

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

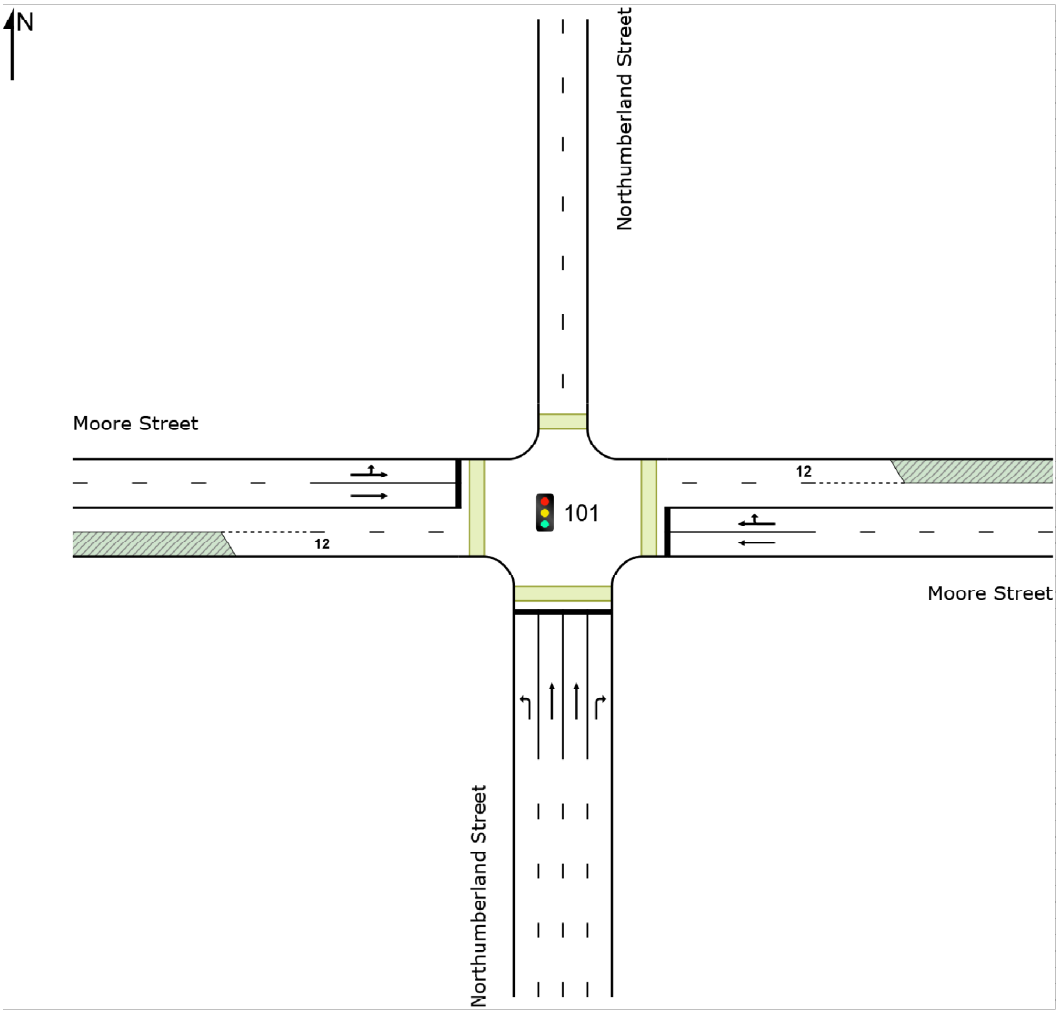


SITE LAYOUT

Site: 101 [2822 Moore Street / Northumberland Street WE (Site Folder: Existing)]

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

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

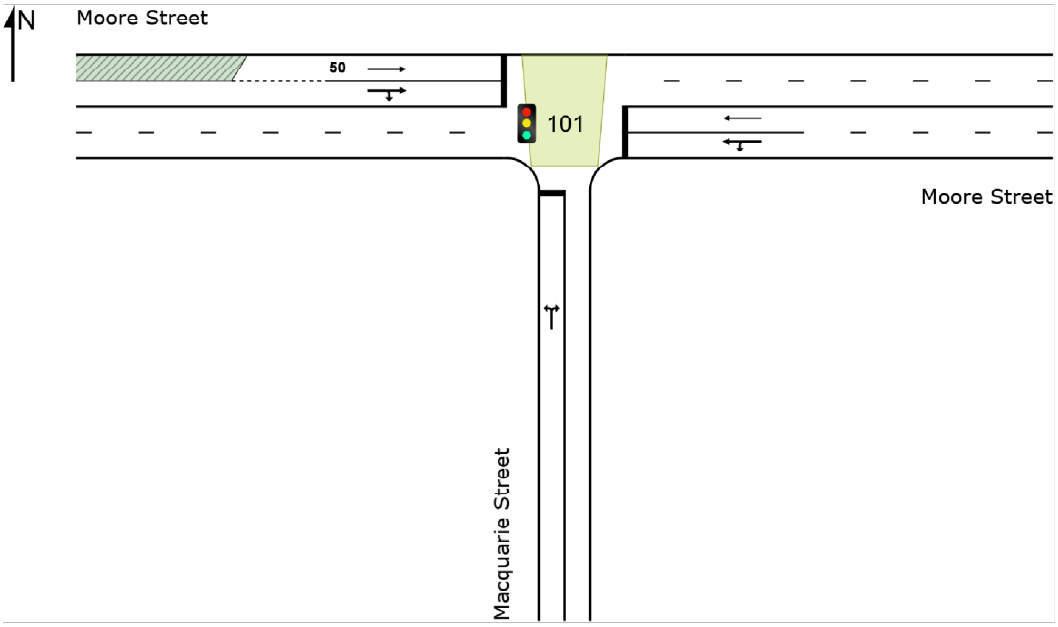


SITE LAYOUT

Site: 101 [877 Moore Street / Macquarie Street WE (Site Folder: Existing)]

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

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

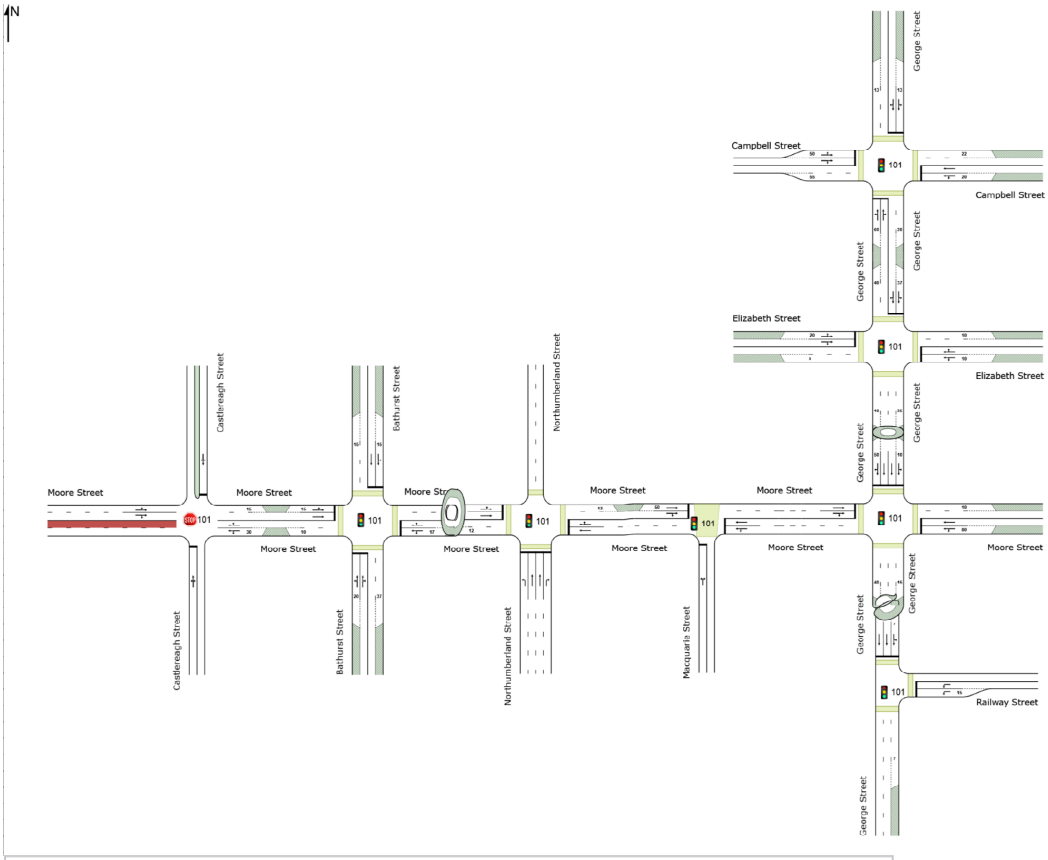


NETWORK LAYOUT

Network: N101 [WE Peak (Network Folder: Existing)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	1004 George Street / Elizabeth Street WE
101	NA	1482 George Street / Moore Street WE
101	NA	1017 George Street / Railway Street WE
101	NA	2869 George Street / Campbell Street WE
101	NA	Moore Street / Castlereagh Street WE
101	NA	3315 Moore Street / Bathurst Street WE
101	NA	2822 Moore Street / Northumberland Street WE
101	NA	877 Moore Street / Macquarie Street WE

MOVEMENT SUMMARY

Site: 101 [1004 George Street / Elizabeth Street WE (Site Folder: Existing)] **Network: N101 [WE Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Elizabeth Street														
7	L2	91	5.8	91	5.8	0.532	35.4	LOS C	6.2	44.9	0.76	0.76	0.76	19.2
8	T1	145	2.2	145	2.2	0.532	32.1	LOS C	6.2	44.9	0.76	0.76	0.76	23.1
9	R2	209	0.5	209	0.5	*0.925	74.4	LOS F	10.9	76.9	1.00	1.33	1.69	8.5
Approach		445	2.1	445	2.1	0.925	52.7	LOS D	10.9	76.9	0.88	1.03	1.20	13.4
North: George Street														
4	L2	66	1.6	66	1.6	0.223	35.6	LOS C	2.7	19.5	0.86	0.72	0.86	22.0
5	T1	263	4.4	263	4.4	*0.836	41.7	LOS C	12.9	93.1	0.99	1.02	1.23	15.2
6	R2	78	0.0	78	0.0	0.836	45.9	LOS D	12.9	93.1	1.00	1.05	1.26	17.6
Approach		407	3.1	407	3.1	0.836	41.5	LOS C	12.9	93.1	0.97	0.98	1.17	16.9
West: Elizabeth Street														
1	L2	247	0.4	247	0.4	0.289	10.6	LOS A	5.2	37.8	0.49	0.60	0.49	19.5
2	T1	142	14.8	142	14.8	0.361	7.8	LOS A	5.2	37.8	0.61	0.65	0.61	27.4
3	R2	139	0.0	139	0.0	*0.361	15.0	LOS B	3.6	26.3	0.74	0.69	0.74	17.0
Approach		528	4.2	528	4.2	0.361	11.0	LOS A	5.2	37.8	0.59	0.64	0.59	22.0
All Vehicles		1381	3.2	1381	3.2	0.925	33.4	LOS C	12.9	93.1	0.79	0.86	0.96	16.5

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
East: Elizabeth Street											
P2	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
North: George Street											
P3	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
West: Elizabeth Street											
P4	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
All Pedestrians		4	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08

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: 101 [1482 George Street / Moore Street WE (Site Folder: Existing)] **Network: N101 [WE Peak (Network Folder: Existing)]**

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

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Moore Street														
7	L2	57	5.6	57	5.6	0.158	18.1	LOS B	2.0	15.4	0.72	0.65	0.72	19.3
8	T1	129	28.5	129	28.5	*0.158	14.7	LOS B	2.0	15.4	0.72	0.59	0.72	20.3
Approach		186	21.5	186	21.5	0.158	15.7	LOS B	2.0	16.2	0.72	0.61	0.72	20.0
North: George Street														
4	L2	59	14.3	59	14.3	0.087	18.9	LOS B	1.1	8.5	0.65	0.66	0.65	27.6
5	T1	368	2.3	368	2.3	*0.252	14.6	LOS B	3.8	27.3	0.70	0.58	0.70	25.5
6	R2	98	0.0	98	0.0	0.132	15.9	LOS B	1.8	12.8	0.67	0.69	0.67	23.5
Approach		525	3.2	525	3.2	0.252	15.3	LOS B	3.8	27.3	0.69	0.61	0.69	25.5
West: Moore Street														
2	T1	84	13.8	84	13.8	0.219	9.3	LOS A	2.2	16.0	0.63	0.54	0.63	26.9
3	R2	78	0.0	78	0.0	*0.219	14.7	LOS B	2.2	16.0	0.69	0.65	0.69	15.7
Approach		162	7.1	162	7.1	0.219	11.9	LOS A	2.2	16.0	0.66	0.59	0.66	22.8
All Vehicles		874	7.8	874	7.8	0.252	14.8	LOS B	3.8	27.3	0.69	0.61	0.69	24.0

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
East: Moore Street											
P2	Full	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
North: George Street											
P3	Full	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
West: Moore Street											
P4	Full	1	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12
All Pedestrians		4	24.3	LOS C	0.0	0.0	0.90	0.90	178.1	200.0	1.12

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: 101 [1017 George Street / Railway Street WE (Site Folder: Existing)] **Network: N101 [WE Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Railway Street														
7	L2	112	0.9	112	0.9	* 0.220	37.7	LOS C	2.0	14.2	0.93	0.73	0.93	15.1
Approach		112	0.9	112	0.9	0.220	37.7	LOS C	2.0	14.2	0.93	0.73	0.93	15.1
North: George Street														
4	L2	113	0.0	113	0.0	0.088	14.5	LOS B	1.4	10.1	0.35	0.58	0.35	30.5
5	T1	391	3.0	391	3.0	* 0.248	16.2	LOS B	5.2	37.5	0.63	0.53	0.63	24.6
Approach		503	2.3	503	2.3	0.248	15.8	LOS B	5.2	37.5	0.57	0.54	0.57	26.0
All Vehicles		615	2.1	615	2.1	0.248	19.8	LOS B	5.2	37.5	0.63	0.57	0.63	22.9

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
East: Railway Street											
P2	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
North: George Street											
P3	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians		3	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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: 101 [2869 George Street / Campbell Street WE (Site Folder: Existing)] **Network: N101 [WE Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
1	L2	161	0.7	161	0.7	0.152	11.9	LOS A	2.7	19.2	0.49	0.64	0.49	28.6
2	T1	125	0.0	125	0.0	0.236	13.7	LOS A	3.9	27.7	0.66	0.59	0.66	29.9
3	R2	45	4.7	45	4.7	0.236	19.1	LOS B	3.9	27.7	0.66	0.59	0.66	27.9
Approach		332	1.0	332	1.0	0.236	13.6	LOS A	3.9	27.7	0.58	0.61	0.58	29.1
East: Campbell Street														
7	L2	44	19.0	44	19.0	0.150	31.4	LOS C	2.0	15.2	0.80	0.68	0.80	15.5
8	T1	233	0.5	233	0.5	*0.431	29.4	LOS C	6.4	45.1	0.87	0.72	0.87	19.6
Approach		277	3.4	277	3.4	0.431	29.7	LOS C	6.4	45.1	0.86	0.71	0.86	19.0
North: George Street														
4	L2	18	0.0	18	0.0	0.063	17.9	LOS B	1.1	7.8	0.60	0.53	0.60	28.5
5	T1	124	1.7	124	1.7	*0.255	15.5	LOS B	3.7	26.1	0.66	0.60	0.66	23.7
6	R2	66	0.0	66	0.0	0.255	21.2	LOS B	3.7	26.1	0.68	0.63	0.68	25.6
Approach		208	1.0	208	1.0	0.255	17.5	LOS B	3.7	26.1	0.66	0.60	0.66	24.9
West: Campbell Street														
1	L2	97	1.1	97	1.1	0.127	18.1	LOS B	2.2	15.5	0.65	0.68	0.65	24.8
2	T1	111	0.0	111	0.0	0.476	18.1	LOS B	6.6	46.4	0.87	0.74	0.87	20.3
3	R2	114	0.9	114	0.9	*0.476	28.0	LOS B	6.6	46.4	0.87	0.74	0.87	11.7
Approach		321	0.7	321	0.7	0.476	21.6	LOS B	6.6	46.4	0.81	0.72	0.81	19.5
All Vehicles		1138	1.5	1138	1.5	0.476	20.5	LOS B	6.6	46.4	0.73	0.67	0.73	23.4

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
East: Campbell Street											
P2	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
North: George Street											
P3	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
West: Campbell Street											
P4	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08

All Pedestrians	4	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08

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: 101 [Moore Street / Castlereagh Street WE (Site Folder: Existing)] **Network: N101 [WE Peak (Network Folder: Existing)]**

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Castlereagh Street														
1	L2	5	0.0	5	0.0	0.060	8.3	LOS A	0.2	1.7	0.46	0.87	0.46	34.5
2	T1	21	0.0	21	0.0	0.060	10.6	LOS A	0.2	1.7	0.46	0.87	0.46	38.1
3	R2	12	0.0	12	0.0	0.060	11.1	LOS A	0.2	1.7	0.46	0.87	0.46	33.0
Approach		38	0.0	38	0.0	0.060	10.4	LOS A	0.2	1.7	0.46	0.87	0.46	36.5
East: Moore Street														
4	L2	24	4.3	24	4.3	0.073	4.6	LOS A	0.0	0.0	0.00	0.10	0.00	44.7
5	T1	172	17.8	172	17.8	0.073	0.0	LOS A	0.2	1.8	0.05	0.16	0.05	44.9
6	R2	44	2.4	44	2.4	0.073	5.5	LOS A	0.2	1.8	0.14	0.25	0.14	42.4
Approach		240	13.6	240	13.6	0.073	1.5	NA	0.2	1.8	0.06	0.17	0.06	44.2
North: Castlereagh Street														
7	L2	17	0.0	17	0.0	0.054	7.7	LOS A	0.2	1.5	0.15	0.90	0.15	33.7
8	T1	17	6.3	17	6.3	0.054	11.2	LOS A	0.2	1.5	0.15	0.90	0.15	38.2
9	R2	6	0.0	6	0.0	0.054	11.1	LOS A	0.2	1.5	0.15	0.90	0.15	35.0
Approach		40	2.6	40	2.6	0.054	9.7	LOS A	0.2	1.5	0.15	0.90	0.15	36.3
West: Moore Street														
10	L2	13	0.0	13	0.0	0.013	4.6	LOS A	0.0	0.0	0.00	0.30	0.00	42.1
11	T1	94	33.7	94	33.7	0.065	0.0	LOS A	0.1	1.2	0.10	0.16	0.10	41.0
12	R2	17	0.0	17	0.0	0.065	6.2	LOS A	0.1	1.2	0.12	0.14	0.12	43.8
Approach		123	25.6	123	25.6	0.065	1.3	NA	0.1	1.2	0.09	0.17	0.09	42.0
All Vehicles		441	14.8	441	14.8	0.073	3.0	NA	0.2	1.8	0.11	0.30	0.11	41.3

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

MOVEMENT SUMMARY

Site: 101 [3315 Moore Street / Bathurst Street WE (Site Folder: Existing)] **Network: N101 [WE Peak (Network Folder: Existing)]**

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

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Bathurst Street														
1	L2	48	2.2	48	2.2	0.526	22.2	LOS B	7.5	53.1	0.74	0.68	0.74	30.1
2	T1	619	0.3	619	0.3	*0.657	18.2	LOS B	8.4	58.9	0.80	0.74	0.82	35.5
3	R2	38	0.0	38	0.0	0.657	40.0	LOS C	8.4	58.9	0.87	0.80	0.90	25.8
Approach		705	0.4	705	0.4	0.657	19.6	LOS B	8.4	58.9	0.80	0.74	0.82	34.8
East: Moore Street														
4	L2	99	0.0	99	0.0	0.188	24.9	LOS B	2.2	15.7	0.79	0.72	0.79	24.9
5	T1	174	17.6	174	17.6	*0.454	21.7	LOS B	5.1	40.2	0.84	0.72	0.84	13.4
6	R2	38	0.0	38	0.0	0.454	26.0	LOS B	5.1	40.2	0.84	0.72	0.84	26.2
Approach		311	9.8	311	9.8	0.454	23.2	LOS B	5.1	40.2	0.83	0.72	0.83	20.3
North: Bathurst Street														
7	L2	129	0.8	129	0.8	0.179	22.3	LOS B	2.6	18.3	0.61	0.68	0.61	28.4
8	T1	526	0.6	526	0.6	0.652	20.1	LOS B	11.3	79.3	0.80	0.71	0.80	36.8
Approach		656	0.6	656	0.6	0.652	20.5	LOS B	11.3	79.3	0.76	0.70	0.76	35.6
West: Moore Street														
10	L2	25	0.0	25	0.0	0.112	21.4	LOS B	1.2	9.9	0.74	0.66	0.74	27.2
11	T1	87	36.1	87	36.1	0.112	17.1	LOS B	1.2	9.9	0.74	0.64	0.74	15.0
Approach		113	28.0	113	28.0	0.112	18.0	LOS B	1.2	10.8	0.74	0.64	0.74	19.2
All Vehicles		1784	3.9	1784	3.9	0.657	20.5	LOS B	11.3	79.3	0.79	0.71	0.79	32.3

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Bathurst Street											
P1	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
East: Moore Street											
P2	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
North: Bathurst Street											
P3	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
West: Moore Street											
P4	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

All Pedestrians	211	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

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: 101 [2822 Moore Street / Northumberland Street WE (Site Folder: Existing)] **Network: N101 [WE Peak (Network Folder: Existing)]**

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

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Northumberland Street														
1	L2	140	0.0	140	0.0	* 0.266	21.8	LOS B	3.3	22.8	0.82	0.74	0.82	20.5
2	T1	266	0.8	266	0.8	0.217	16.5	LOS B	2.9	20.5	0.77	0.62	0.77	29.3
3	R2	69	1.5	69	1.5	0.133	21.1	LOS B	1.5	11.0	0.78	0.71	0.78	20.7
Approach		476	0.7	476	0.7	0.266	18.7	LOS B	3.3	22.8	0.79	0.67	0.79	26.1
East: Moore Street														
5	T1	168	18.1	168	18.1	* 0.409	10.3	LOS A	4.9	37.5	0.66	0.59	0.66	17.1
6	R2	135	7.0	135	7.0	0.409	18.1	LOS B	4.9	37.5	0.73	0.70	0.73	26.2
Approach		303	13.2	303	13.2	0.409	13.8	LOS A	4.9	37.5	0.69	0.64	0.69	22.9
West: Moore Street														
10	L2	159	6.0	159	6.0	0.198	14.3	LOS A	2.8	20.9	0.64	0.69	0.64	26.9
11	T1	94	24.7	94	24.7	0.115	9.2	LOS A	1.5	12.8	0.58	0.46	0.58	20.4
Approach		253	12.9	253	12.9	0.198	12.4	LOS A	2.8	20.9	0.61	0.60	0.61	25.7
All Vehicles		1032	7.3	1032	7.3	0.409	15.7	LOS B	4.9	37.5	0.72	0.64	0.72	25.3

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Northumberland Street											
P1	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
East: Moore Street											
P2	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
North: Northumberland Street											
P3	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
West: Moore Street											
P4	Full	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		211	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

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: 101 [877 Moore Street / Macquarie Street WE (Site Folder: Existing)] **Network: N101 [WE Peak (Network Folder: Existing)]**

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

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Macquarie Street														
1	L2	73	0.0	73	0.0	0.495	28.3	LOS B	4.7	32.6	0.94	0.79	0.94	17.1
3	R2	96	0.0	96	0.0	* 0.495	28.4	LOS B	4.7	32.6	0.94	0.79	0.94	17.1
Approach		168	0.0	168	0.0	0.495	28.4	LOS B	4.7	32.6	0.94	0.79	0.94	17.1
East: Moore Street														
4	L2	44	0.0	44	0.0	0.416	38.7	LOS C	1.7	12.5	1.00	0.74	1.00	17.7
5	T1	231	17.4	231	17.4	0.416	18.7	LOS B	5.3	42.5	0.85	0.70	0.85	11.8
Approach		275	14.6	275	14.6	0.416	21.9	LOS B	5.3	42.5	0.88	0.71	0.88	13.6
West: Moore Street														
11	T1	45	51.2	45	51.2	0.103	16.8	LOS B	1.0	9.9	0.75	0.57	0.75	14.0
12	R2	118	0.9	118	0.9	* 0.972	52.7	LOS D	4.7	33.5	1.00	1.27	2.11	14.0
Approach		163	14.8	163	14.8	0.972	42.8	LOS D	4.7	33.5	0.93	1.08	1.74	14.0
All Vehicles		606	10.6	606	10.6	0.972	29.3	LOS C	5.3	42.5	0.91	0.83	1.13	14.8

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Pedestrian Movements (Diagonal)											
PD	Diagonal	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

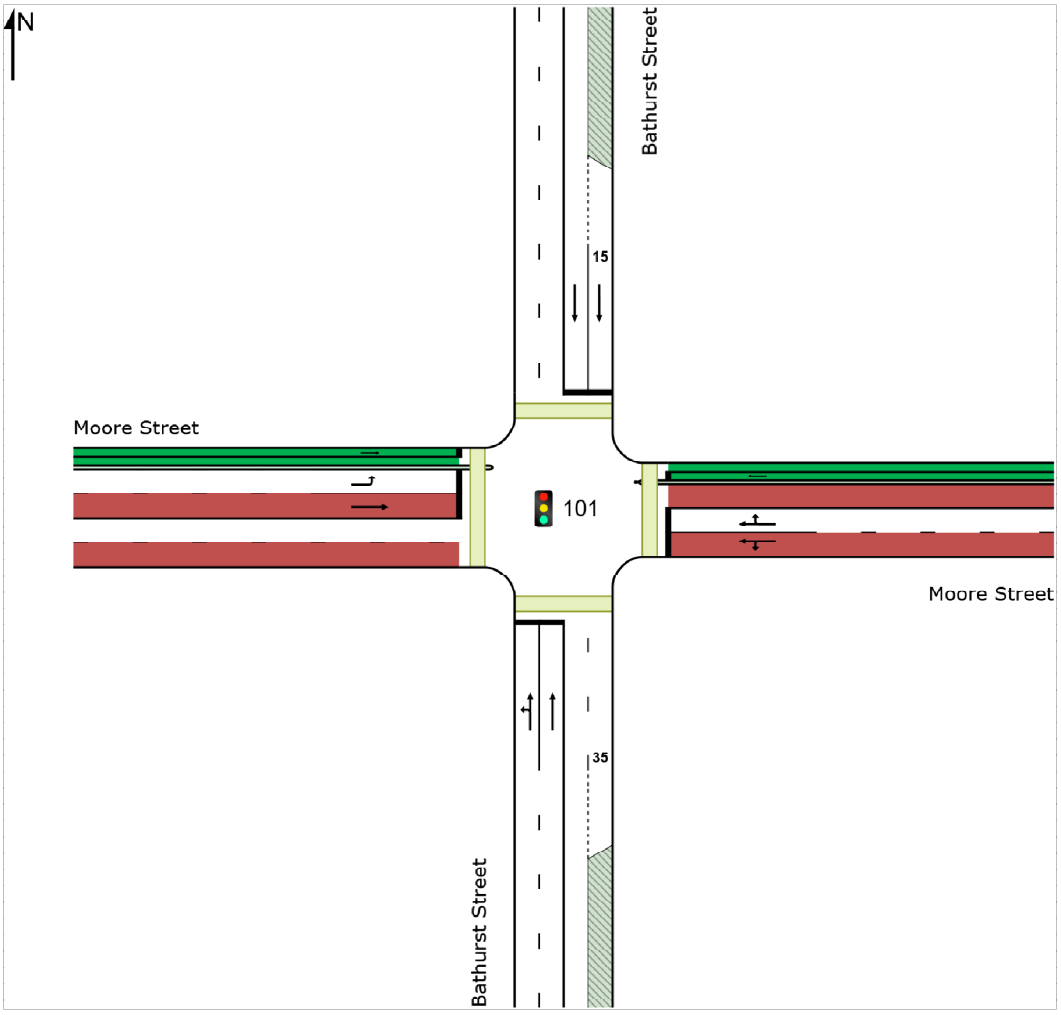
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 101 [3315 Moore Street / Bathurst Street AM (Site Folder: With changes)]

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

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

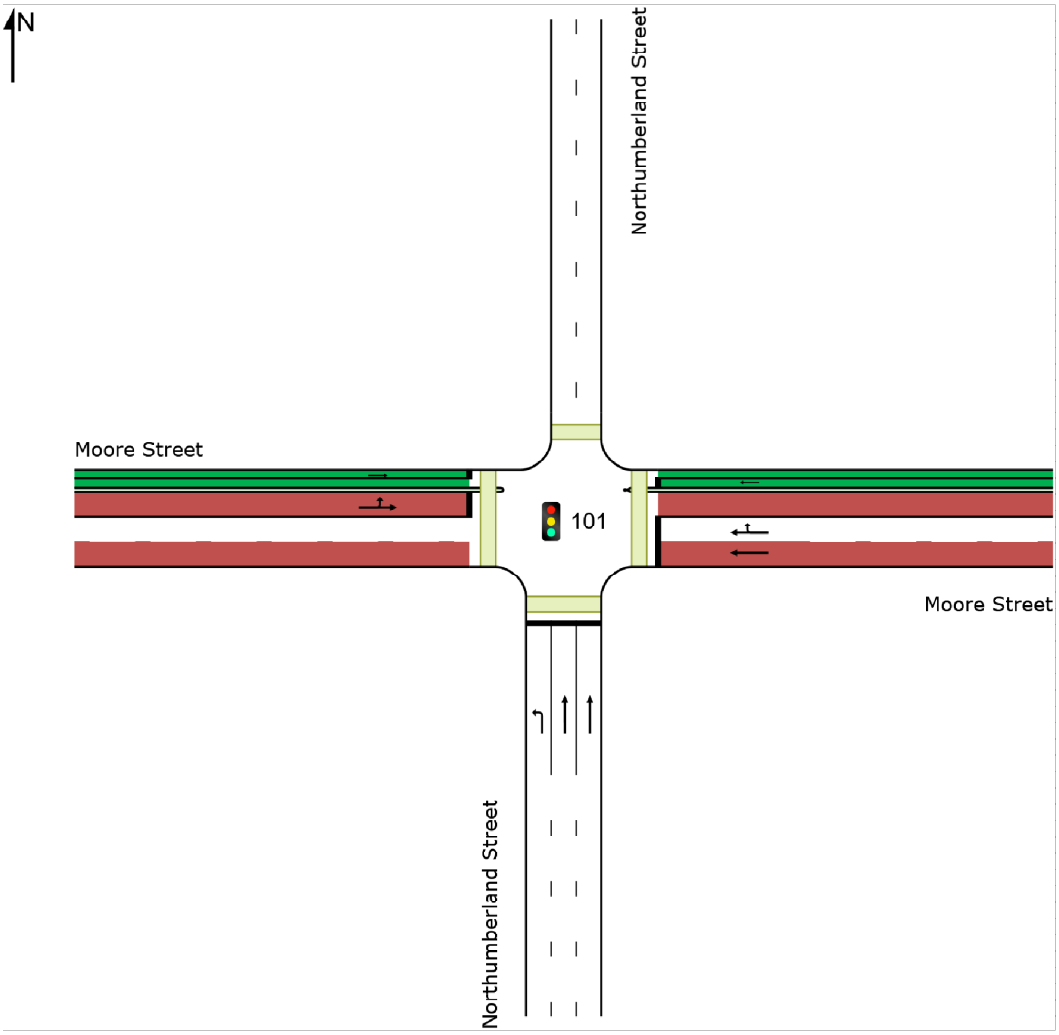


SITE LAYOUT

Site: 101 [2822 Moore Street / Northumberland Street AM (Site Folder: With changes)]

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

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

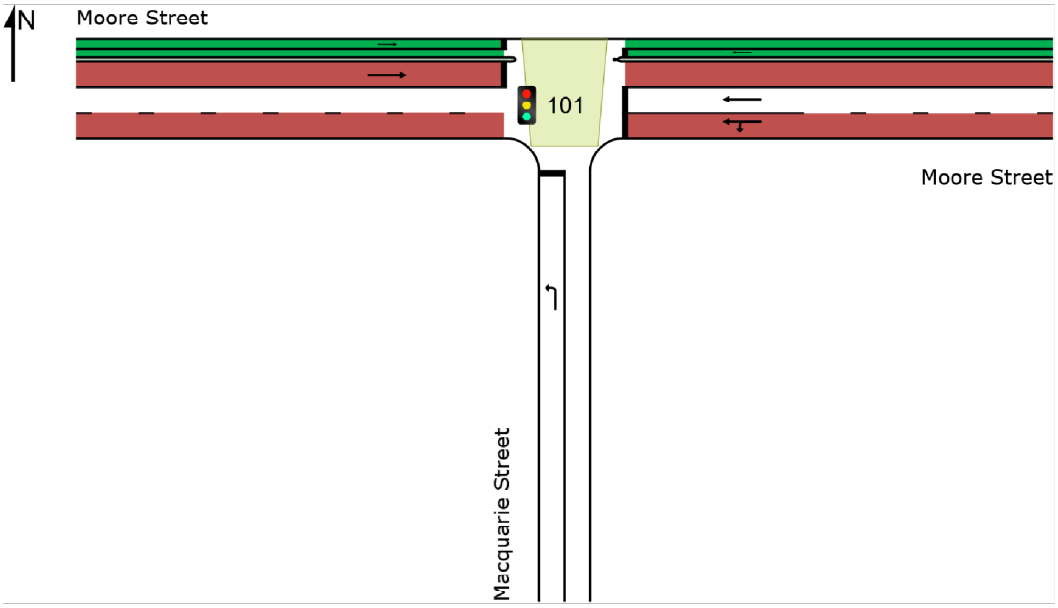


SITE LAYOUT

Site: 101 [877 Moore Street / Macquarie Street AM (Site Folder: With changes)]

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

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

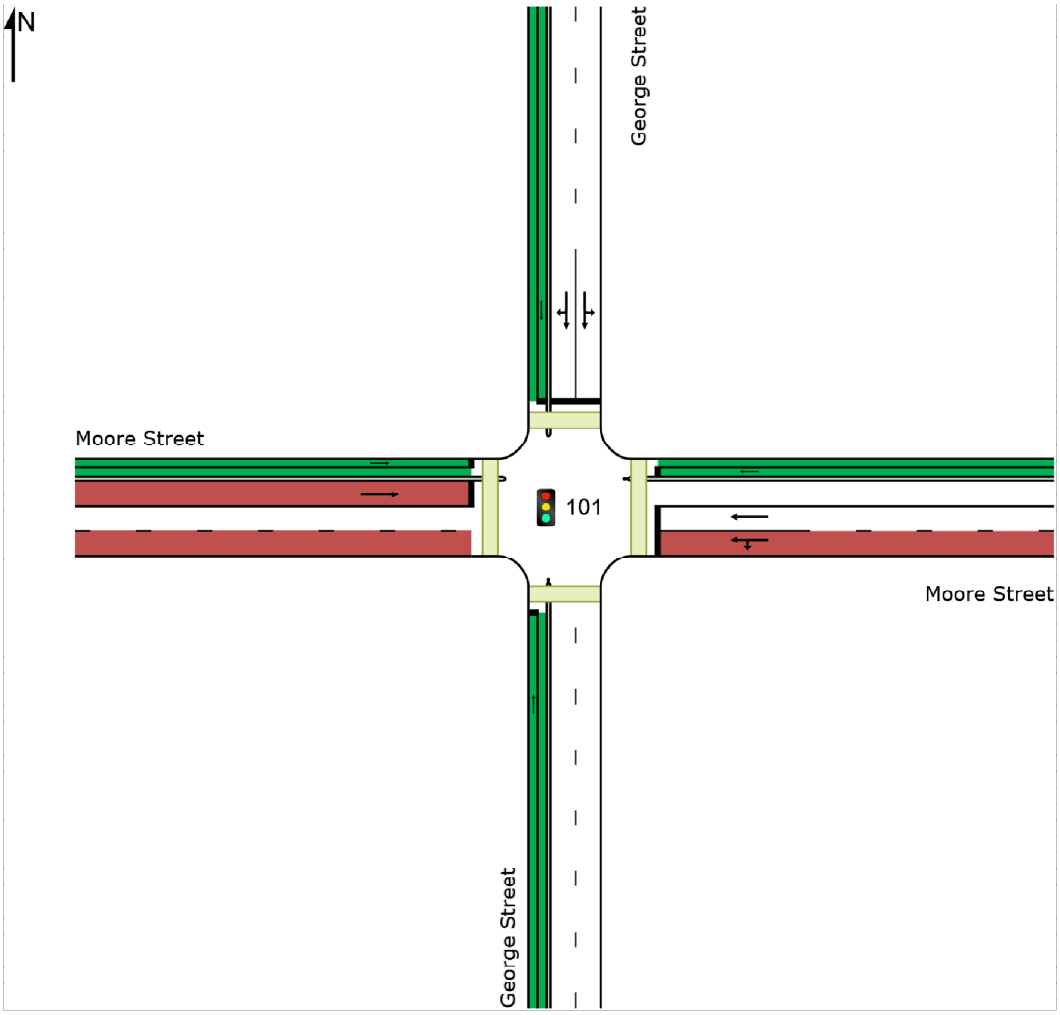


SITE LAYOUT

Site: 101 [1482 George Street / Moore Street AM (Site Folder: With changes)]

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

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

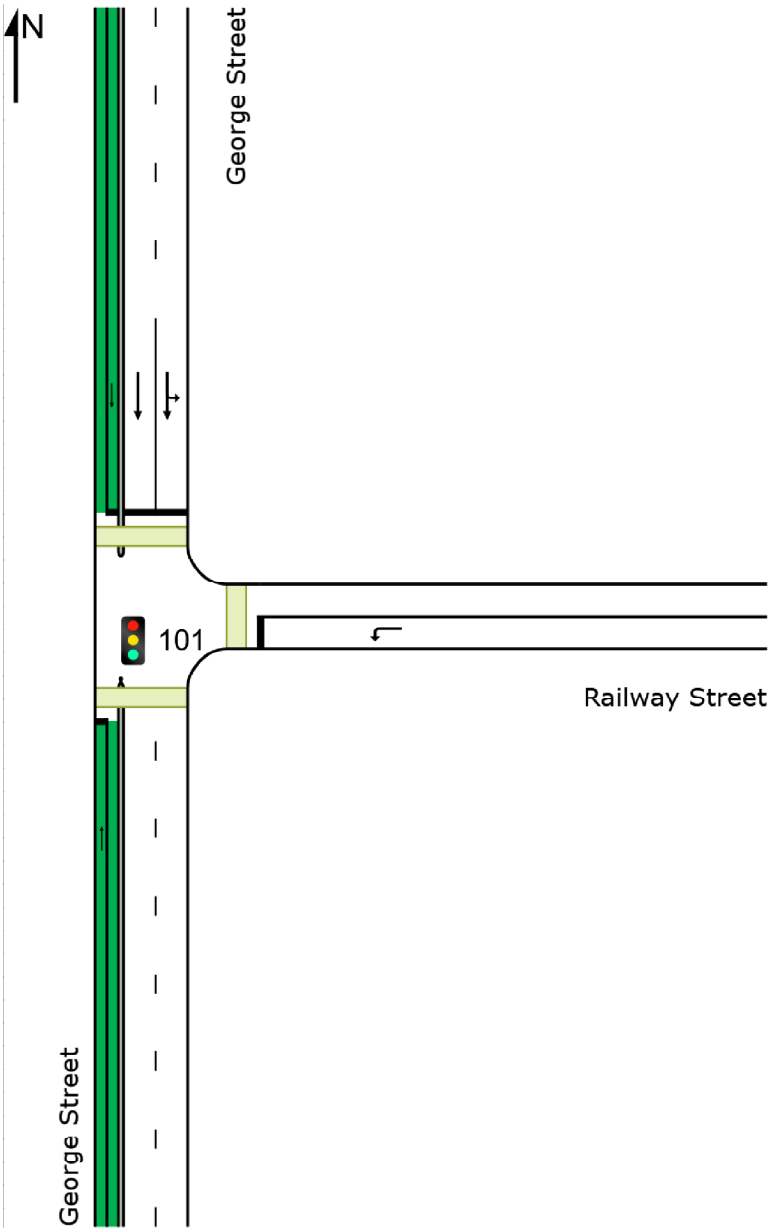


SITE LAYOUT

Site: 101 [1017 George Street / Railway Street AM (Site Folder: With changes)]

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

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

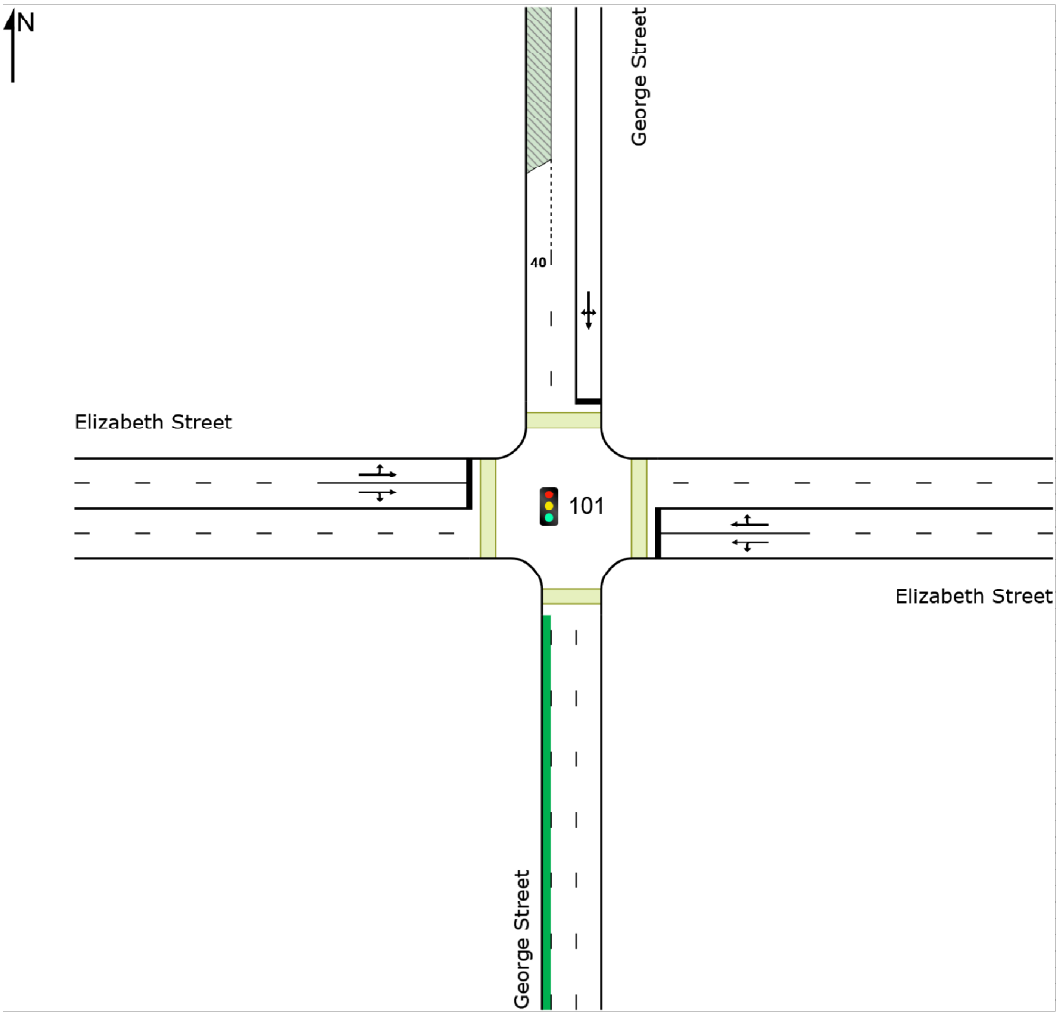


SITE LAYOUT

Site: 101 [1004 George Street / Elizabeth Street AM (Site Folder: With changes)]

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

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



SITE LAYOUT

Site: 101 [Moore Street / Castlereagh Street AM (Site Folder: With changes)]

New Site
Site Category: (None)
Stop (Two-Way)

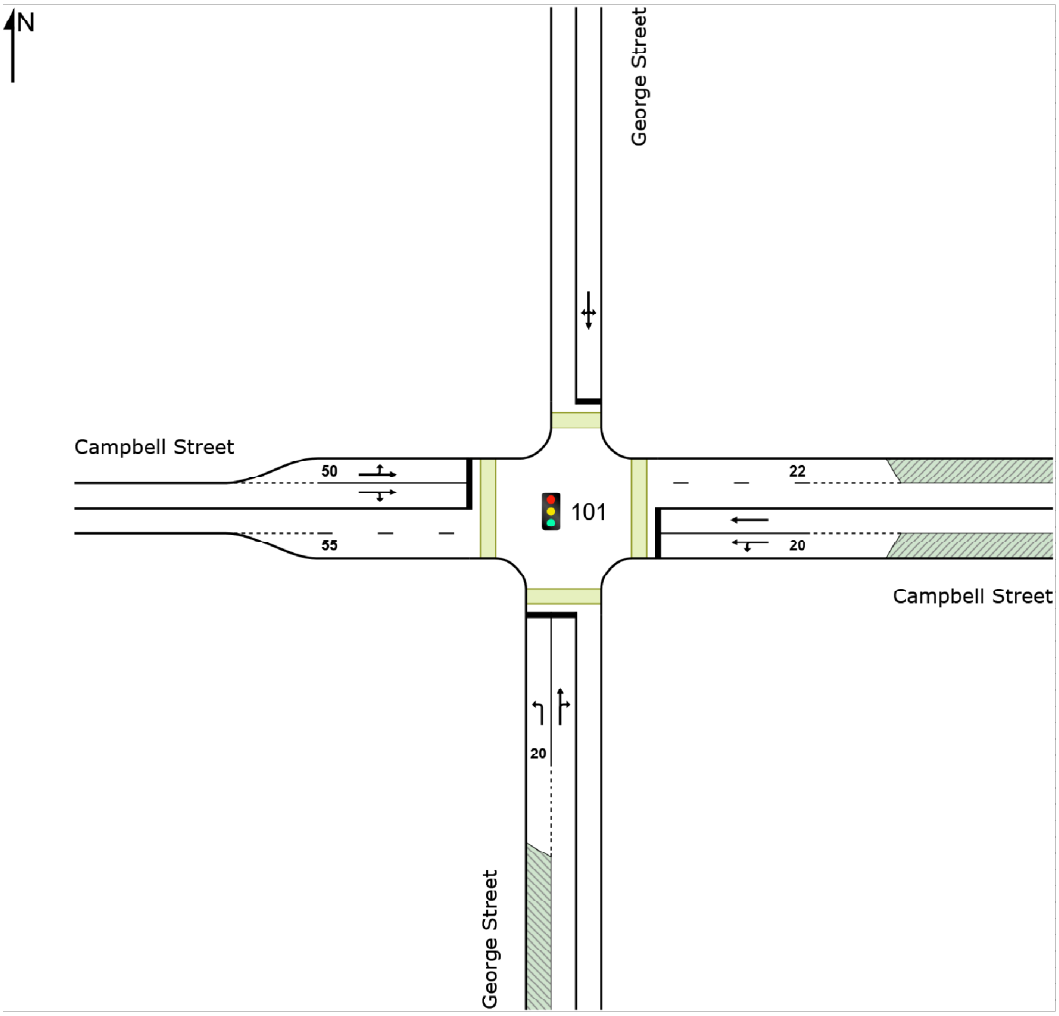
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

SITE LAYOUT

Site: 101 [2869 George Street / Campbell Street AM (Site Folder: With changes)]

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

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

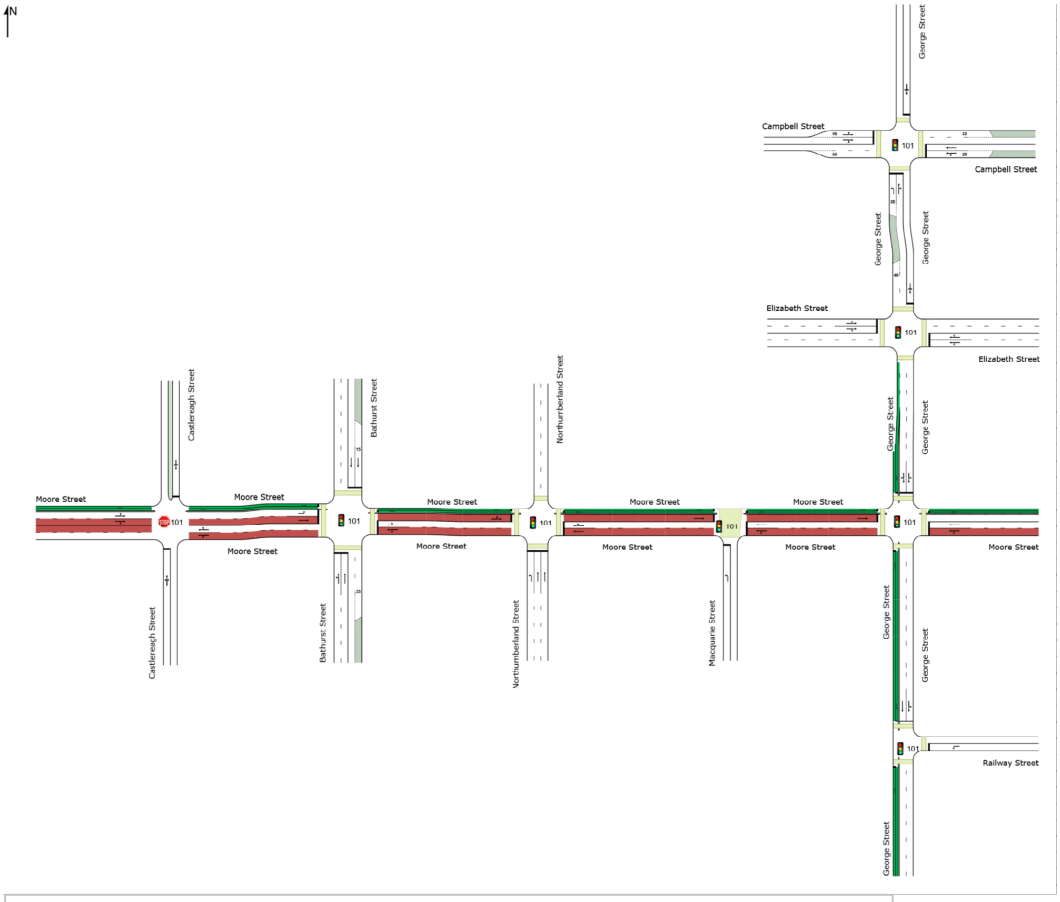


NETWORK LAYOUT

Network: N101 [AM Peak (Network Folder: With changes)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	3315 Moore Street / Bathurst Street AM
101	NA	2822 Moore Street / Northumberland Street AM
101	NA	877 Moore Street / Macquarie Street AM
101	NA	1482 George Street / Moore Street AM
101	NA	1017 George Street / Railway Street AM
101	NA	1004 George Street / Elizabeth Street AM
101	NA	Moore Street / Castlereagh Street AM
101	NA	2869 George Street / Campbell Street AM

MOVEMENT SUMMARY

Site: 101 [877 Moore Street / Macquarie Street AM (Site Folder: With changes)] **Network: N101 [AM Peak (Network Folder: With changes)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Macquarie Street														
1	L2	107	2.9	107	2.9	*0.204	32.3	LOS C	4.0	28.4	0.79	0.73	0.79	15.9
Approach		107	2.9	107	2.9	0.204	32.3	LOS C	4.0	28.4	0.79	0.73	0.79	15.9
East: Moore Street														
4	L2	51	0.0	51	0.0	0.142	25.2	LOS B	2.6	24.4	0.69	0.64	0.69	21.2
5	T1	229	14.7	229	14.7	*0.198	17.9	LOS B	4.7	33.4	0.61	0.50	0.61	12.1
Approach		280	12.0	280	12.0	0.198	19.2	LOS B	4.7	33.4	0.62	0.53	0.62	14.8
West: Moore Street														
11	T1	74	28.6	74	28.6	0.047	8.7	LOS A	0.7	1.8	0.39	0.29	0.39	18.1
Approach		74	28.6	74	28.6	0.047	8.7	LOS A	0.7	8.4	0.39	0.29	0.39	18.1
All Vehicles		461	12.6	461	12.6	0.204	20.6	LOS B	4.7	33.4	0.63	0.54	0.63	15.5

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Pedestrian Movements (Diagonal)											
PD	Diagonal	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

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: 101 [3315 Moore Street / Bathurst Street AM (Site Folder: With changes)] **Network: N101 [AM Peak (Network Folder: With changes)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Bathurst Street														
1	L2	37	0.0	37	0.0	* 0.373	18.7	LOS B	10.6	75.8	0.59	0.53	0.59	29.7
2	T1	774	2.7	774	2.7	0.373	12.4	LOS A	10.7	76.7	0.59	0.52	0.59	37.0
Approach		811	2.6	811	2.6	0.373	12.7	LOS A	10.7	76.7	0.59	0.52	0.59	36.8
East: Moore Street														
4	L2	53	2.0	53	2.0	0.163	32.7	LOS C	2.7	23.7	0.78	0.69	0.78	20.8
5	T1	145	17.4	145	17.4	* 0.254	36.4	LOS C	3.8	27.6	0.90	0.70	0.90	7.6
6	R2	21	0.0	21	0.0	0.254	54.4	LOS D	3.8	27.6	0.87	0.70	0.87	19.2
Approach		219	12.0	219	12.0	0.254	37.2	LOS C	3.8	27.6	0.87	0.70	0.87	12.5
North: Bathurst Street														
8	T1	482	1.1	482	1.1	0.393	19.4	LOS B	9.5	67.4	0.57	0.49	0.57	37.5
Approach		482	1.1	482	1.1	0.393	19.4	LOS B	9.5	67.4	0.57	0.49	0.57	37.5
West: Moore Street														
10	L2	105	7.0	105	7.0	* 0.372	46.2	LOS D	4.7	35.0	0.94	0.78	0.94	17.0
11	T1	84	37.5	84	37.5	0.142	40.5	LOS C	2.4	6.6	0.89	0.66	0.89	7.5
Approach		189	20.6	189	20.6	0.372	43.7	LOS D	4.7	35.0	0.92	0.73	0.92	13.6
All Vehicles		1701	5.4	1701	5.4	0.393	21.2	LOS B	10.7	76.7	0.65	0.56	0.65	30.4

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Bathurst Street											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
East: Moore Street											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
North: Bathurst Street											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
West: Moore Street											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

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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Project: C:\Users\Gabi.Mcerlane\Downloads\20250128_LCC_model v3 (1).sip9

MOVEMENT SUMMARY

Site: 101 [2822 Moore Street / Northumberland Street AM (Site Folder: With changes)]

Network: N101 [AM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Northumberland Street														
1	L2	58	5.5	58	5.5	0.154	38.5	LOS C	2.3	17.1	0.85	0.72	0.85	15.0
2	T1	233	2.3	233	2.3	* 0.252	33.3	LOS C	4.6	33.0	0.85	0.68	0.85	23.0
Approach		291	2.9	291	2.9	0.252	34.4	LOS C	4.6	33.0	0.85	0.69	0.85	21.7
East: Moore Street														
5	T1	157	14.8	157	14.8	* 0.251	21.9	LOS B	5.2	38.7	0.70	0.60	0.70	10.3
6	R2	105	12.0	105	12.0	* 0.251	22.9	LOS B	5.2	38.7	0.61	0.62	0.61	25.1
Approach		262	13.7	262	13.7	0.251	22.3	LOS B	5.2	38.7	0.66	0.61	0.66	17.4
West: Moore Street														
10	L2	11	100.0	11	100.0	0.054	22.6	LOS B	0.8	9.8	0.53	0.47	0.53	26.7
11	T1	74	28.6	74	28.6	0.121	36.3	LOS C	2.4	6.5	0.84	0.63	0.84	7.6
Approach		84	37.5	84	37.5	0.121	34.6	LOS C	2.4	9.8	0.80	0.61	0.80	9.9
All Vehicles		637	11.9	637	11.9	0.252	29.4	LOS C	5.2	38.7	0.77	0.65	0.77	19.1

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Northumberland Street											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
East: Moore Street											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
North: Northumberland Street											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
West: Moore Street											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

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: 101 [1482 George Street / Moore Street AM (Site Folder: With changes)] **Network: N101 [AM Peak (Network Folder: With changes)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
2	T1	53	0.0	53	0.0	0.014	7.5	LOS A	0.9	2.5	0.40	0.30	0.40	26.0
Approach		53	0.0	53	0.0	0.014	7.5	LOS A	0.9	2.5	0.40	0.30	0.40	26.0
East: Moore Street														
7	L2	46	22.7	46	22.7	*0.214	35.3	LOS C	3.0	31.0	0.82	0.70	0.82	12.8
8	T1	188	19.6	188	19.6	0.214	30.6	LOS C	4.0	29.2	0.81	0.64	0.81	13.1
Approach		235	20.2	235	20.2	0.214	31.6	LOS C	4.0	31.0	0.81	0.65	0.81	13.0
North: George Street														
4	L2	95	12.2	95	12.2	0.215	12.3	LOS A	5.1	37.8	0.47	0.49	0.47	30.8
5	T1	352	3.0	352	3.0	*0.215	8.6	LOS A	5.1	37.8	0.46	0.46	0.46	27.3
6	R2	73	1.4	73	1.4	0.215	12.3	LOS A	4.7	33.8	0.47	0.48	0.47	27.9
Approach		519	4.5	519	4.5	0.215	9.8	LOS A	5.1	37.8	0.46	0.47	0.46	28.2
West: Moore Street														
2	T1	74	28.6	74	28.6	0.069	29.2	LOS C	1.8	5.0	0.78	0.57	0.78	16.0
Approach		74	28.6	74	28.6	0.069	29.2	LOS C	1.8	10.2	0.78	0.57	0.78	16.0
All Vehicles		880	10.4	880	10.4	0.215	17.1	LOS B	5.1	37.8	0.58	0.52	0.58	22.0

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
East: Moore Street											
P2	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
North: George Street											
P3	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
West: Moore Street											
P4	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
All Pedestrians		4	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01

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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Project: C:\Users\Gabi.Mcerlane\Downloads\20250128_LCC_model v3 (1).sip9

MOVEMENT SUMMARY

Site: 101 [1017 George Street / Railway Street AM (Site Folder: With changes)]

Network: N101 [AM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
2	T1	53	0.0	53	0.0	0.009	0.3	LOS A	0.2	0.5	0.08	0.06	0.08	29.2
Approach		53	0.0	53	0.0	0.009	0.3	LOS A	0.2	0.5	0.08	0.06	0.08	29.2
East: Railway Street														
7	L2	120	4.4	120	4.4	*0.202	29.3	LOS C	4.2	30.5	0.76	0.72	0.76	17.4
Approach		120	4.4	120	4.4	0.202	29.3	LOS C	4.2	30.5	0.76	0.72	0.76	17.4
North: George Street														
4	L2	111	0.0	111	0.0	0.206	4.2	LOS A	5.1	37.1	0.56	0.58	0.56	25.4
5	T1	346	7.3	346	7.3	*0.206	15.1	LOS B	5.1	37.1	0.49	0.44	0.49	25.0
Approach		457	5.5	457	5.5	0.206	12.5	LOS A	5.1	38.5	0.51	0.47	0.51	25.1
All Vehicles		629	4.8	629	4.8	0.206	14.7	LOS B	5.1	38.5	0.52	0.49	0.52	23.1

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
East: Railway Street											
P2	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
North: George Street											
P3	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
All Pedestrians		3	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01

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: 101 [1004 George Street / Elizabeth Street AM (Site Folder: With changes)]

Network: N101 [AM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Elizabeth Street														
7	L2	80	7.9	80	7.9	0.212	14.7	LOS B	4.7	34.8	0.55	0.54	0.55	22.3
8	T1	147	4.3	147	4.3	*0.212	11.2	LOS A	4.7	34.8	0.55	0.55	0.55	25.7
9	R2	83	2.5	83	2.5	0.212	17.7	LOS B	2.5	17.6	0.59	0.65	0.59	19.3
Approach		311	4.7	311	4.7	0.212	13.9	LOS A	4.7	34.8	0.56	0.58	0.56	23.3
North: George Street														
4	L2	52	2.0	52	2.0	0.821	42.9	LOS D	18.1	130.4	1.00	0.98	1.16	18.9
5	T1	259	5.3	259	5.3	*0.821	39.5	LOS C	18.1	130.4	1.00	0.98	1.16	14.5
6	R2	82	0.0	82	0.0	0.821	42.9	LOS D	18.1	130.4	1.00	0.98	1.16	17.0
Approach		393	3.8	393	3.8	0.821	40.6	LOS C	18.1	130.4	1.00	0.98	1.16	15.7
West: Elizabeth Street														
1	L2	236	0.4	236	0.4	0.348	12.6	LOS A	8.4	61.1	0.53	0.59	0.53	17.7
2	T1	296	10.3	296	10.3	0.348	9.6	LOS A	8.4	61.1	0.55	0.60	0.55	26.6
3	R2	139	2.3	139	2.3	*0.348	13.9	LOS A	6.2	45.7	0.57	0.60	0.57	16.8
Approach		671	5.2	671	5.2	0.348	11.6	LOS A	8.4	61.1	0.54	0.60	0.54	22.7
All Vehicles		1374	4.7	1374	4.7	0.821	20.4	LOS B	18.1	130.4	0.68	0.70	0.72	19.4

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04
East: Elizabeth Street											
P2	Full	1	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04
North: George Street											
P3	Full	1	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04
West: Elizabeth Street											
P4	Full	1	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04
All Pedestrians		4	39.2	LOS D	0.0	0.0	0.93	0.93	193.0	200.0	1.04

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: 101 [Moore Street / Castlereagh Street AM (Site Folder: With changes)]

Network: N101 [AM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Castlereagh Street														
1	L2	6	0.0	6	0.0	0.106	7.4	LOS A	0.4	2.7	0.02	0.98	0.02	36.0
2	T1	26	0.0	26	0.0	0.106	8.5	LOS A	0.4	2.7	0.02	0.98	0.02	39.3
3	R2	16	0.0	16	0.0	0.106	7.8	LOS A	0.4	2.7	0.02	0.98	0.02	34.9
Approach		48	0.0	48	0.0	0.106	8.1	LOS A	0.4	2.7	0.02	0.98	0.02	37.9
East: Moore Street														
4	L2	18	0.0	18	0.0	0.010	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	39.8
5	T1	152	22.9	152	22.9	0.121	0.0	LOS A	0.4	3.2	0.12	0.17	0.12	36.8
6	R2	51	4.2	51	4.2	0.121	7.0	LOS A	0.4	3.2	0.18	0.25	0.18	42.2
Approach		220	16.7	220	16.7	0.121	2.0	NA	0.4	3.2	0.12	0.22	0.12	38.8
North: Castlereagh Street														
7	L2	12	0.0	12	0.0	0.071	7.6	LOS A	0.3	1.8	0.29	0.85	0.29	32.1
8	T1	21	0.0	21	0.0	0.071	13.0	LOS A	0.3	1.8	0.29	0.85	0.29	37.1
9	R2	5	0.0	5	0.0	0.071	13.6	LOS A	0.3	1.8	0.29	0.85	0.29	33.8
Approach		38	0.0	38	0.0	0.071	11.4	LOS A	0.3	1.8	0.29	0.85	0.29	35.6
West: Moore Street														
10	L2	13	0.0	13	0.0	0.079	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	45.4
11	T1	164	27.6	164	27.6	0.079	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	39.1
12	R2	19	0.0	19	0.0	0.021	5.3	LOS A	0.1	0.5	0.25	0.51	0.25	38.7
Approach		196	23.1	196	23.1	0.079	0.8	NA	0.1	0.5	0.02	0.09	0.02	39.9
All Vehicles		502	16.4	502	16.4	0.121	2.8	NA	0.4	3.2	0.09	0.29	0.09	38.4

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

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MOVEMENT SUMMARY

Site: 101 [2869 George Street / Campbell Street AM (Site Folder: With changes)]

Network: N101 [AM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
1	L2	97	1.1	97	1.1	0.108	15.7	LOS B	2.0	14.3	0.57	0.65	0.57	26.2
2	T1	84	0.0	84	0.0	0.212	19.4	LOS B	3.3	23.6	0.75	0.64	0.75	27.0
3	R2	34	6.3	34	6.3	0.212	26.9	LOS B	3.3	23.6	0.75	0.64	0.75	24.9
Approach		215	1.5	215	1.5	0.212	18.9	LOS B	3.3	23.6	0.67	0.65	0.67	26.4
East: Campbell Street														
7	L2	98	12.9	98	12.9	0.159	26.1	LOS B	2.6	20.2	0.71	0.70	0.71	16.7
8	T1	226	0.0	226	0.0	*0.356	24.1	LOS B	6.5	45.5	0.78	0.65	0.78	21.6
Approach		324	3.9	324	3.9	0.356	24.7	LOS B	6.5	45.5	0.76	0.66	0.76	20.3
North: George Street														
4	L2	16	0.0	16	0.0	0.377	24.3	LOS B	6.8	47.9	0.79	0.69	0.79	24.7
5	T1	174	0.0	174	0.0	*0.377	20.6	LOS B	6.8	47.9	0.79	0.69	0.79	20.4
6	R2	42	0.0	42	0.0	0.377	27.4	LOS B	6.8	47.9	0.79	0.69	0.79	22.9
Approach		232	0.0	232	0.0	0.377	22.1	LOS B	6.8	47.9	0.79	0.69	0.79	21.3
West: Campbell Street														
1	L2	91	0.0	91	0.0	0.096	14.1	LOS A	1.8	12.7	0.54	0.64	0.54	26.9
2	T1	178	0.0	178	0.0	0.455	13.8	LOS A	8.0	56.4	0.76	0.68	0.76	23.0
3	R2	120	1.8	120	1.8	*0.455	22.9	LOS B	8.0	56.4	0.76	0.68	0.76	13.9
Approach		388	0.5	388	0.5	0.455	16.7	LOS B	8.0	56.4	0.71	0.67	0.71	22.1
All Vehicles		1159	1.5	1159	1.5	0.455	20.4	LOS B	8.0	56.4	0.73	0.67	0.73	22.5

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
East: Campbell Street											
P2	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
North: George Street											
P3	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: Campbell Street											

P4 Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians	4	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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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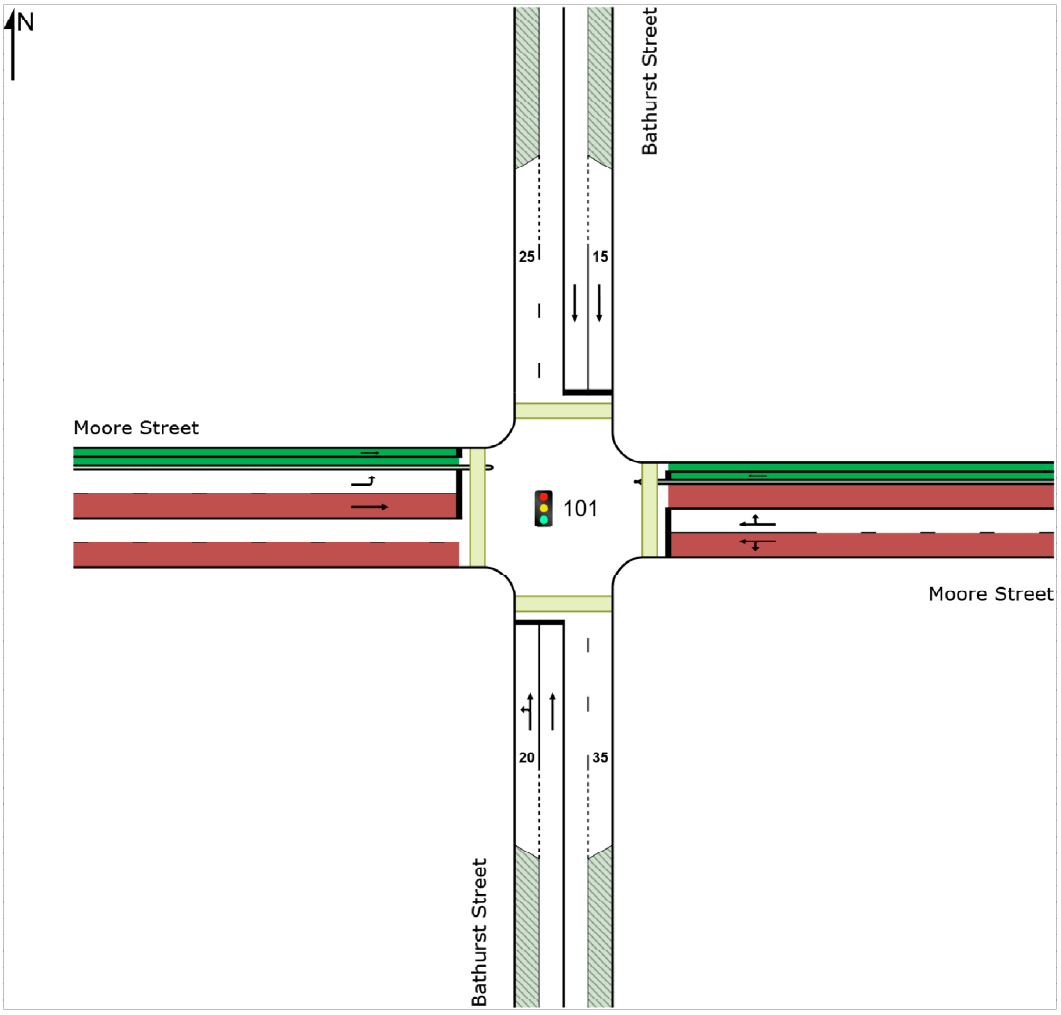
SITE LAYOUT

Site: 101 [3315 Moore Street / Bathurst Street PM (Site Folder: With changes)]

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

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

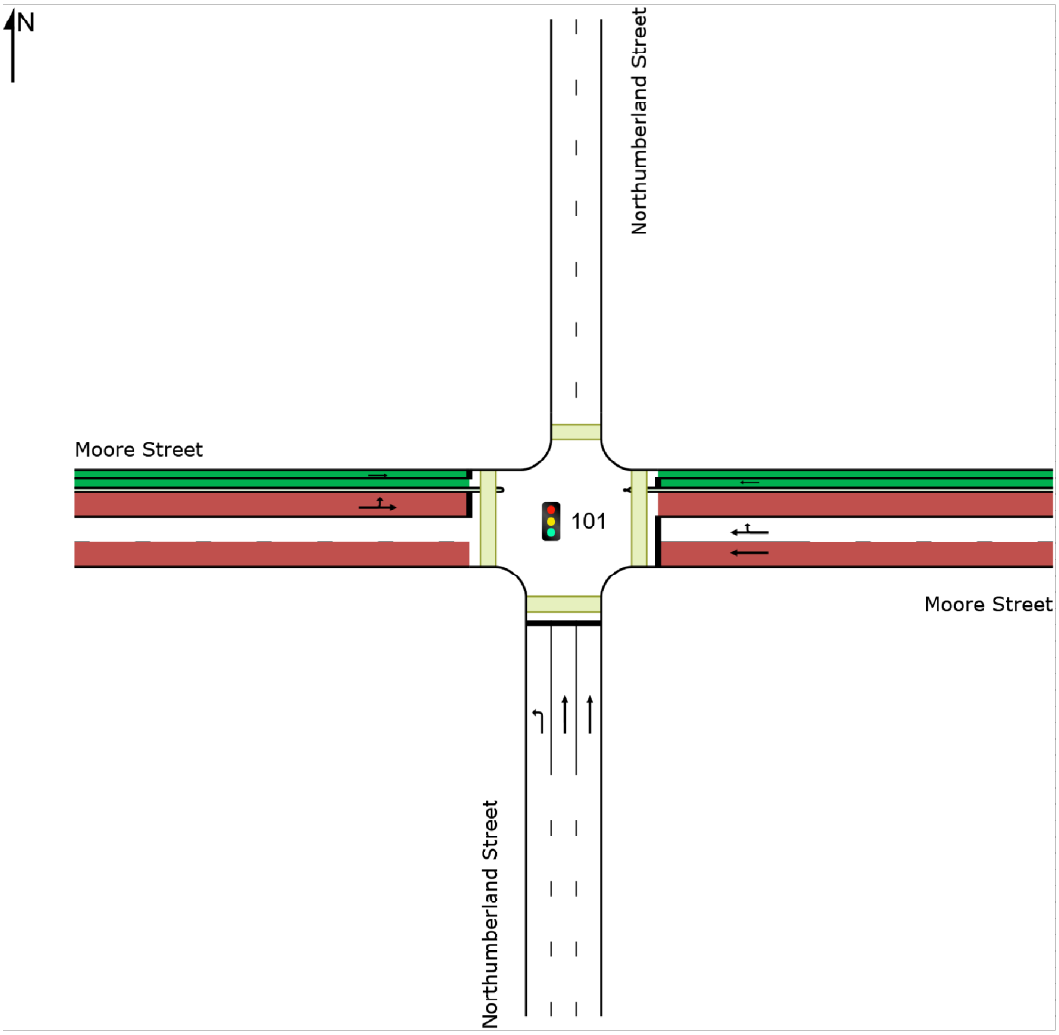


SITE LAYOUT

Site: 101 [2822 Moore Street / Northumberland Street PM (Site Folder: With changes)]

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

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



SITE LAYOUT

Site: 101 [877 Moore Street / Macquarie Street PM (Site Folder: With changes)]

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

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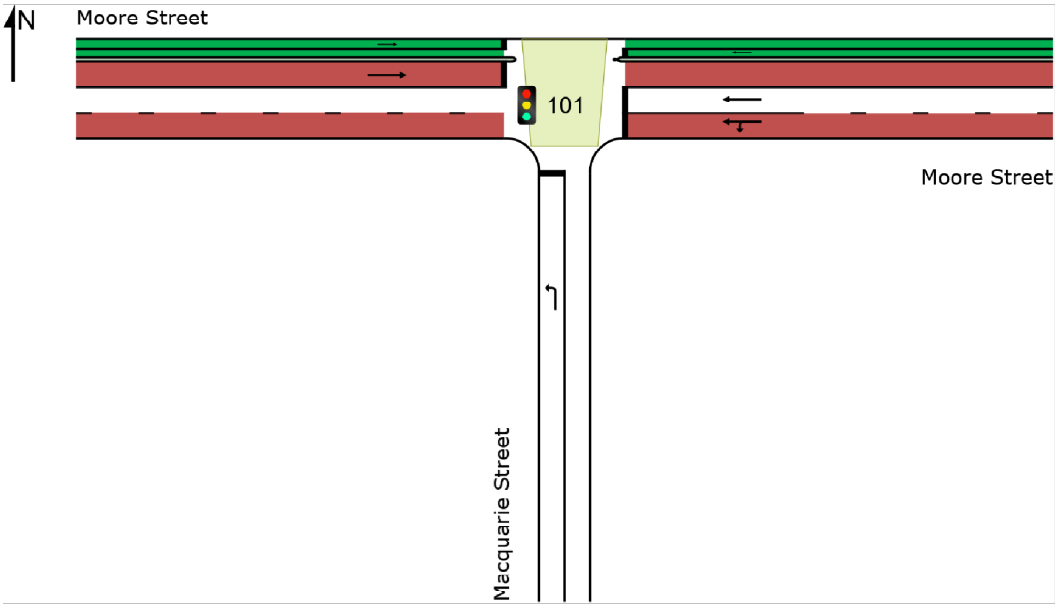

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SITE LAYOUT

Site: 101 [1482 George Street / Moore Street PM (Site Folder: With changes)]

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

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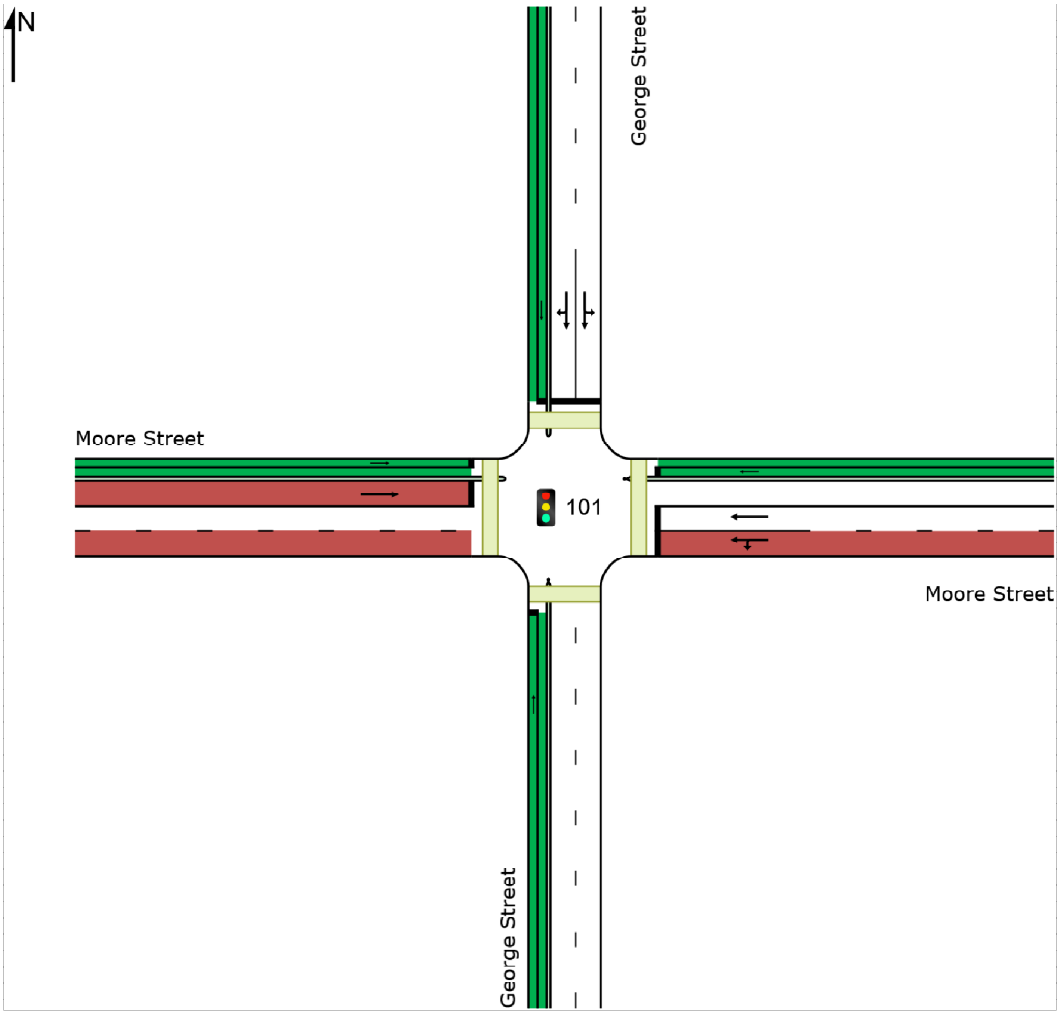
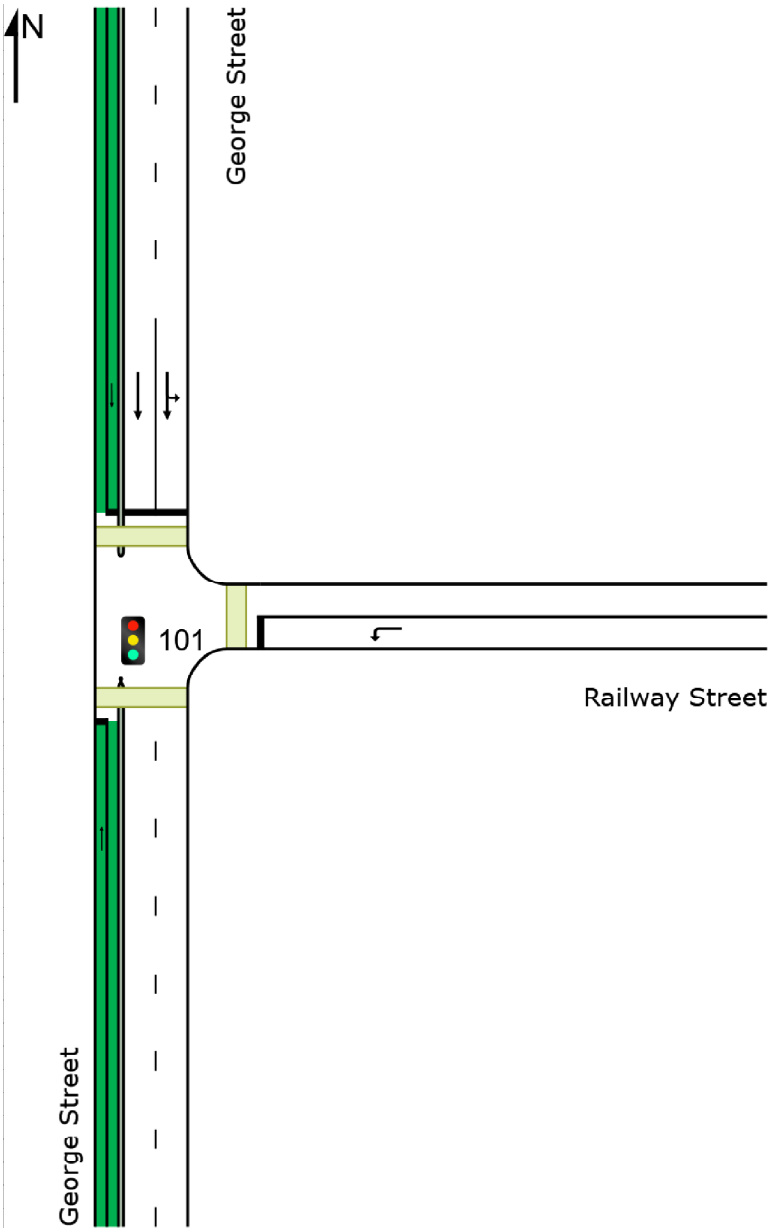


SITE LAYOUT

Site: 101 [1017 George Street / Railway Street PM (Site Folder: With changes)]

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

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

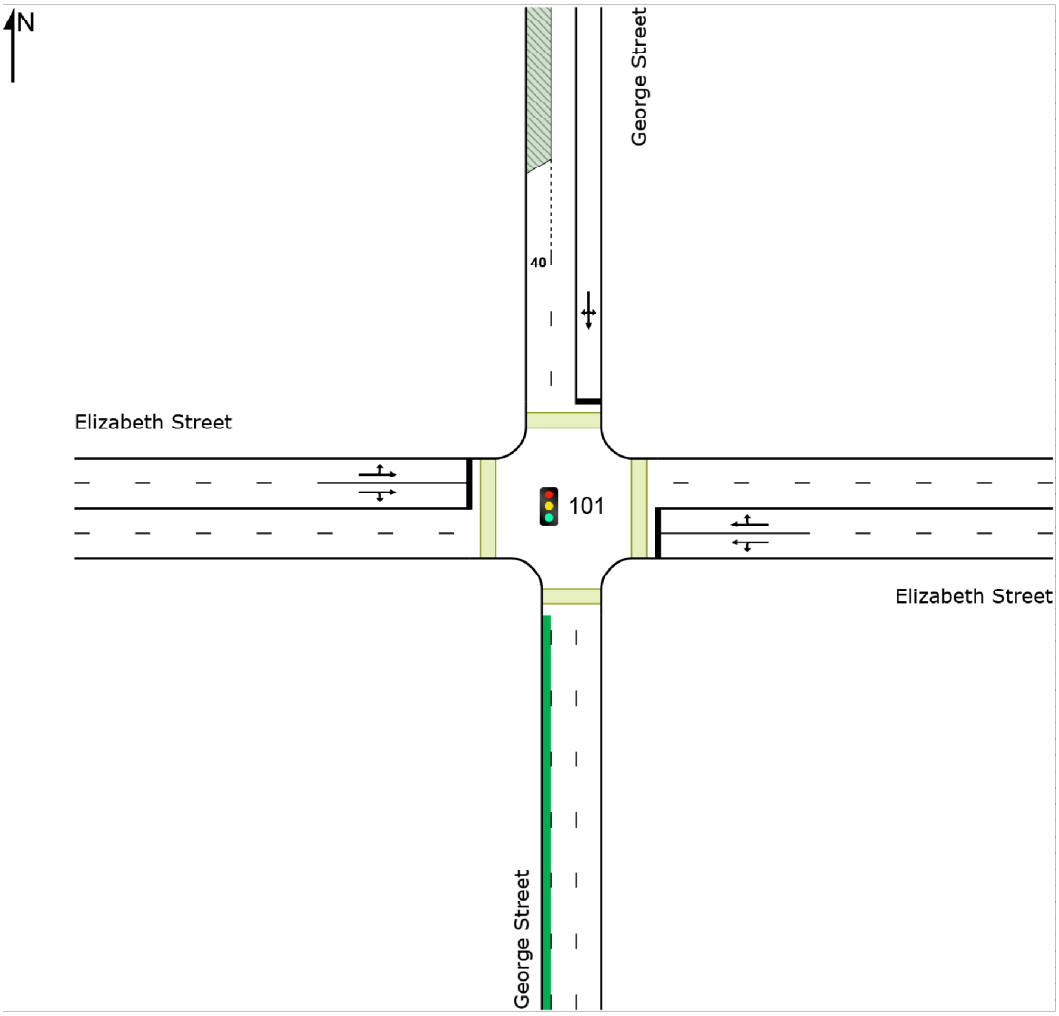


SITE LAYOUT

Site: 101 [1004 George Street / Elizabeth Street PM (Site Folder: With changes)]

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

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



SITE LAYOUT

Site: 101 [Moore Street / Castlereagh Street PM (Site Folder: With changes)]

New Site
Site Category: (None)
Stop (Two-Way)

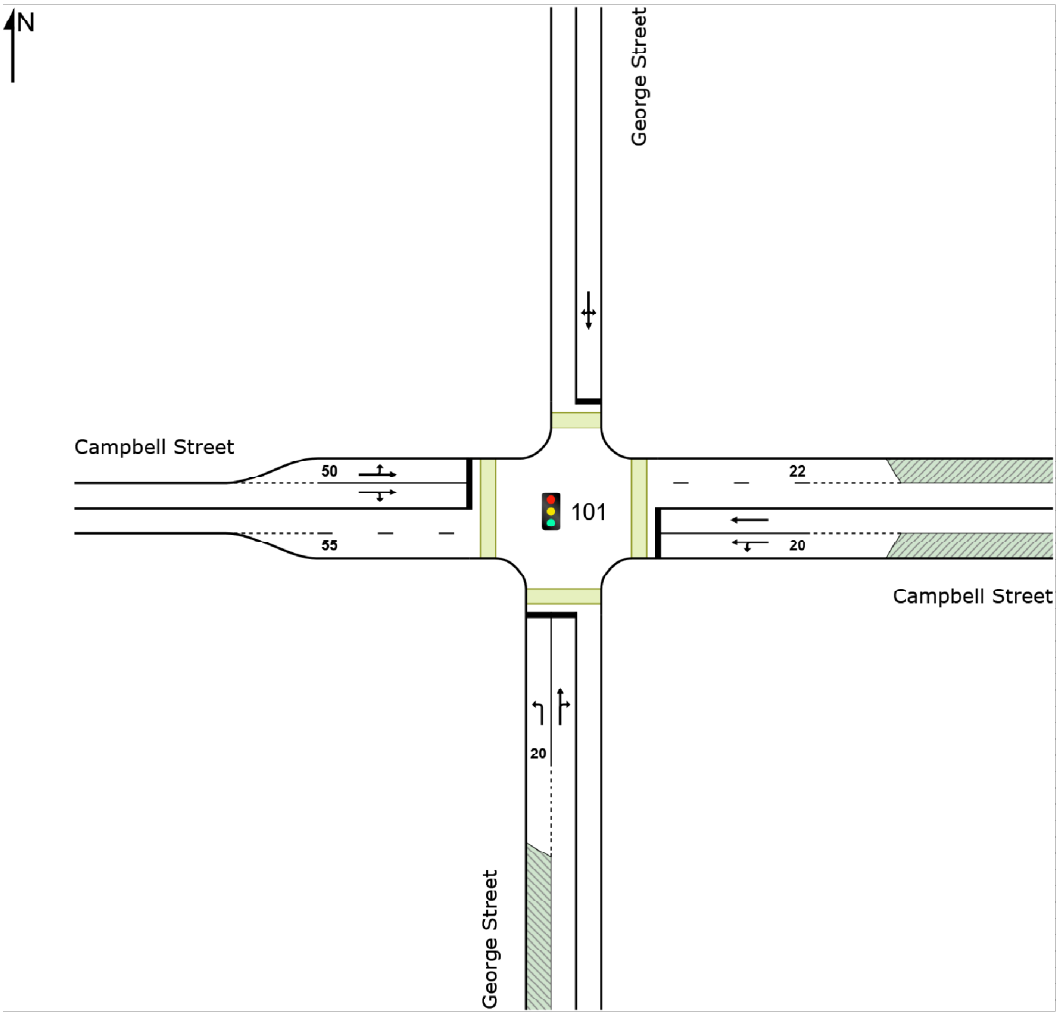
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

SITE LAYOUT

Site: 101 [2869 George Street / Campbell Street PM (Site Folder: With changes)]

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

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

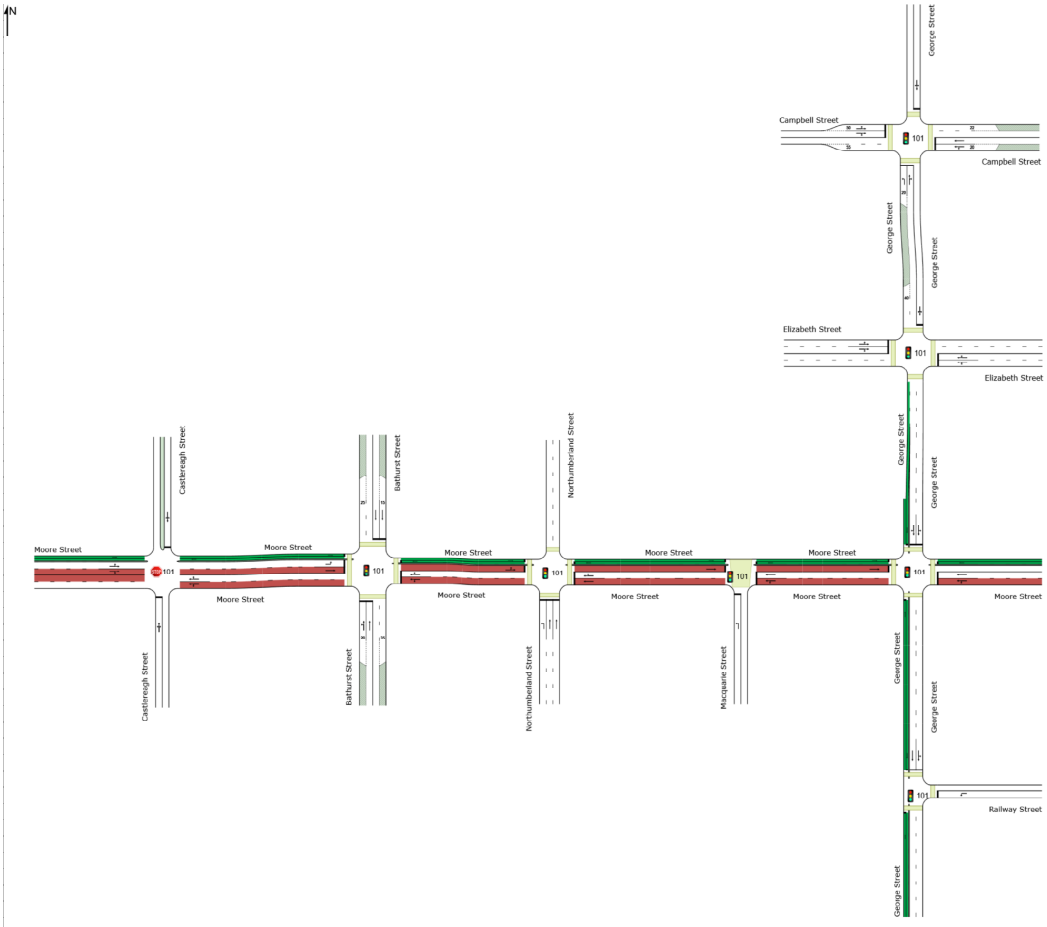


NETWORK LAYOUT

Network: N101 [PM Peak (Network Folder: With changes)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	3315 Moore Street / Bathurst Street PM
101	NA	2822 Moore Street / Northumberland Street PM
101	NA	877 Moore Street / Macquarie Street PM
101	NA	1482 George Street / Moore Street PM
101	NA	1017 George Street / Railway Street PM
101	NA	1004 George Street / Elizabeth Street PM
101	NA	Moore Street / Castlereagh Street PM
101	NA	2869 George Street / Campbell Street PM

MOVEMENT SUMMARY

Site: 101 [3315 Moore Street / Bathurst Street PM (Site Folder: With changes)] **Network: N101 [PM Peak (Network Folder: With changes)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Bathurst Street														
1	L2	39	0.0	39	0.0	0.145	24.0	LOS B	3.5	24.5	0.48	0.46	0.48	31.7
2	T1	672	1.3	672	1.3	* 0.583	21.8	LOS B	16.5	116.9	0.64	0.58	0.64	36.7
Approach		711	1.2	711	1.2	0.583	21.9	LOS B	16.5	116.9	0.63	0.57	0.63	36.5
East: Moore Street														
4	L2	98	0.0	98	0.0	0.299	35.6	LOS C	5.1	43.0	0.84	0.74	0.84	19.8
5	T1	307	12.0	307	12.0	* 0.574	36.3	LOS C	11.0	78.4	0.93	0.77	0.93	7.9
6	R2	28	0.0	28	0.0	* 0.574	57.5	LOS E	11.0	78.4	0.93	0.79	0.93	18.9
Approach		434	8.5	434	8.5	0.574	37.5	LOS C	11.0	78.4	0.91	0.76	0.91	12.0
North: Bathurst Street														
8	T1	628	1.0	628	1.0	0.508	20.6	LOS B	13.0	91.9	0.59	0.51	0.59	37.6
Approach		628	1.0	628	1.0	0.508	20.6	LOS B	13.0	91.9	0.59	0.51	0.59	37.6
West: Moore Street														
10	L2	80	25.0	80	25.0	0.195	36.2	LOS C	3.1	26.1	0.82	0.74	0.82	19.7
11	T1	74	28.6	74	28.6	0.142	42.7	LOS D	2.4	6.6	0.91	0.67	0.91	7.1
Approach		154	26.7	154	26.7	0.195	39.3	LOS C	3.1	26.1	0.86	0.71	0.86	14.1
All Vehicles		1926	4.8	1926	4.8	0.583	26.4	LOS B	16.5	116.9	0.70	0.61	0.70	28.9

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Bathurst Street											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
East: Moore Street											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
North: Bathurst Street											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
West: Moore Street											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

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: 101 [2822 Moore Street / Northumberland Street PM (Site Folder: With changes)]

Network: N101 [PM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Northumberland Street														
1	L2	204	1.0	204	1.0	*0.410	36.0	LOS C	8.3	58.3	0.87	0.78	0.87	15.6
2	T1	329	0.3	329	0.3	0.282	28.8	LOS C	6.2	43.2	0.81	0.66	0.81	24.4
Approach		534	0.6	534	0.6	0.410	31.6	LOS C	8.3	58.3	0.83	0.71	0.83	21.5
East: Moore Street														
5	T1	228	14.7	228	14.7	*0.412	21.6	LOS B	9.4	68.0	0.74	0.64	0.74	10.3
6	R2	143	6.6	143	6.6	*0.412	28.6	LOS C	9.4	68.0	0.72	0.69	0.72	23.0
Approach		372	11.6	372	11.6	0.412	24.3	LOS B	9.4	68.0	0.73	0.66	0.73	16.5
West: Moore Street														
10	L2	5	100.0	5	100.0	0.069	27.9	LOS B	1.0	12.8	0.58	0.48	0.58	25.5
11	T1	84	37.5	84	37.5	0.142	35.4	LOS C	2.4	6.6	0.83	0.61	0.83	7.8
Approach		89	41.2	89	41.2	0.142	35.0	LOS C	2.4	12.8	0.82	0.60	0.82	8.9
All Vehicles		995	8.4	995	8.4	0.412	29.2	LOS C	9.4	68.0	0.79	0.68	0.79	19.2

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Northumberland Street											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
East: Moore Street											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
North: Northumberland Street											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
West: Moore Street											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

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: 101 [1482 George Street / Moore Street PM (Site Folder: With changes)]

Network: N101 [PM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
2	T1	53	0.0	53	0.0	0.012	5.0	LOS A	0.8	2.1	0.33	0.24	0.33	28.5
Approach		53	0.0	53	0.0	0.012	5.0	LOS A	0.8	2.1	0.33	0.24	0.33	28.5
East: Moore Street														
7	L2	45	7.0	45	7.0	0.299	42.0	LOS C	3.5	35.2	0.90	0.74	0.90	11.2
8	T1	199	24.3	199	24.3	*0.316	37.3	LOS C	4.7	35.8	0.89	0.69	0.89	11.5
Approach		244	21.1	244	21.1	0.316	38.2	LOS C	4.7	35.8	0.89	0.70	0.89	11.5
North: George Street														
4	L2	74	20.0	74	20.0	0.321	10.1	LOS A	7.9	57.8	0.43	0.42	0.43	32.8
5	T1	621	2.5	621	2.5	*0.321	6.4	LOS A	7.9	57.8	0.42	0.43	0.42	29.9
6	R2	138	0.8	138	0.8	0.321	10.1	LOS A	7.1	50.3	0.43	0.48	0.43	29.8
Approach		833	3.8	833	3.8	0.321	7.3	LOS A	7.9	57.8	0.42	0.44	0.42	30.2
West: Moore Street														
2	T1	84	37.5	84	37.5	0.141	35.6	LOS C	2.0	5.5	0.85	0.63	0.85	14.5
Approach		84	37.5	84	37.5	0.141	35.6	LOS C	2.0	17.2	0.85	0.63	0.85	14.5
All Vehicles		1214	9.5	1214	9.5	0.321	15.4	LOS B	7.9	57.8	0.54	0.50	0.54	23.4

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
East: Moore Street											
P2	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
North: George Street											
P3	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
West: Moore Street											
P4	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
All Pedestrians		4	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01

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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Project: C:\Users\Gabi.Mcerlane\Downloads\20250128_LCC_model v3 (1).sip9

MOVEMENT SUMMARY

Site: 101 [877 Moore Street / Macquarie Street PM (Site Folder: With changes)]

Network: N101 [PM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Macquarie Street														
1	L2	125	1.7	125	1.7	*0.273	36.2	LOS C	5.0	35.2	0.85	0.75	0.85	14.8
Approach		125	1.7	125	1.7	0.273	36.2	LOS C	5.0	35.2	0.85	0.75	0.85	14.8
East: Moore Street														
4	L2	67	0.0	67	0.0	0.161	22.7	LOS B	3.1	28.7	0.66	0.63	0.66	22.2
5	T1	306	13.7	306	13.7	*0.269	17.3	LOS B	6.9	49.0	0.62	0.53	0.62	12.4
Approach		374	11.3	374	11.3	0.269	18.3	LOS B	6.9	49.0	0.63	0.55	0.63	15.4
West: Moore Street														
11	T1	84	37.5	84	37.5	0.064	9.3	LOS A	0.9	11.9	0.41	0.31	0.41	17.8
Approach		84	37.5	84	37.5	0.064	9.3	LOS A	0.9	11.9	0.41	0.31	0.41	17.8
All Vehicles		583	13.0	583	13.0	0.273	20.8	LOS B	6.9	49.0	0.64	0.56	0.64	15.4

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Pedestrian Movements (Diagonal)											
PD	Diagonal	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

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: 101 [1017 George Street / Railway Street PM (Site Folder: With changes)] **Network: N101 [PM Peak (Network Folder: With changes)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
2	T1	53	0.0	53	0.0	0.009	0.3	LOS A	0.2	0.5	0.08	0.06	0.08	29.2
Approach		53	0.0	53	0.0	0.009	0.3	LOS A	0.2	0.5	0.08	0.06	0.08	29.2
East: Railway Street														
7	L2	138	2.3	138	2.3	*0.302	36.5	LOS C	5.5	39.3	0.85	0.76	0.85	15.4
Approach		138	2.3	138	2.3	0.302	36.5	LOS C	5.5	39.3	0.85	0.76	0.85	15.4
North: George Street														
4	L2	142	0.7	142	0.7	0.298	4.1	LOS A	7.8	55.9	0.51	0.54	0.51	27.8
5	T1	600	3.0	600	3.0	*0.298	11.2	LOS A	7.9	57.2	0.47	0.44	0.47	27.1
Approach		742	2.6	742	2.6	0.298	9.8	LOS A	7.9	57.2	0.48	0.46	0.48	27.3
All Vehicles		933	2.4	933	2.4	0.302	13.2	LOS A	7.9	57.2	0.51	0.48	0.51	24.3

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
East: Railway Street											
P2	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
North: George Street											
P3	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
All Pedestrians		3	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01

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: 101 [1004 George Street / Elizabeth Street PM (Site Folder: With changes)]

Network: N101 [PM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Elizabeth Street														
7	L2	87	13.3	87	13.3	0.427	22.3	LOS B	9.0	65.9	0.77	0.69	0.77	17.7
8	T1	246	2.6	246	2.6	* 0.427	18.8	LOS B	9.0	65.9	0.78	0.69	0.78	21.4
9	R2	129	3.3	129	3.3	0.427	29.5	LOS C	4.8	34.3	0.85	0.77	0.85	14.2
Approach		463	4.8	463	4.8	0.427	22.4	LOS B	9.0	65.9	0.80	0.71	0.80	18.7
North: George Street														
4	L2	41	5.1	41	5.1	0.996	74.8	LOS F	36.5	263.0	1.00	1.45	1.70	13.5
5	T1	435	3.9	435	3.9	* 0.996	71.3	LOS F	36.5	263.0	1.00	1.45	1.70	9.7
6	R2	111	1.0	111	1.0	0.996	74.8	LOS F	36.5	263.0	1.00	1.45	1.70	11.8
Approach		586	3.4	586	3.4	0.996	72.2	LOS F	36.5	263.0	1.00	1.45	1.70	10.4
West: Elizabeth Street														
1	L2	211	0.5	211	0.5	0.347	14.7	LOS B	7.5	55.3	0.61	0.64	0.61	16.0
2	T1	152	14.6	152	14.6	0.347	11.3	LOS A	7.5	55.3	0.63	0.65	0.63	25.1
3	R2	145	2.2	145	2.2	* 0.347	16.3	LOS B	3.7	26.6	0.74	0.71	0.74	14.3
Approach		507	5.2	507	5.2	0.347	14.1	LOS A	7.5	55.3	0.65	0.66	0.65	19.2
All Vehicles		1557	4.4	1557	4.4	0.996	38.5	LOS C	36.5	263.0	0.83	0.98	1.09	13.5

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
East: Elizabeth Street											
P2	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
North: George Street											
P3	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: Elizabeth Street											
P4	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians		4	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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: 101 [Moore Street / Castlereagh Street PM (Site Folder: With changes)]

Network: N101 [PM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Castlereagh Street														
1	L2	9	0.0	9	0.0	0.144	7.4	LOS A	0.5	3.9	0.02	0.99	0.02	35.9
2	T1	25	0.0	25	0.0	0.144	8.5	LOS A	0.5	3.9	0.02	0.99	0.02	39.3
3	R2	19	22.2	19	22.2	0.144	8.9	LOS A	0.5	3.9	0.02	0.99	0.02	34.8
Approach		54	7.8	54	7.8	0.144	8.5	LOS A	0.5	3.9	0.02	0.99	0.02	37.6
East: Moore Street														
4	L2	12	0.0	12	0.0	0.006	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	39.8
5	T1	293	12.2	293	12.2	0.198	0.0	LOS A	0.5	3.7	0.08	0.12	0.08	41.7
6	R2	57	1.9	57	1.9	0.198	6.5	LOS A	0.5	3.7	0.10	0.14	0.10	44.3
Approach		361	10.2	361	10.2	0.198	1.2	NA	0.5	3.7	0.08	0.13	0.08	42.2
North: Castlereagh Street														
7	L2	19	0.0	19	0.0	0.231	7.6	LOS A	1.0	6.7	0.45	0.81	0.45	29.5
8	T1	36	2.9	36	2.9	0.231	15.7	LOS B	1.0	6.7	0.45	0.81	0.45	35.2
9	R2	42	0.0	42	0.0	0.231	16.6	LOS B	1.0	6.7	0.45	0.81	0.45	31.6
Approach		97	1.1	97	1.1	0.231	14.5	LOS A	1.0	6.7	0.45	0.81	0.45	32.9
West: Moore Street														
10	L2	18	0.0	18	0.0	0.049	4.6	LOS A	0.0	0.0	0.00	0.13	0.00	43.4
11	T1	108	31.1	108	31.1	0.049	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	34.3
12	R2	15	7.1	15	7.1	0.020	6.3	LOS A	0.1	0.5	0.35	0.55	0.35	37.7
Approach		141	24.6	141	24.6	0.049	1.2	NA	0.1	0.5	0.04	0.13	0.04	37.2
All Vehicles		653	11.8	653	11.8	0.231	3.8	NA	1.0	6.7	0.12	0.30	0.12	38.3

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

MOVEMENT SUMMARY

Site: 101 [2869 George Street / Campbell Street PM (Site Folder: With changes)]

Network: N101 [PM Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
1	L2	120	0.9	120	0.9	0.113	12.1	LOS A	2.1	14.8	0.48	0.63	0.48	28.4
2	T1	103	0.0	103	0.0	0.222	15.7	LOS B	3.7	26.3	0.71	0.62	0.71	28.2
3	R2	36	11.8	36	11.8	0.222	27.3	LOS B	3.7	26.3	0.71	0.62	0.71	26.1
Approach		259	2.0	259	2.0	0.222	15.6	LOS B	3.7	26.3	0.60	0.62	0.60	28.0
East: Campbell Street														
7	L2	87	19.3	87	19.3	0.224	32.2	LOS C	2.7	22.0	0.81	0.73	0.81	14.4
8	T1	192	0.5	192	0.5	*0.399	29.8	LOS C	6.2	43.5	0.86	0.71	0.86	19.2
Approach		279	6.4	279	6.4	0.399	30.6	LOS C	6.2	43.5	0.84	0.71	0.84	17.8
North: George Street														
4	L2	4	0.0	4	0.0	0.521	21.3	LOS B	10.2	71.7	0.79	0.70	0.79	26.0
5	T1	297	0.7	297	0.7	*0.521	17.7	LOS B	10.2	71.7	0.79	0.70	0.79	21.9
6	R2	48	0.0	48	0.0	0.521	27.2	LOS B	10.2	71.7	0.79	0.70	0.79	24.3
Approach		349	0.6	349	0.6	0.521	19.0	LOS B	10.2	71.7	0.79	0.70	0.79	22.4
West: Campbell Street														
1	L2	119	0.0	119	0.0	0.155	19.2	LOS B	2.9	20.4	0.66	0.69	0.66	24.2
2	T1	121	0.0	121	0.0	0.561	19.9	LOS B	8.0	56.1	0.90	0.77	0.90	19.4
3	R2	126	0.0	126	0.0	*0.561	30.1	LOS C	8.0	56.1	0.90	0.77	0.90	10.9
Approach		366	0.0	366	0.0	0.561	23.2	LOS B	8.0	56.1	0.82	0.74	0.82	18.9
All Vehicles		1254	2.0	1254	2.0	0.561	22.1	LOS B	10.2	71.7	0.77	0.70	0.77	21.7

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
East: Campbell Street											
P2	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
North: George Street											
P3	Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
West: Campbell Street											

P4 Full	1	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06
All Pedestrians	4	34.2	LOS D	0.0	0.0	0.93	0.93	188.1	200.0	1.06

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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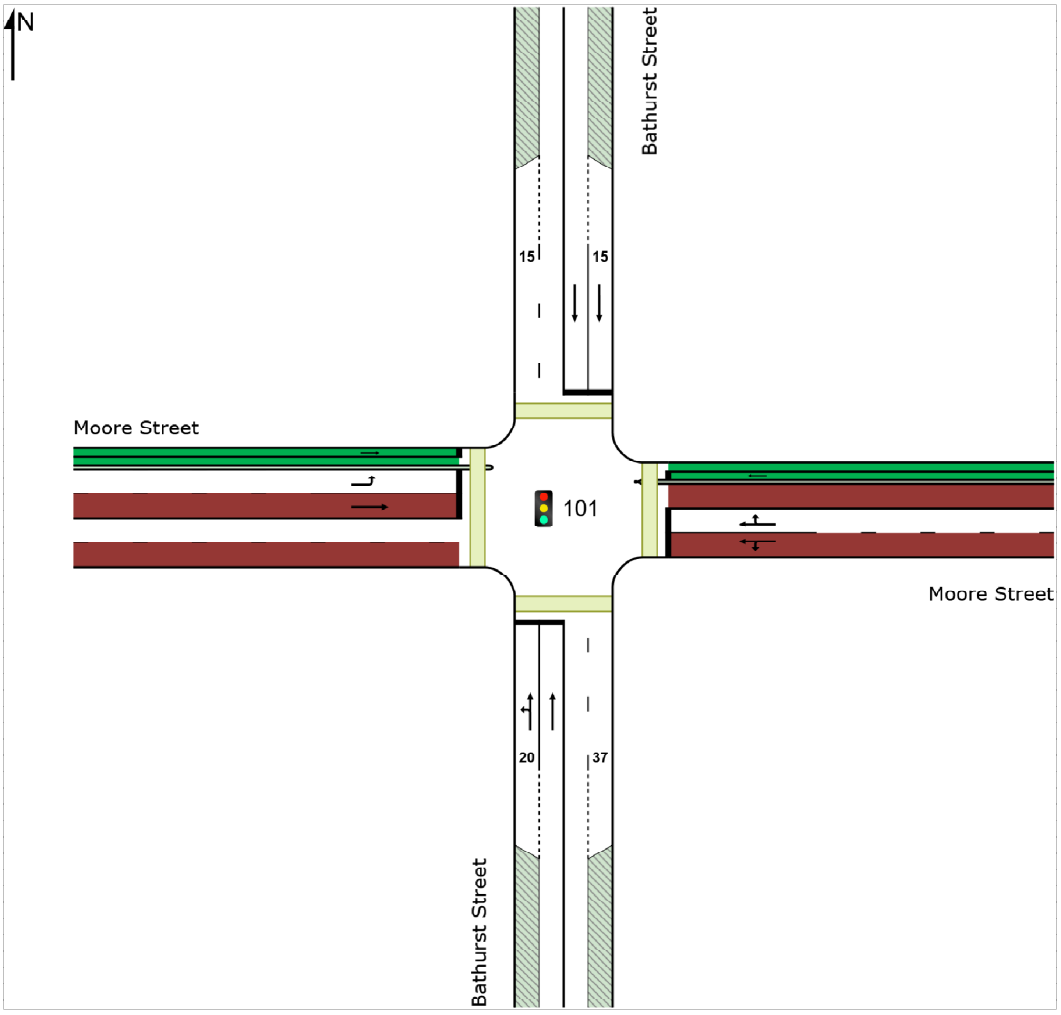
SITE LAYOUT

Site: 101 [3315 Moore Street / Bathurst Street WE (Site Folder: With changes)]

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

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

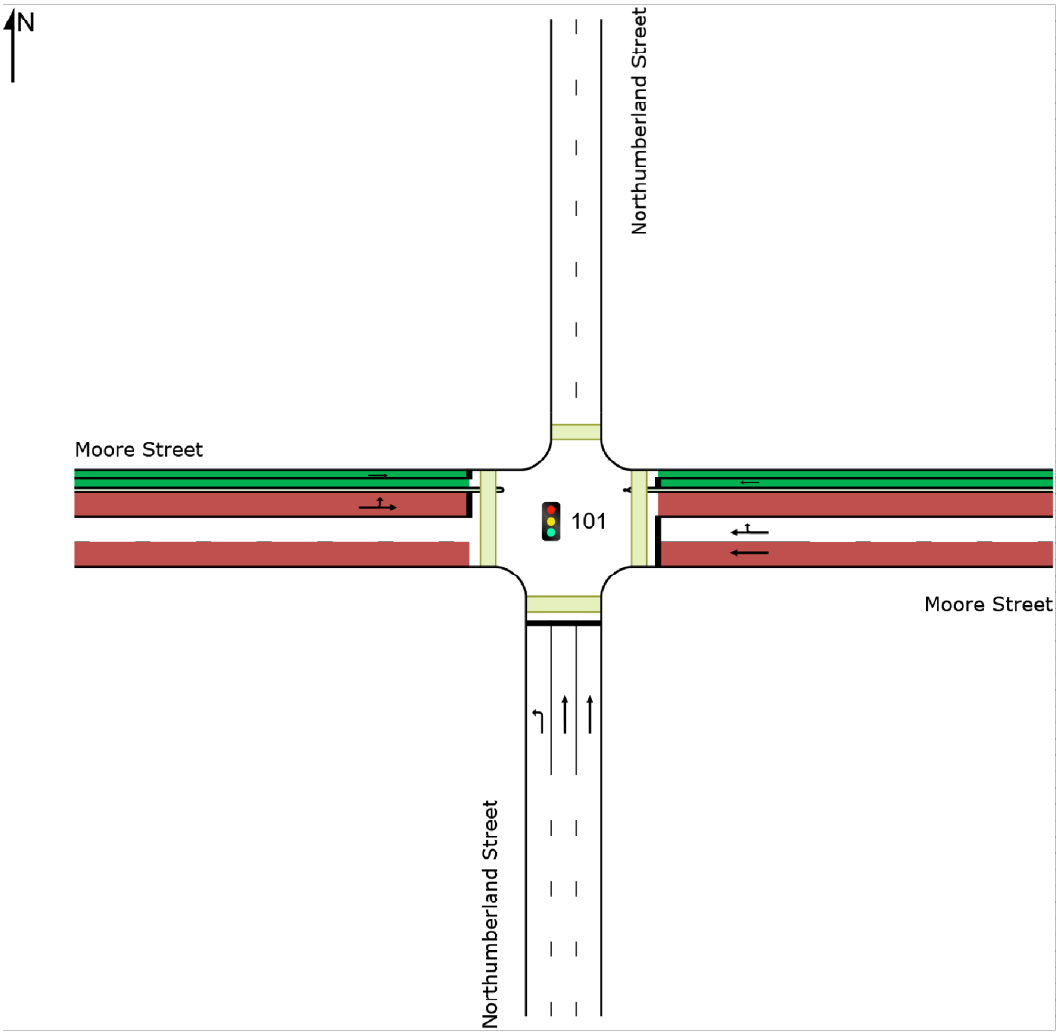


SITE LAYOUT

Site: 101 [2822 Moore Street / Northumberland Street WE (Site Folder: With changes)]

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

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

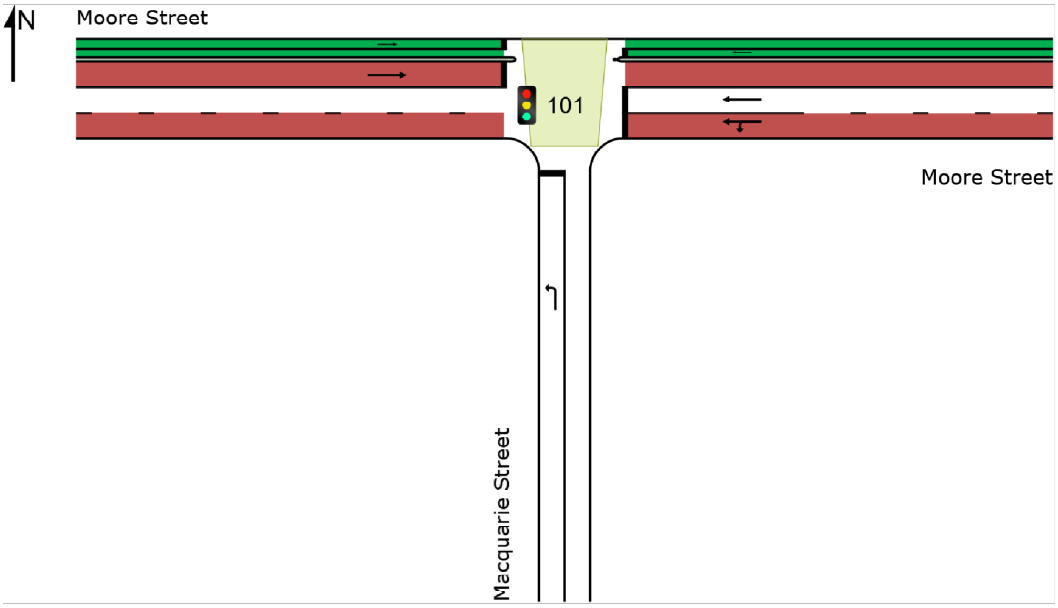


SITE LAYOUT

Site: 101 [877 Moore Street / Macquarie Street WE (Site Folder: With changes)]

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

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

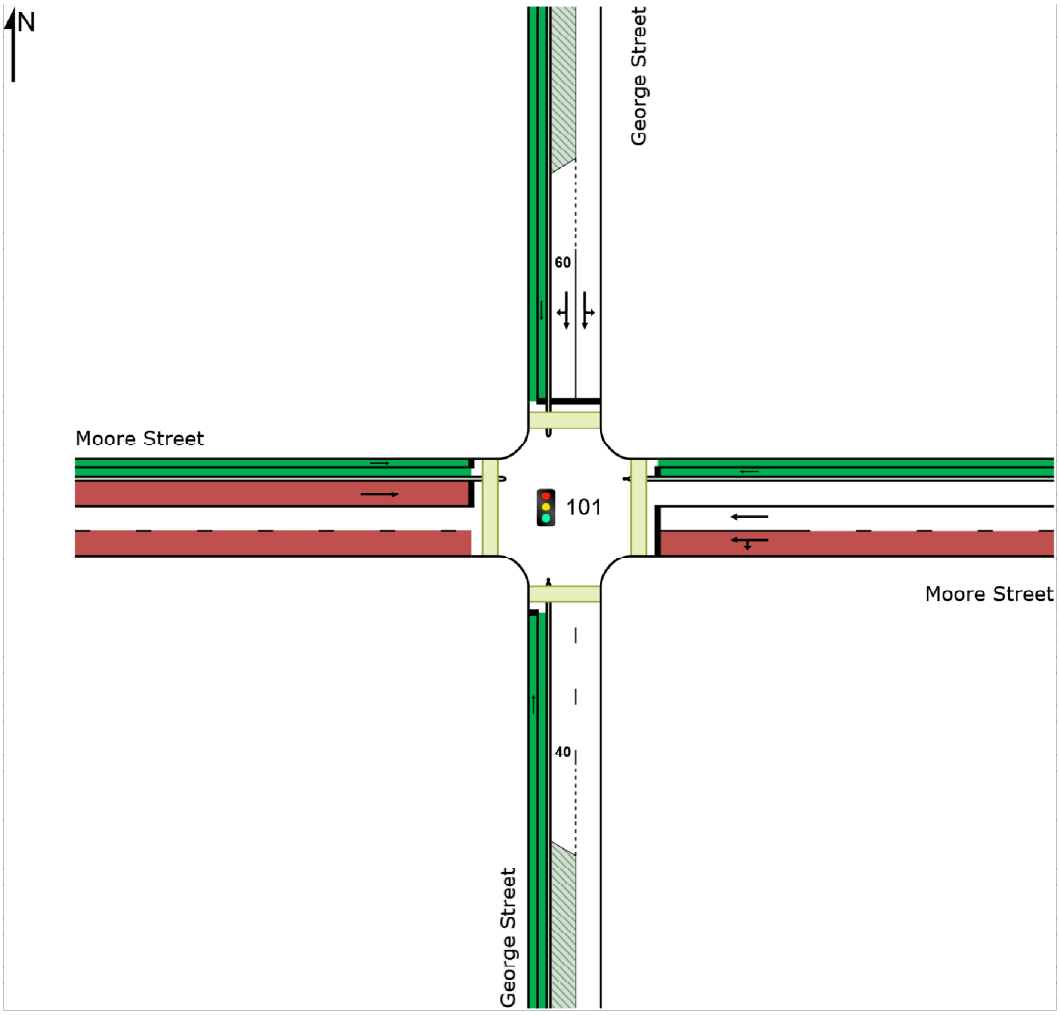


SITE LAYOUT

Site: 101 [1482 George Street / Moore Street WE (Site Folder: With changes)]

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

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

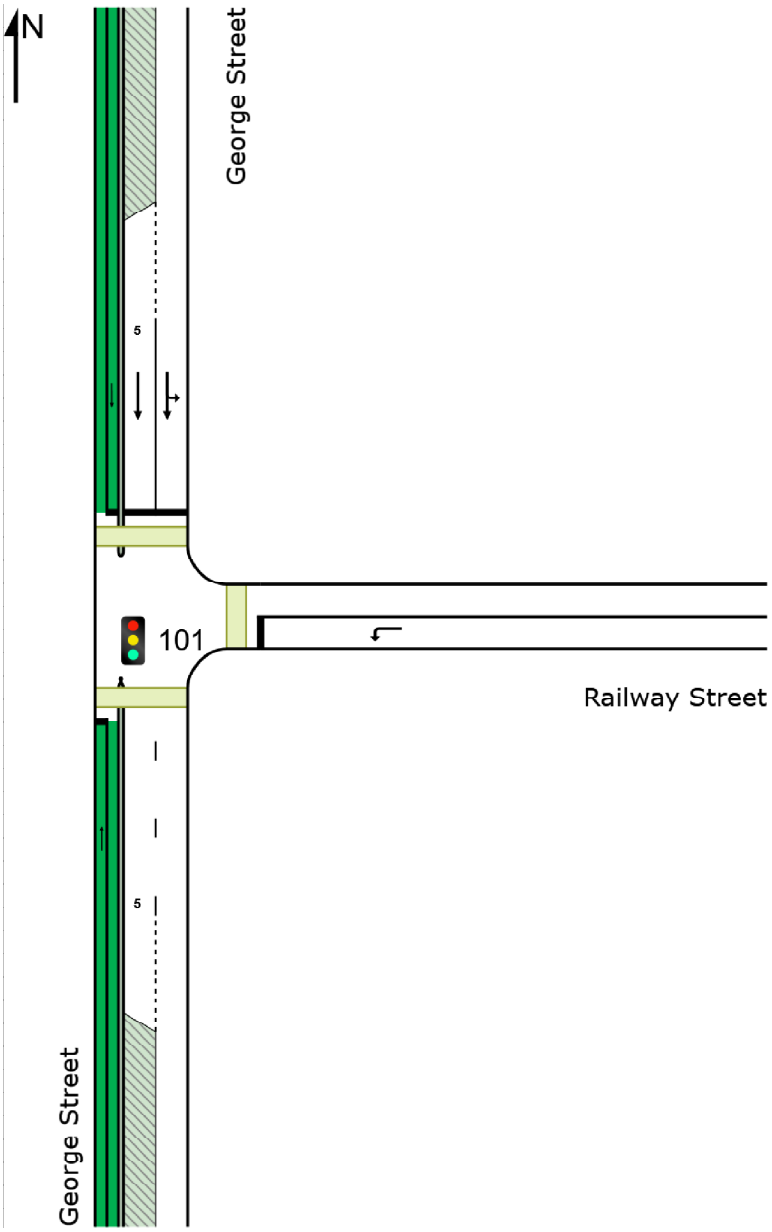


SITE LAYOUT

Site: 101 [1017 George Street / Railway Street WE (Site Folder: With changes)]

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

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

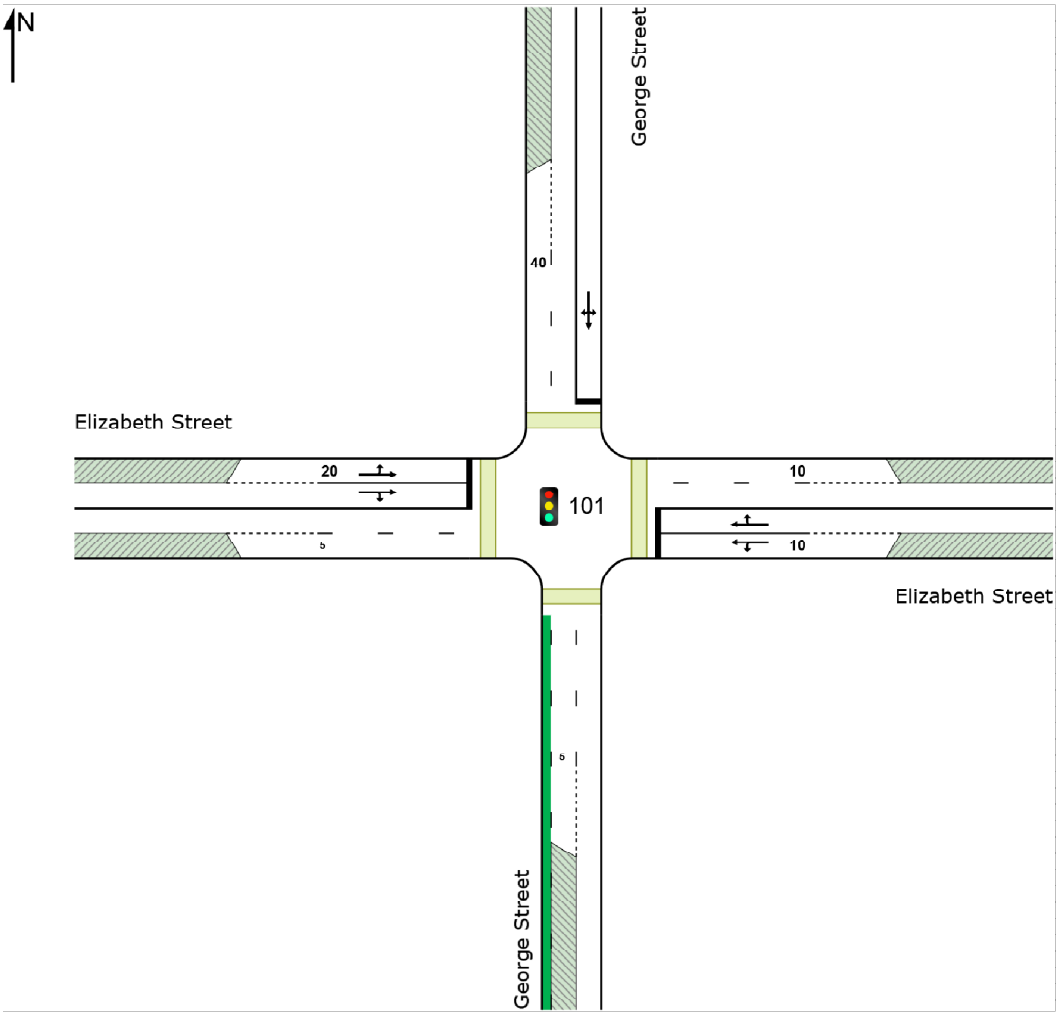


SITE LAYOUT

Site: 101 [1004 George Street / Elizabeth Street WE (Site Folder: With changes)]

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

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



SITE LAYOUT

Site: 101 [Moore Street / Castlereagh Street WE (Site Folder: With changes)]

New Site
Site Category: (None)
Stop (Two-Way)

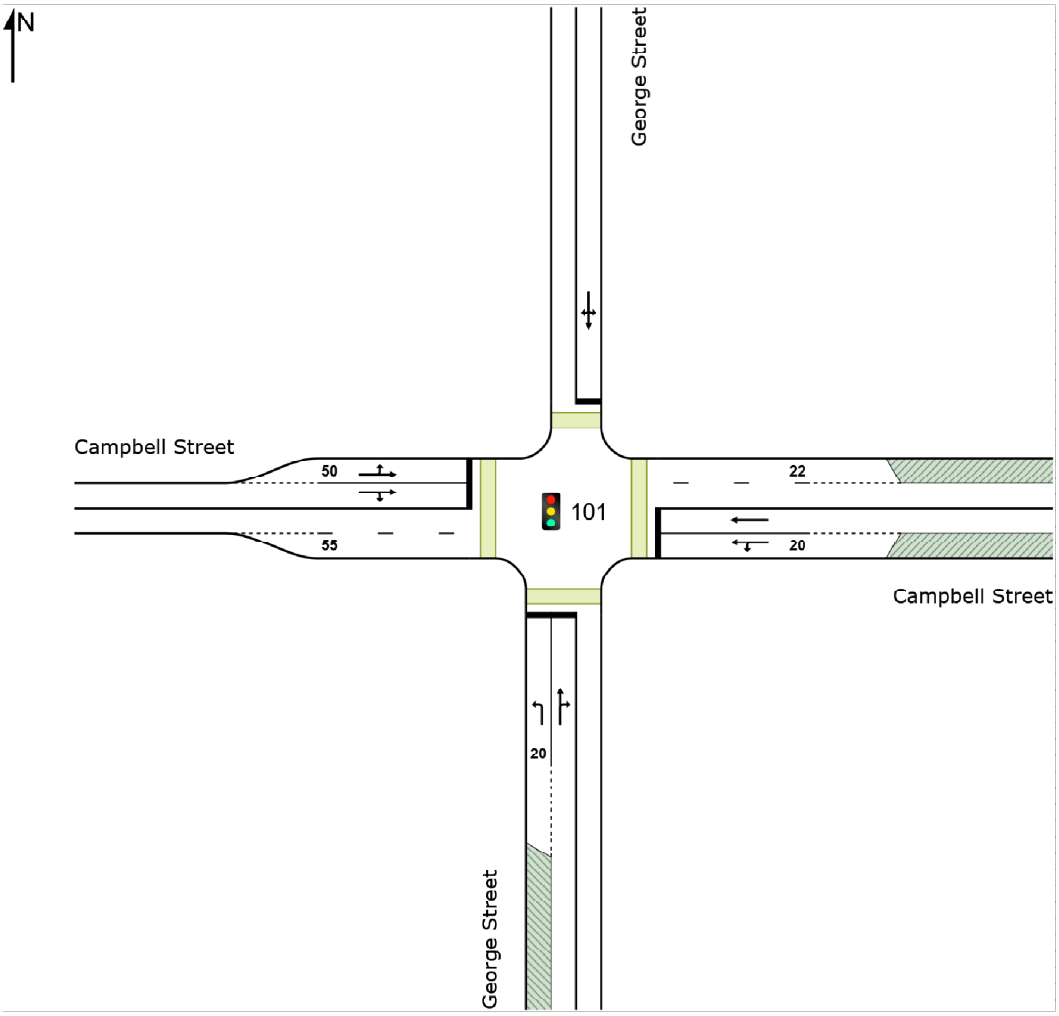
Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

SITE LAYOUT

Site: 101 [2869 George Street / Campbell Street WE (Site Folder: With changes)]

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

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

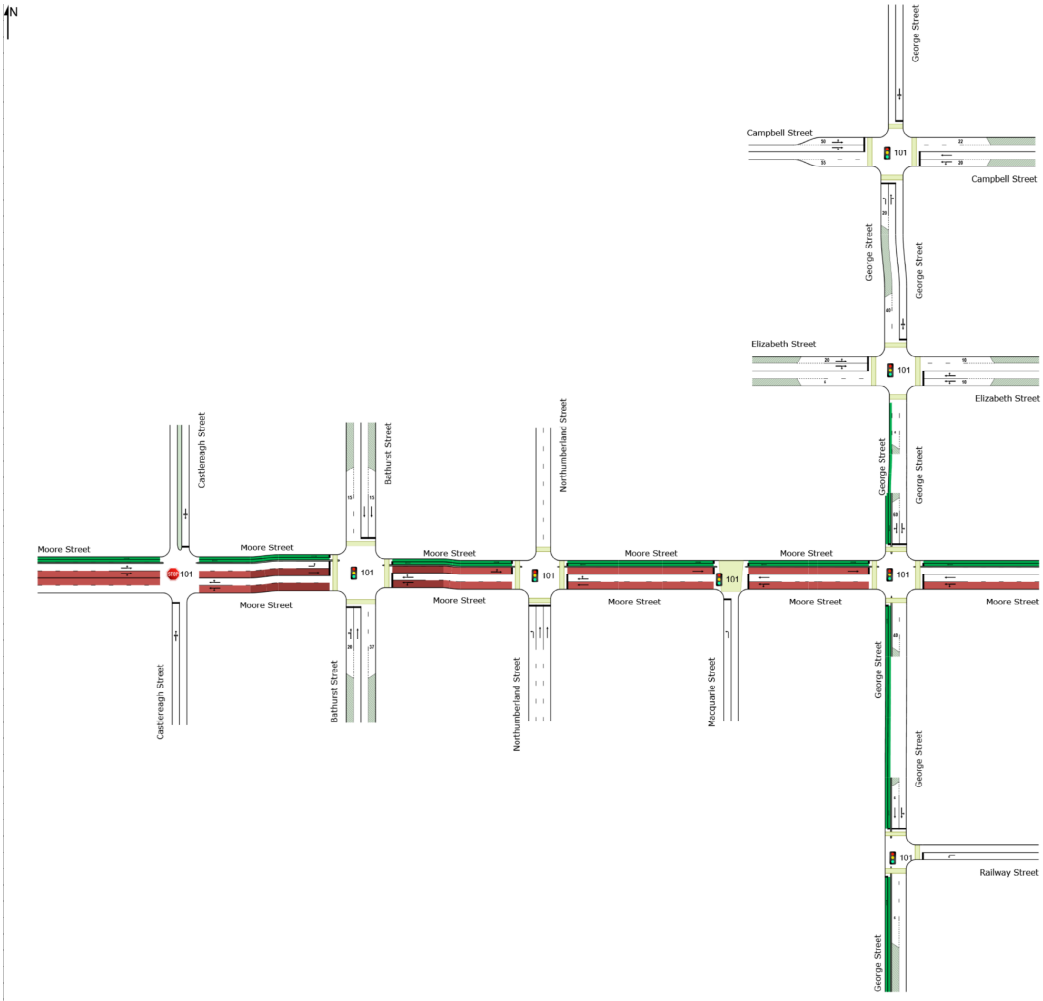


NETWORK LAYOUT

Network: N101 [WE Peak (Network Folder: With changes)]

New Network
Network Category: (None)

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



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	3315 Moore Street / Bathurst Street WE
101	NA	2822 Moore Street / Northumberland Street WE
101	NA	877 Moore Street / Macquarie Street WE
101	NA	1482 George Street / Moore Street WE
101	NA	1017 George Street / Railway Street WE
101	NA	1004 George Street / Elizabeth Street WE
101	NA	Moore Street / Castlereagh Street WE
101	NA	2869 George Street / Campbell Street WE

MOVEMENT SUMMARY

Site: 101 [3315 Moore Street / Bathurst Street WE (Site Folder: With changes)] **Network: N101 [WE Peak (Network Folder: With changes)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Bathurst Street														
1	L2	48	2.2	48	2.2	0.401	23.7	LOS B	7.8	55.2	0.57	0.53	0.57	30.1
2	T1	657	0.3	657	0.3	0.501	18.7	LOS B	11.2	78.8	0.60	0.54	0.60	37.1
Approach		705	0.4	705	0.4	0.501	19.0	LOS B	11.2	78.8	0.60	0.54	0.60	36.8
East: Moore Street														
4	L2	99	0.0	99	0.0	0.295	35.5	LOS C	5.0	42.1	0.84	0.74	0.84	19.8
5	T1	226	13.5	226	13.5	*0.503	36.7	LOS C	8.0	56.4	0.93	0.75	0.93	7.5
6	R2	38	0.0	38	0.0	*0.503	58.2	LOS E	8.0	56.4	0.93	0.78	0.93	18.4
Approach		363	8.4	363	8.4	0.503	38.7	LOS C	8.0	56.4	0.91	0.75	0.91	12.7
North: Bathurst Street														
8	T1	656	0.6	656	0.6	*0.529	21.2	LOS B	13.9	97.6	0.60	0.52	0.60	37.4
Approach		656	0.6	656	0.6	0.529	21.2	LOS B	13.9	97.6	0.60	0.52	0.60	37.4
West: Moore Street														
10	L2	86	6.1	86	6.1	0.346	47.8	LOS D	3.9	29.0	0.95	0.77	0.95	16.7
11	T1	79	33.3	79	33.3	0.142	41.9	LOS C	2.4	6.6	0.91	0.67	0.91	7.2
Approach		165	19.1	165	19.1	0.346	45.0	LOS D	3.9	29.0	0.93	0.72	0.93	13.0
All Vehicles		1889	3.7	1889	3.7	0.529	25.8	LOS B	13.9	97.6	0.69	0.59	0.69	29.3

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Bathurst Street											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
East: Moore Street											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
North: Bathurst Street											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
West: Moore Street											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

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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Project: C:\Users\Gabi.Mcerlane\Downloads\20250128_LCC_model v3 (1).sip9

MOVEMENT SUMMARY

Site: 101 [2822 Moore Street / Northumberland Street WE (Site Folder: With changes)]

Network: N101 [WE Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Northumberland Street														
1	L2	140	0.0	140	0.0	0.343	39.3	LOS C	5.8	40.9	0.89	0.77	0.89	14.8
2	T1	336	0.9	336	0.9	*0.347	33.4	LOS C	6.8	47.9	0.87	0.71	0.87	23.0
Approach		476	0.7	476	0.7	0.347	35.2	LOS C	6.8	47.9	0.87	0.73	0.87	21.0
East: Moore Street														
5	T1	221	13.8	221	13.8	*0.347	19.6	LOS B	8.0	57.6	0.69	0.61	0.69	11.0
6	R2	135	7.0	135	7.0	*0.347	24.5	LOS B	8.0	57.6	0.64	0.64	0.64	24.8
Approach		356	11.2	355[N1]	11.3	0.347	21.4	LOS B	8.0	57.6	0.67	0.62	0.67	17.6
West: Moore Street														
10	L2	5	100.0	5	100.0	0.044	23.5	LOS B	0.6	8.2	0.52	0.44	0.52	27.0
11	T1	74	28.6	74	28.6	0.142	37.5	LOS C	2.4	6.6	0.85	0.62	0.85	7.5
Approach		79	33.3	79	33.3	0.142	36.6	LOS C	2.4	8.2	0.83	0.61	0.83	8.7
All Vehicles		911	7.6	910[N1]	7.6	0.347	29.9	LOS C	8.0	57.6	0.79	0.68	0.79	19.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
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)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Northumberland Street											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
East: Moore Street											
P2	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
North: Northumberland Street											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
West: Moore Street											
P4	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		211	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

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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Project: C:\Users\Gabi.Mcerlane\Downloads\20250128_LCC_model v3 (1).sip9

MOVEMENT SUMMARY

Site: 101 [877 Moore Street / Macquarie Street WE (Site Folder: With changes)] **Network: N101 [WE Peak (Network Folder: With changes)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Macquarie Street														
1	L2	168	0.0	168	0.0	*0.252	27.6	LOS B	5.8	40.4	0.74	0.73	0.74	17.4
Approach		168	0.0	168	0.0	0.252	27.6	LOS B	5.8	40.4	0.74	0.73	0.74	17.4
East: Moore Street														
4	L2	44	0.0	44	0.0	0.250	31.3	LOS C	5.1	39.0	0.79	0.67	0.79	19.3
5	T1	283	14.1	283	14.2	*0.250	23.4	LOS B	5.1	39.0	0.70	0.57	0.70	10.1
Approach		327	12.2	327	12.2	0.250	24.4	LOS B	5.1	40.0	0.71	0.59	0.71	12.1
West: Moore Street														
11	T1	74	28.6	74	28.6	0.057	10.2	LOS A	0.7	9.4	0.41	0.31	0.41	16.9
Approach		74	28.6	74	28.6	0.057	10.2	LOS A	0.7	9.4	0.41	0.31	0.41	16.9
All Vehicles		569	10.7	569	10.7	0.252	23.5	LOS B	5.8	40.4	0.68	0.59	0.68	14.5

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Pedestrian Movements (Diagonal)											
PD	Diagonal	53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01
All Pedestrians		53	44.3	LOS E	0.1	0.1	0.94	0.94	198.1	200.0	1.01

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: 101 [1017 George Street / Railway Street WE (Site Folder: With changes)] **Network: N101 [WE Peak (Network Folder: With changes)]**

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
2	T1	53	0.0	53	0.0	0.009	0.3	LOS A	0.2	0.5	0.08	0.06	0.08	29.2
Approach		53	0.0	53	0.0	0.009	0.3	LOS A	0.2	0.5	0.08	0.06	0.08	29.2
East: Railway Street														
7	L2	112	0.9	112	0.9	*0.356	43.8	LOS D	4.9	34.8	0.93	0.77	0.93	13.7
Approach		112	0.9	112	0.9	0.356	43.8	LOS D	4.9	34.8	0.93	0.77	0.93	13.7
North: George Street														
4	L2	113	0.0	112	0.0	0.363	8.5	LOS A	8.1	57.8	0.44	0.46	0.44	30.5
5	T1	443	2.6	441	2.6	*0.363	11.3	LOS A	8.1	57.8	0.38	0.38	0.38	29.9
Approach		556	2.1	553[N1]	2.1	0.363	10.8	LOS A	8.1	57.8	0.39	0.39	0.39	30.0
All Vehicles		720	1.8	717[N1]	1.8	0.363	15.1	LOS B	8.1	57.8	0.45	0.43	0.45	25.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
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)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
East: Railway Street											
P2	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
North: George Street											
P3	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
All Pedestrians		3	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01

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: 101 [1482 George Street / Moore Street WE (Site Folder: With changes)]

Network: N101 [WE Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
2	T1	53	0.0	53	0.0	0.012	5.0	LOS A	0.8	2.1	0.33	0.24	0.33	28.5
Approach		53	0.0	53	0.0	0.012	5.0	LOS A	0.8	2.1	0.33	0.24	0.33	28.5
East: Moore Street														
7	L2	57	5.6	57	5.6	*0.332	42.2	LOS C	4.1	38.9	0.91	0.75	0.91	11.2
8	T1	182	20.2	182	20.2	0.332	37.0	LOS C	4.1	38.9	0.88	0.68	0.88	11.5
Approach		239	16.7	239	16.7	0.332	38.2	LOS C	4.1	38.9	0.89	0.70	0.89	11.4
North: George Street														
4	L2	59	14.3	58	14.2	0.326	10.0	LOS A	8.1	58.8	0.43	0.42	0.43	32.9
5	T1	421	2.0	418	2.0	*0.326	6.4	LOS A	8.1	58.8	0.42	0.39	0.42	30.0
6	R2	98	0.0	97	0.0	0.100	9.0	LOS A	1.6	10.9	0.35	0.60	0.35	28.7
Approach		578	2.9	574[N1]	2.9	0.326	7.2	LOS A	8.1	58.8	0.41	0.43	0.41	30.2
West: Moore Street														
2	T1	74	28.6	74	28.6	0.094	35.2	LOS C	2.0	5.5	0.85	0.62	0.85	14.4
Approach		74	28.6	74	28.6	0.094	35.2	LOS C	2.0	11.3	0.85	0.62	0.85	14.4
All Vehicles		943	8.3	939[N1]	8.3	0.332	17.1	LOS B	8.1	58.8	0.56	0.50	0.56	22.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
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)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
East: Moore Street											
P2	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
North: George Street											
P3	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
West: Moore Street											
P4	Full	1	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01
All Pedestrians		4	44.2	LOS E	0.0	0.0	0.94	0.94	198.0	200.0	1.01

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: 101 [1004 George Street / Elizabeth Street WE (Site Folder: With changes)]

Network: N101 [WE Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Elizabeth Street														
7	L2	91	5.8	91	5.8	0.530	36.2	LOS C	6.2	44.8	0.76	0.76	0.76	19.1
8	T1	145	2.2	145	2.2	0.530	32.9	LOS C	6.2	44.8	0.76	0.76	0.76	23.0
9	R2	209	0.5	209	0.5	* 0.968	89.4	LOS F	12.3	86.6	1.00	1.44	1.89	7.1
Approach		445	2.1	445	2.1	0.968	60.1	LOS E	12.3	86.6	0.87	1.08	1.29	11.8
North: George Street														
4	L2	66	1.6	66	1.6	1.017	85.5	LOS F	25.3	181.8	1.00	1.58	1.95	12.3
5	T1	263	4.4	263	4.4	* 1.017	81.9	LOS F	25.3	181.8	1.00	1.58	1.95	8.7
6	R2	78	0.0	78	0.0	1.017	85.3	LOS F	25.3	181.8	1.00	1.58	1.95	10.7
Approach		407	3.1	407	3.1	1.017	83.1	LOS F	25.3	181.8	1.00	1.58	1.95	9.7
West: Elizabeth Street														
1	L2	247	0.4	247	0.4	0.290	10.7	LOS A	5.2	37.8	0.49	0.60	0.49	19.4
2	T1	142	14.8	142	14.8	0.362	7.8	LOS A	5.2	37.8	0.61	0.65	0.61	27.4
3	R2	139	0.0	139	0.0	* 0.362	15.4	LOS B	3.6	26.3	0.72	0.69	0.72	17.1
Approach		528	4.2	528	4.2	0.362	11.1	LOS A	5.2	37.8	0.58	0.64	0.58	22.0
All Vehicles		1381	3.2	1381	3.2	1.017	48.2	LOS D	25.3	181.8	0.80	1.06	1.21	12.2

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
East: Elizabeth Street											
P2	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
North: George Street											
P3	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
West: Elizabeth Street											
P4	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
All Pedestrians		4	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08

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: 101 [Moore Street / Castlereagh Street WE (Site Folder: With changes)]

Network: N101 [WE Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: Castlereagh Street														
1	L2	5	0.0	5	0.0	0.086	7.4	LOS A	0.3	2.1	0.02	0.98	0.02	36.0
2	T1	21	0.0	21	0.0	0.086	8.5	LOS A	0.3	2.1	0.02	0.98	0.02	39.3
3	R2	12	0.0	12	0.0	0.086	7.8	LOS A	0.3	2.1	0.02	0.98	0.02	34.9
Approach		38	0.0	38	0.0	0.086	8.1	LOS A	0.3	2.1	0.02	0.98	0.02	38.0
East: Moore Street														
4	L2	24	4.3	24	4.4	0.013	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	39.6
5	T1	224	13.6	224	13.6	0.149	0.0	LOS A	0.4	2.9	0.09	0.12	0.09	40.3
6	R2	44	2.4	44	2.4	0.149	6.9	LOS A	0.4	2.9	0.11	0.16	0.11	44.0
Approach		293	11.2	293	11.2	0.149	1.4	NA	0.4	2.9	0.08	0.16	0.08	41.0
North: Castlereagh Street														
7	L2	17	0.0	17	0.0	0.074	7.6	LOS A	0.3	1.9	0.26	0.85	0.26	32.1
8	T1	17	6.3	17	6.3	0.074	14.3	LOS A	0.3	1.9	0.26	0.85	0.26	37.0
9	R2	6	0.0	6	0.0	0.074	14.1	LOS A	0.3	1.9	0.26	0.85	0.26	33.7
Approach		40	2.6	40	2.6	0.074	11.4	LOS A	0.3	1.9	0.26	0.85	0.26	34.9
West: Moore Street														
10	L2	13	0.0	13	0.0	0.065	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	45.4
11	T1	146	21.6	146	21.6	0.065	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	38.4
12	R2	17	0.0	17	0.0	0.020	5.7	LOS A	0.1	0.5	0.31	0.53	0.31	38.4
Approach		176	18.0	176	18.0	0.065	0.9	NA	0.1	0.5	0.03	0.09	0.03	39.4
All Vehicles		546	11.9	546	11.9	0.149	2.4	NA	0.4	2.9	0.07	0.25	0.07	39.5

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

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MOVEMENT SUMMARY

Site: 101 [2869 George Street / Campbell Street WE (Site Folder: With changes)]

Network: N101 [WE Peak (Network Folder: With changes)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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: George Street														
1	L2	161	0.7	161	0.7	0.152	11.9	LOS A	2.7	19.2	0.49	0.64	0.49	28.6
2	T1	125	0.0	125	0.0	0.236	13.7	LOS A	3.9	27.7	0.66	0.59	0.66	29.9
3	R2	45	4.7	45	4.7	0.236	19.2	LOS B	3.9	27.7	0.66	0.59	0.66	27.8
Approach		332	1.0	332	1.0	0.236	13.6	LOS A	3.9	27.7	0.58	0.61	0.58	29.0
East: Campbell Street														
7	L2	44	19.0	44	19.0	0.145	31.2	LOS C	1.9	14.8	0.80	0.68	0.80	15.4
8	T1	233	0.5	233	0.5	*0.436	29.6	LOS C	6.5	45.7	0.87	0.72	0.87	19.5
Approach		277	3.4	277	3.4	0.436	29.9	LOS C	6.5	45.7	0.86	0.71	0.86	18.9
North: George Street														
4	L2	18	0.0	18	0.0	0.311	18.4	LOS B	5.1	36.0	0.70	0.65	0.70	27.0
5	T1	124	1.7	124	1.7	*0.311	14.8	LOS B	5.1	36.0	0.70	0.65	0.70	23.1
6	R2	66	0.0	66	0.0	0.311	20.4	LOS B	5.1	36.0	0.70	0.65	0.70	25.3
Approach		208	1.0	208	1.0	0.311	16.9	LOS B	5.1	36.0	0.70	0.65	0.70	24.3
West: Campbell Street														
1	L2	97	1.1	97	1.1	0.127	18.1	LOS B	2.2	15.5	0.65	0.68	0.65	24.8
2	T1	111	0.0	111	0.0	0.477	18.1	LOS B	6.6	46.4	0.87	0.75	0.87	20.2
3	R2	114	0.9	114	0.9	*0.477	28.0	LOS B	6.6	46.4	0.87	0.75	0.87	11.5
Approach		321	0.7	321	0.7	0.477	21.6	LOS B	6.6	46.4	0.81	0.73	0.81	19.5
All Vehicles		1138	1.5	1138	1.5	0.477	20.4	LOS B	6.6	46.4	0.73	0.68	0.73	23.2

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

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: George Street											
P1	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
East: Campbell Street											
P2	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
North: George Street											
P3	Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
West: Campbell Street											

P4 Full	1	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08
All Pedestrians	4	31.7	LOS D	0.0	0.0	0.92	0.92	185.6	200.0	1.08

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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GBI 09 George Street & Moore Street, Liverpool CBD - Proposed implementation of streetscape works from the adopted Liverpool City Centre Public Domain Master Plan

Attachment 1 Traffic and Transport Imapct Assessment

GBI 09	George Street & Moore Street, Liverpool CBD - Proposed implementation of streetscape works from the adopted Liverpool City Centre Public Domain Master Plan
Attachment 1	Traffic and Transport Imapct Assessment

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GBI 09
Attachment 2

George Street & Moore Street, Liverpool CBD - Proposed implementation of streetscape works from the adopted Liverpool City Centre Public Domain Master Plan
80% Design Plans

GBI 09
Attachment 2

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80% Design Plans

TCS 1004

DATE IN SERVICE : 14/04/1975

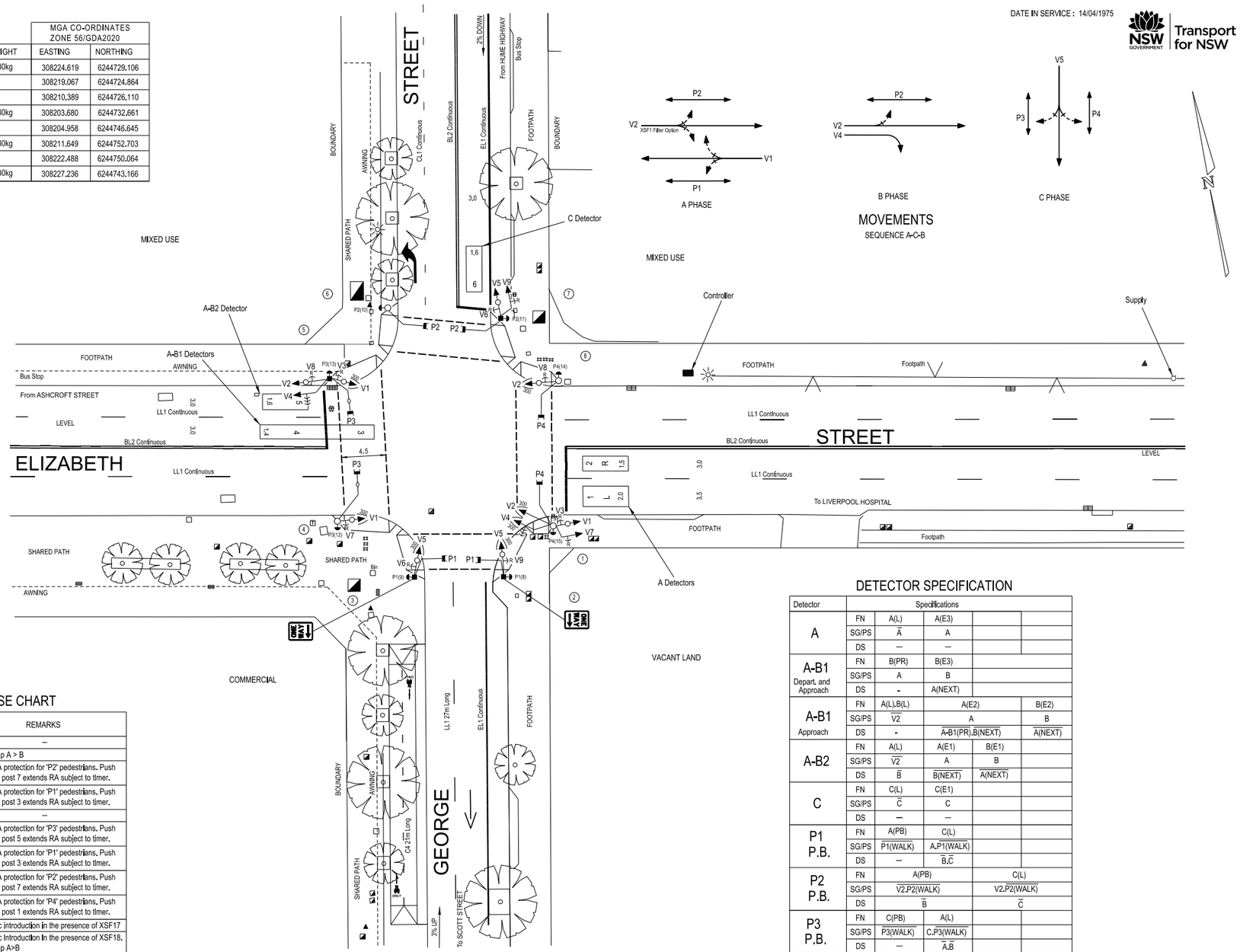
NSW GOVERNMENT Transport for NSW

POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS	WEIGHT	MGA CO-ORDINATES ZONE 56/GDA2020 EASTING	NORTHING
1	14	9.6m	1.0	New	380kg	308224.619	6244729.106
2	8	-	1.0	New		308219.067	6244724.864
3	8	-	1.0	New		308210.389	6244726.110
4	14	9.6m	1.0	New	380kg	308203.680	6244732.661
5	8	-	1.0	New		308204.958	6244746.645
6	14	9.6m	1.0	New	380kg	308211.649	6244752.703
7	8	-	1.0	New		308222.488	6244750.064
8	14	9.6m	1.0	New	380kg	308227.236	6244743.166

NOTES

1. This site is SCATS linked.
2. Special STOP Signs (R1-4) are mounted on posts 6 and 7.
3. Audio-tactile push-buttons are provided on posts 1, 2, 3, 4, 5, 6, 7 and 8.
4. Civil road works in accordance with AECOM drawing set 60737859.
5. Red runner software added for detectors 1-2 & 4-6.



SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE WHEN GREEN A	B	C	STANDARD TYPE	REMARKS
V1	X			1	–
V2	X	X		4	No overlap A > B
V3				83	Timed RA protection for 'P2' pedestrians. Push button on post 7 extends RA subject to timer.
V4		X		60	Timed RA protection for 'P1' pedestrians. Push button on post 3 extends RA subject to timer.
V5			X	1	–
V6				83	Timed RA protection for 'P3' pedestrians. Push button on post 5 extends RA subject to timer.
V7				44	Timed RA protection for 'P1' pedestrians. Push button on post 3 extends RA subject to timer.
V8				44	Timed RA protection for 'P2' pedestrians. Push button on post 7 extends RA subject to timer.
V9				44	Timed RA protection for 'P4' pedestrians. Push button on post 1 extends RA subject to timer.
P1	X			41	Automatic introduction in the presence of XSF17
P2	X	X		43	Automatic introduction in the presence of XSF18. No overlap A>B
P3			X	41	Automatic introduction in the presence of XSF19
P4			X	41	Automatic introduction in the presence of XSF20

DETECTOR SPECIFICATION

Detector	Specifications				
A	FN	A(L)	A(E3)		
	SG/PS	$\overline{A}$	A		
	DS	–	–		
A-B1 Depart. and Approach	FN	B(PR)	B(E3)		
	SG/PS	A	B		
	DS	-	A(NEXT)		
A-B1 Approach	FN	A(L),B(L)	A(E2)		B(E2)
	SG/PS	$\overline{V2}$	A		B
	DS	-	$\overline{A}$-B1(PR),B(NEXT)		A(NEXT)
A-B2	FN	A(L)	A(E1)	B(E1)	
	SG/PS	$\overline{V2}$	A	B	
	DS	$\overline{B}$	$\overline{B(NEXT)}$	A(NEXT)	
C	FN	C(L)	C(E1)		
	SG/PS	$\overline{C}$	C		
	DS	–	–		
P1 P.B.	FN	A(PB)	C(L)		
	SG/PS	P1(WALK)	A.P1(WALK)		
	DS	–	$\overline{B}.\overline{C}$		
P2 P.B.	FN	A(PB)		C(L)	
	SG/PS	$\overline{V2}$.P2(WALK)		$\overline{V2}$.$\overline{P2(WALK)}$	
	DS	$\overline{B}$		$\overline{C}$	
P3 P.B.	FN	C(PB)	A(L)		
	SG/PS	P3(WALK)	C.P3(WALK)		
	DS	–	$\overline{A}.\overline{B}$		
P4 P.B.	FN	C(PB)	A(L)		
	SG/PS	P4(WALK)	C.P4(WALK)		
	DS	–	$\overline{A}.\overline{B}$		

A ORIGINAL ISSUE

PUBLIC UTILITY LEGEND		REFERENCE PLANS	
HYDRANT		SYMBOLS/ABRVS	VD003-4
STOP VALVE		STD POSN CMPT	VD001-5
GAS VALVE		INSTL STOP DET	VC005-17
SEWER MANHOLE		VEH GROUP OP	TS-TN-219
COMMS PIT		DET LOGIC OP	TS-TN-220
ELECT LIGHT POLE		PED MVT OP	TS-TN-221
POWER POLE			
STAY POLE			
TELEPHONE BOX		SURVEYOR : North Western Survey	
COMMS PILLAR		DATE : April 24	

U.B.D. Ref. Map 269 E2
L.G.S. CO-ORDS E : 292 985 N : 1 240 215
DESIGNED : JIMMY WAN
CHECKED : TRUDIE LEE-JONES
SHARATH KOTHA
SITE CHECKED
MARTIN MALLIA
RECOMMENDED

DESIGN APPROVAL
APPROVED
NAME SHARATH KOTHA
POSITION PRINCIPAL TRAFFIC ENGINEER
DATE 22/05/2025
DESIGN PREPARED BY AECOM

TFNSW RECOMMENDATION
ROAD DESIGN ENGINEERING
NAME
POSITION
DATE
NETWORK OPERATIONS
NAME
POSITION
DATE

TFNSW ACCEPTANCE
ACCEPTED
NAME
POSITION
DATE
ACCEPTED BY
SECTION

TRANSPORT FOR NEW SOUTH WALES

LIVERPOOL COUNCIL AREA
TRAFFIC SIGNALS AT
ELIZABETH STREET AND GEORGE STREET
LIVERPOOL

DESIGN LAYOUT

EXISTING ☐ PROPOSED ☒
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SCALE 5 0 (1:200) 5 10
FILE SF2014/009743
SUPERSEDES SHEET/ISSUE 13/D
ISSUE A
REG No. DS2014/001396
TCS No. 1004
SHEET 17

Revision 7 - August 2021

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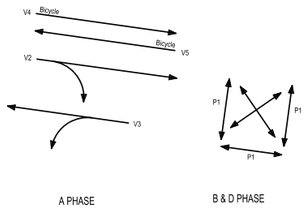
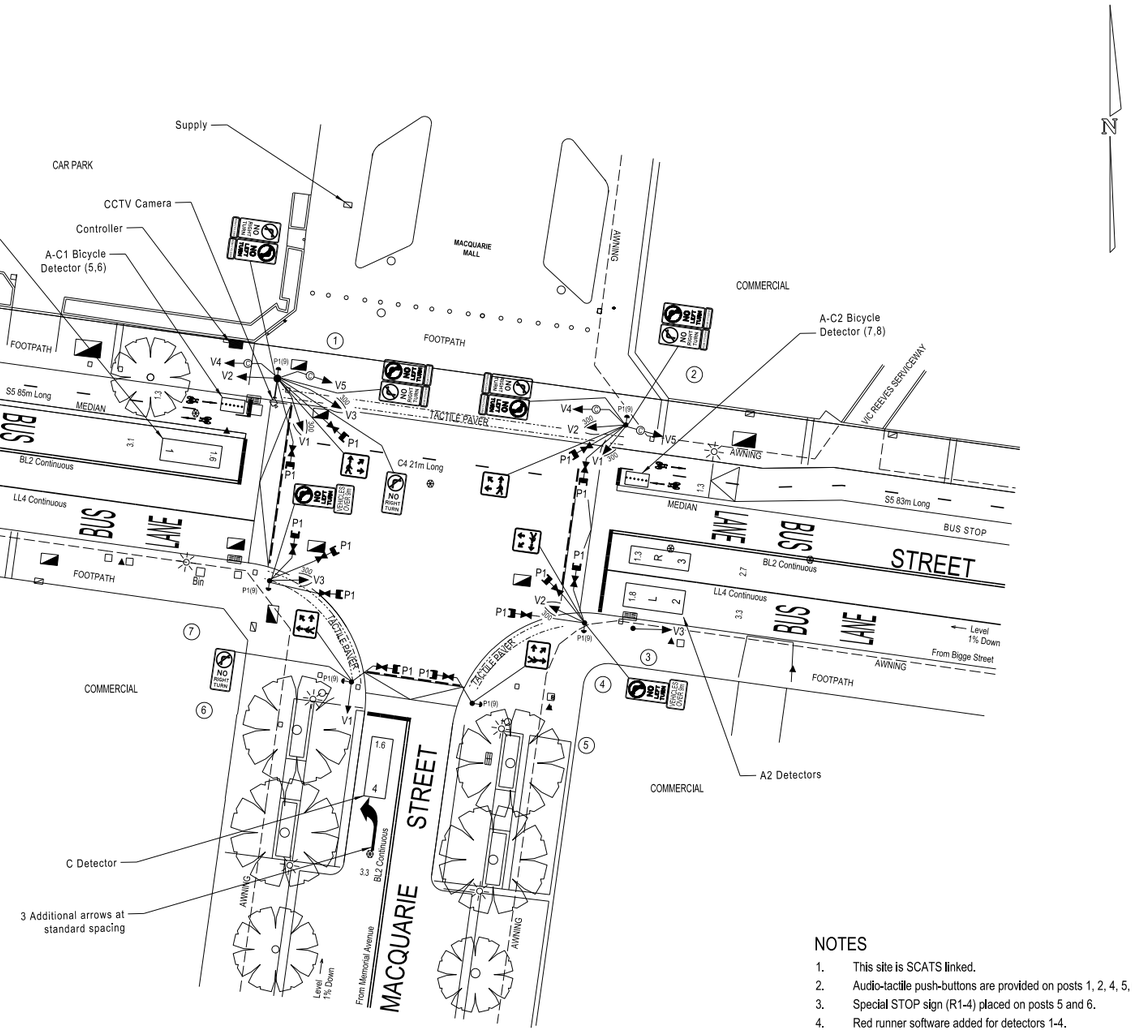
TCS 0877

DATE IN SERVICE : 15/05/74

NSW GOVERNMENT Transport for NSW



MOVEMENTS



POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS
1	4 MA	1.5	1.6	EXISTING
2	2	4.1	1.8	EXISTING
3	2	4.1	0.7	EXISTING
4	2	4.1	0.8	EXISTING
5	2	3.2	1.0	EXISTING
6	2	4.1	1.0	EXISTING
7	2	4.1	1.0	EXISTING

SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE WHEN GREEN				TABLE TYPE	REMARKS
	A	B	C	D		
V1			X		1	-
V2	X				1	-
V3	X				1	-
V4			X		3	Bicycle lantern
V5			X		3	Bicycle lantern
P1		X		X	32	-

NOTES

1. This site is SCATS linked.
2. Audio-tactile push-buttons are provided on posts 1, 2, 4, 5, 6 and 7.
3. Special STOP sign (R1-4) placed on posts 5 and 6.
4. Red runner software added for detectors 1-4.
5. CCTV camera mounted on post 1. CCTV camera control equipment mounted in signals controller.
6. Bicycle lane to be in accordance with RMS NSW Bicycle Guidelines.
7. Bicycle detectors to be installed in accordance with RMS drawings VC005-36 and VC005-38.
8. Bicycle lanterns to be 200mm with square visors and no target board.
9. Red pavement in Bus Lane to be in accordance with RMS Delineation guide and RMS QA Specification R110.

A ORIGINAL ISSUE

PUBLIC UTILITY LEGEND		REFERENCE PLANS	
HYDRANT	□	SYMBOLS/ABRVS	VD003-6
STOP VALVE	▲	STD POSN CMPT	VD001-5
GAS VALVE	#	INSTL STOP DET	VC005-17
SEWER MANHOLE	Ⓢ	VEH GROUP OP	TS-TN-019
COMMS PIT	◪	DET LOGIC OP	TS-TN-020
ELECT LIGHT POLE	☼	PED MVT OP	TS-TN-021
POWER POLE	○	CABLE INS. PLAN	SHEET 12
STAY POLE	⊘	CABLE CHART	SHEET 9
TELEPHONE BOX	☎	SURVEYOR : North Western Survey	
COMMS PILLAR	◪	DATE : April 24	

U.B.D. Ref. Map 269 D3
LS.G. CO-ORDS E : 292 830 N : 1 244 901

DESIGNED : JIMMY WAN
CHECKED : SHARATH KOTHA
SITE CHECKED MARTIN MALLIA
RECOMMENDED

DESIGN APPROVAL
APPROVED
NAME SHARATH KOTHA
POSITION PRINCIPAL TRAFFIC ENGINEER
DATE 23/05/2025
DESIGN PREPARED BY AECOM

TFNSW RECOMMENDATION
ROAD DESIGN ENGINEERING
NAME
POSITION
DATE
NETWORK OPERATIONS
NAME
POSITION
DATE

TFNSW ACCEPTANCE
ACCEPTED
NAME
POSITION
DATE
ACCEPTED BY
SECTION

TRANSPORT FOR NEW SOUTH WALES
CITY OF LIVERPOOL COUNCIL AREA
TRAFFIC SIGNALS AT
MOORE STREET AND
MACQUARIE STREET
LIVERPOOL
DESIGN LAYOUT

EXISTING ☒ PROPOSED ☐
CADD FILE: VV0877_11D_DES.DGN
SCALE 5 0 (1:200) 5 10
ISSUE F
FILE SF2014/010208
SUPERSEDES SHEET/ISSUE 11/D
REG No. DS2014/001269
TCS No. 0877
SHEET 17

$DATES $TIMES $FILES

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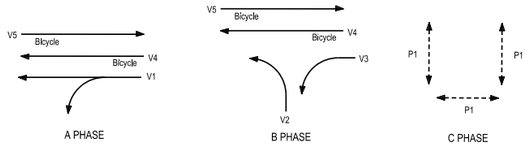
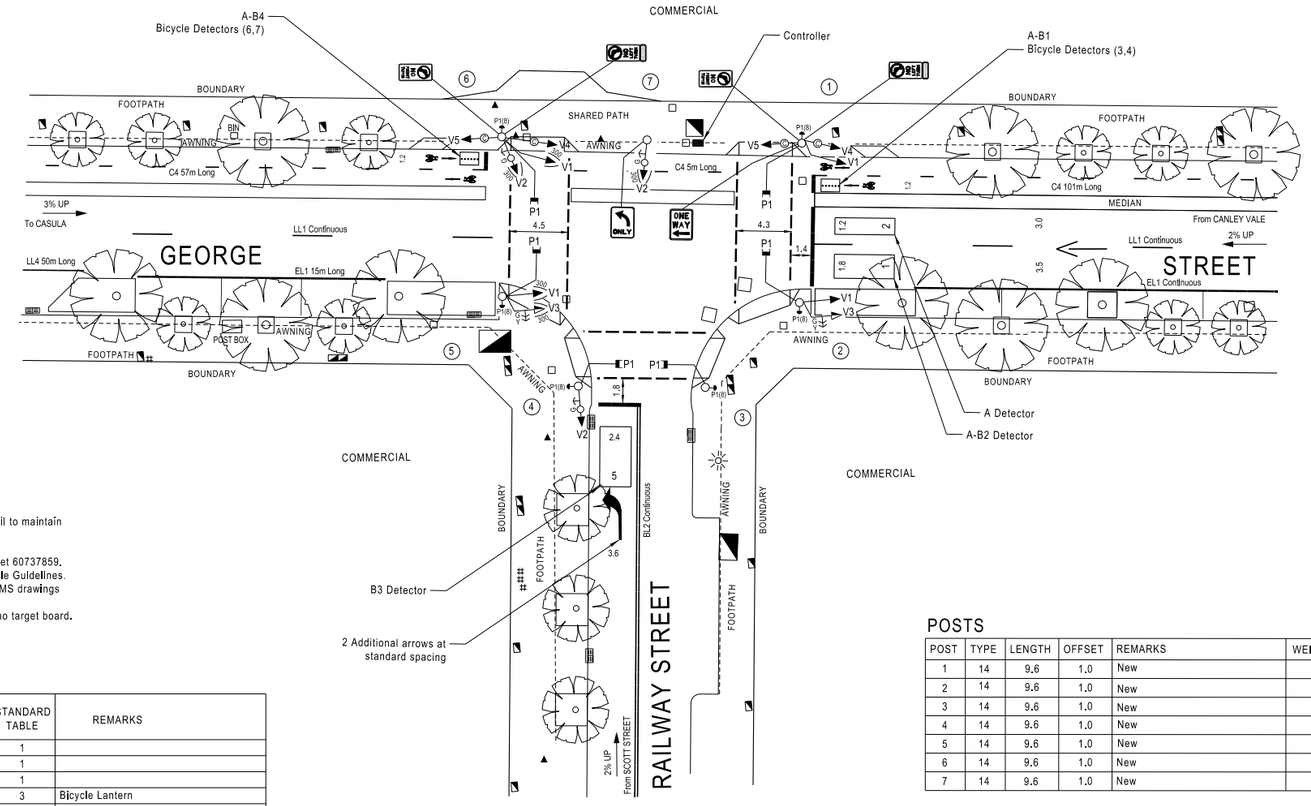
TCS 1017

DATE IN SERVICE : 01/08/1975

Transport for NSW



MOVEMENTS



NOTES

1. This site is SCATS linked.
2. Special STOP sign (R1-4) placed on post 4.
3. Audio tactile push buttons are provided on posts 1-6.
4. Trees to be regularly inspected and trimmed by Council to maintain lantern visibility.
5. Red runner software added to detectors 3, 4 and 5.
6. Civil road works in accordance with AECOM drawing set 60737859.
7. Bicycle lane to be in accordance with RMS NSW Bicycle Guidelines.
8. Bicycle Detectors to be installed in accordance with RMS drawings VC005-36 and VC005-38.
9. Bicycle lanterns to be 200mm with square visors and no target board.

SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE DURING WHICH GREEN			STANDARD TABLE	REMARKS
	A	B	C		
V1	X			1	
V2		X		1	
V3		X		1	
V4	X	X		3	Bicycle Lantern
V5	X	X		3	Bicycle Lantern
P1			X	20	Auto introduction in the presence of XFS1.

POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS	WEIGHT	MGA CO-ORDINATES ZONE 56 GDA2020 EASTING	NORTHING
1	14	9.6	1.0	New	380	308151.533	6244331.267
2	14	9.6	1.0	New	380	308163.351	6244329.560
3	14	9.6	1.0	New	380	308168.752	6244321.745
4	14	9.6	1.0	New	380	308167.430	6244312.317
5	14	9.6	1.0	New	380	308160.038	6244307.537
6	14	9.6	1.0	New	380	308148.172	6244309.024
7	14	9.6	1.0	New	380	308149.792	6244319.797

A ORIGINAL ISSUE

PUBLIC UTILITY LEGEND	
HYDRANT	
STOP VALVE	
GAS VALVE	
SEWER MANHOLE	
COMMS PIT	
ELECT LIGHT POLE	
POWER POLE	
STAY POLE	
TELEPHONE BOX	
COMMS PILLAR	

REFERENCE PLANS	
SYMBOLS/ABRVS	VD003-6
STD POSN CMPT	VD001-5
INSTL STOP DET	VC005-17
VEH GROUP OP	TS-TN-019
DET LOGIC OP	TS-TN-020
PED MVT OP	TS-TN-021
SURVEYOR : North Western Survey	
DATE : April 24	

U.B.D. Ref. Map 269 E4
I.S.G. CO-ORDS E : 292 920 N : 1 244 480

DESIGNED : JIMMY WAN
CHECKED : SHARATH KOTHA
MARTIN MALLIA
SITE CHECKED
SHARATH KOTHA
RECOMMENDED

DESIGN APPROVAL
APPROVED
NAME SHARATH KOTHA
POSITION PRINCIPAL TRAFFIC ENGINEER
DATE 30/05/2025
DESIGN PREPARED BY AECOM

TFNSW RECOMMENDATION
ROAD DESIGN ENGINEERING
NAME
POSITION
DATE
NETWORK OPERATIONS
NAME
POSITION
DATE

TFNSW ACCEPTANCE
ACCEPTED
NAME
POSITION
DATE
ACCEPTED BY
SECTION

TRANSPORT FOR NEW SOUTH WALES
LIVERPOOL COUNCIL AREA
TRAFFIC SIGNALS AT
GEORGE STREET AND
RAILWAY STREET
LIVERPOOL
DESIGN LAYOUT

EXISTING ☐ PROPOSED ☒
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SCALE 5 0 (1:200) 5 10
ISSUE A
FILE SF2014/009761
SUPERSEDES SHEET/ISSUE C/8
REG No. DS2014/001409
TCS No. 1017
SHEET 11

Revision 5 - October 2021

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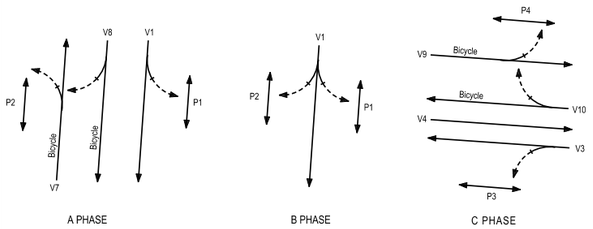
TCS 1482

DATE IN SERVICE : 01/03/786

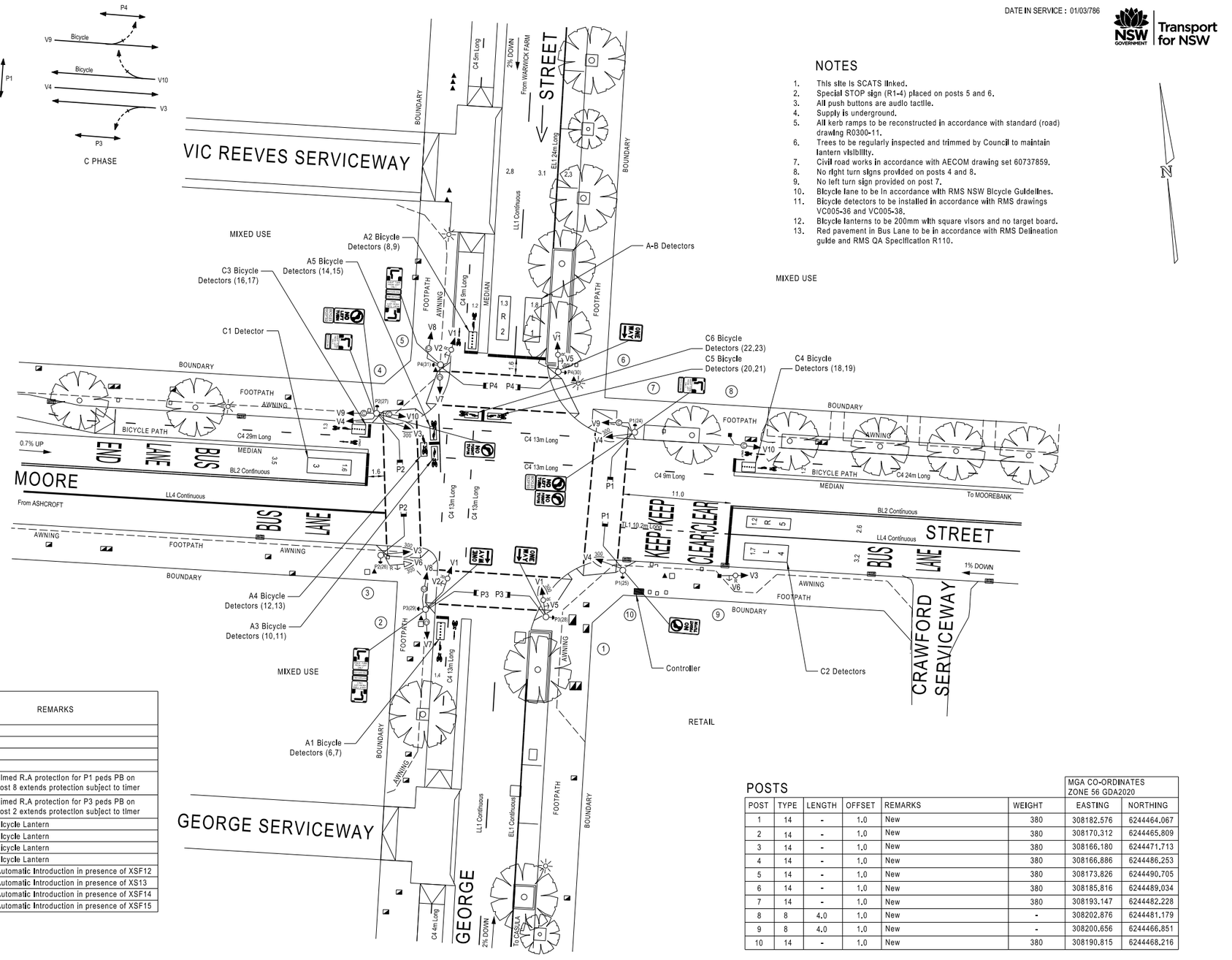
NSW GOVERNMENT Transport for NSW



MOVEMENTS

NOTES

1. This site is SCATS linked.
2. Special STOP sign (R1-4) placed on posts 5 and 6.
3. All push buttons are audio tactile.
4. Supply is underground.
5. All kerb ramps to be reconstructed in accordance with standard (road) drawing R0300-11.
6. Trees to be regularly inspected and trimmed by Council to maintain lantern visibility.
7. Civil road works in accordance with AECOM drawing set 60737859.
8. No right turn signs provided on posts 4 and 8.
9. No left turn sign provided on post 7.
10. Bicycle lane to be in accordance with RMS NSW Bicycle Guidelines.
11. Bicycle detectors to be installed in accordance with RMS drawings VC005-36 and VC005-38.
12. Bicycle lanterns to be 200mm with square visors and no target board.
13. Red pavement in Bus Lane to be in accordance with RMS Delineation guide and RMS QA Specification R110.



SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE DURING WHICH GREEN			STANDARD TABLE	REMARKS
	A	B	C		
V1	X	X		1	
V2		X		83	
V3			X	1	
V4			X	3	
V5	X	X		44	Timed R.A protection for P1 peds PB on post 8 extends protection subject to timer
V6				44	Timed R.A protection for P3 peds PB on post 2 extends protection subject to timer
V7	X			1	Bicycle Lantern
V8	X			1	Bicycle Lantern
V9			X	1	Bicycle Lantern
V10			X	1	Bicycle Lantern
P1	X	X		1	Automatic Introduction in presence of XSF12
P2	X	X		1	Automatic Introduction in presence of XS13
P3			X	1	Automatic Introduction in presence of XSF14
P4			X	26	Automatic Introduction in presence of XSF15

POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS	WEIGHT	MGA CO-ORDINATES ZONE 56 GDA2020 EASTING	NORTHING
1	14	-	1.0	New	380	308182.576	6244464.067
2	14	-	1.0	New	380	308170.312	6244465.809
3	14	-	1.0	New	380	308166.180	6244471.713
4	14	-	1.0	New	380	308166.886	6244486.253
5	14	-	1.0	New	380	308173.826	6244490.705
6	14	-	1.0	New	380	308185.816	6244489.034
7	14	-	1.0	New	380	308193.147	6244482.228
8	8	4.0	1.0	New	-	308202.876	6244481.179
9	8	4.0	1.0	New	-	308200.656	6244466.851
10	14	-	1.0	New	380	308190.815	6244468.216

A ORIGINAL ISSUE

PUBLIC UTILITY LEGEND		REFERENCE PLANS	
HYDRANT	□	SYMBOLS/ABRVS	VD003-6
STOP VALVE	▲	STD POSN CMPT	VD001-5
GAS VALVE	#	INSTL STOP DET	VC005-17
SEWER MANHOLE	Ⓢ	VEH GROUP OP	TS-TN-019
COMMS PIT	◪	DET LOGIC OP	TS-TN-020
ELECT LIGHT POLE	☼	PED MVT OP	TS-TN-021
POWER POLE	○		
STAY POLE	⊘		
TELEPHONE BOX	T	SURVEYOR : North Western Survey	
COMMS PILLAR	◕	DATE : April 24	

U.B.D. Ref. Map 1 E11
L.G.S. CO-ORDS E: 318 921 N: 1 251 337

DESIGNED : JIMMY WAN
CHECKED : SHARATH KOTHA
MARTIN MALLIA
SITE CHECKED
SHARATH KOTHA
RECOMMENDED

DESIGN APPROVAL
APPROVED
NAME SHARATH KOTHA
POSITION PRINCIPAL TRAFFIC ENGINEER
DATE 30/05/2025
DESIGN PREPARED BY AECOM

TFNSW RECOMMENDATION
ROAD DESIGN ENGINEERING
NAME
POSITION
DATE
NETWORK OPERATIONS
NAME
POSITION
DATE

TFNSW ACCEPTANCE
ACCEPTED
NAME
POSITION
DATE
ACCEPTED BY
SECTION

TRANSPORT FOR NEW SOUTH WALES

LIVERPOOL COUNCIL AREA
TRAFFIC SIGNALS AT
MOORE STREET AND GEORGE STREET,
LIVERPOOL

DESIGN LAYOUT

EXISTING ☐ PROPOSED ☒
CADD FILE: VV1482_8D_DES.dgn
SCALE 5 0 (1:200) 5 10
ISSUE A
FILE SF2014/010399
SUPERSEDES SHEET/ISSUE D/8
REG No. DS2014/001873
TCS No. 1482
SHEET 11

Revision 7 - August 2021

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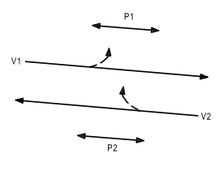
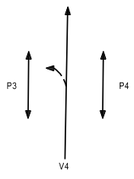
TCS 2822

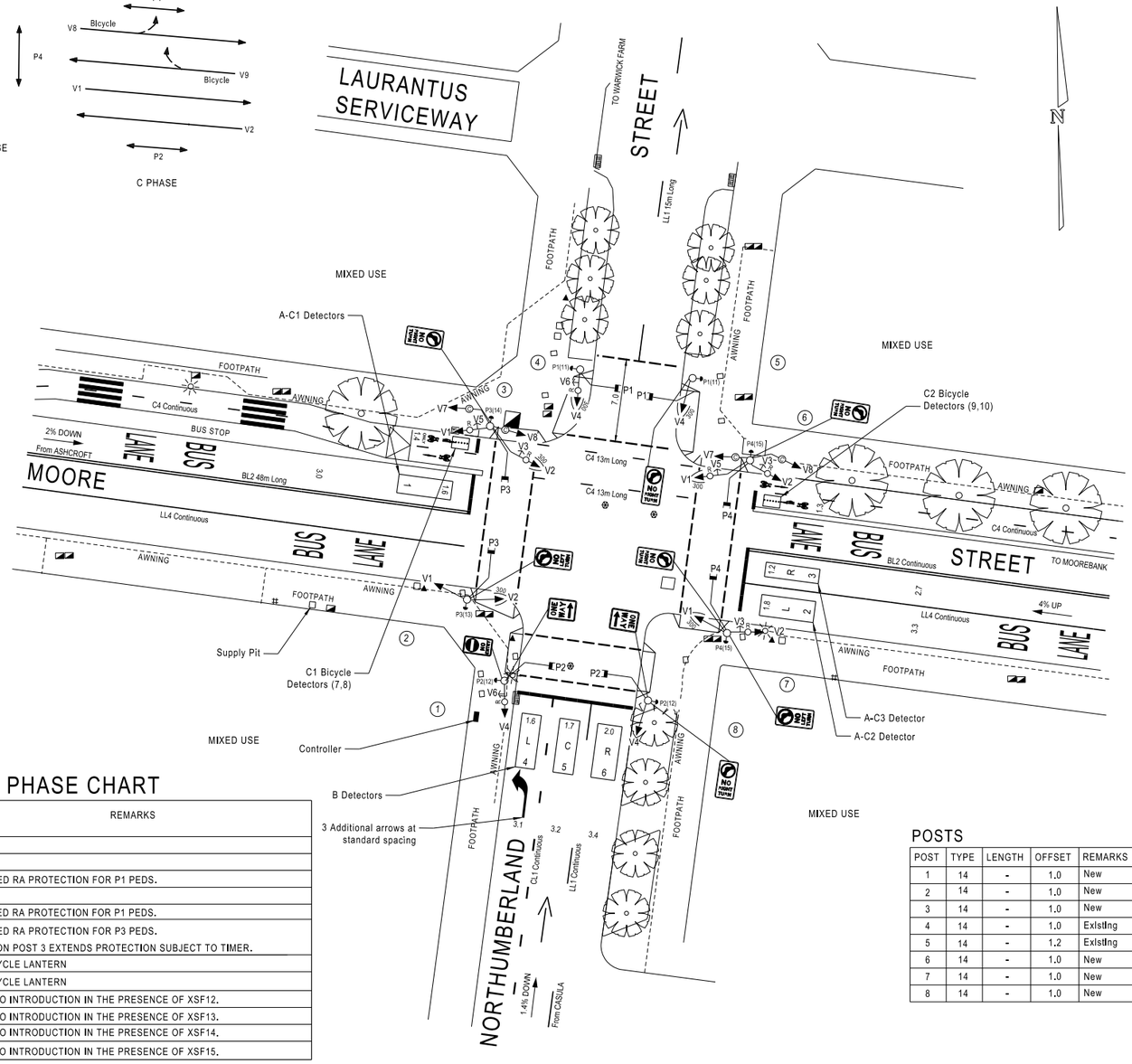
DATE IN SERVICE : 14/12/86

Transport for NSW





MOVEMENTS



DETECTOR SPECIFICATION

Detector		Specifications			
A1	FN	A(L)	C(L)	A(E1)	C(E1)
	SG/PS	V1	V1	A	C
	DS	—	XSF1	C(NEXT)	A(NEXT)
A2	FN	A(L)	C(L)	A(E2)	C(E2)
	SG/PS	V2	V2	A	C
	DS	—	XSF1	C(NEXT)	A(NEXT)
B	FN	B(L)	D(L)	B(E1)	D(E1)
	SG/PS	V4	V4	B	D
	DS	—	XSF1	D(NEXT)	B(NEXT)
C1 (Bicycle)	FN	E(L)	E(E1)		
	SG/PS	E	E		
	DS	—	—		
C2 (Bicycle)	FN	C(L)	C(E2)		
	SG/PS	E	E		
	DS	—	—		
P1 P.B.	FN	A(PB)	C(PB)	B(L)	D(L)
	SG/PS	V1,P1(WALK)	V1,P1(WALK)	V1,P1(WALK)	C,P1(WALK)
	DS	—	XSF1	B	D
P2 P.B.	FN	A(PB)	C(PB)	B(L)	D(L)
	SG/PS	V1,P2(WALK)	V1,P2(WALK)	V1,P2(WALK)	C,P2(WALK)
	DS	—	XSF1	B	D
P3 P.B.	FN	B(PB)	D(PB)	A(L)	C(L)
	SG/PS	V4,P3(WALK)	V4,P3(WALK)	V4,P3(WALK)	D,P3(WALK)
	DS	—	XSF1	A	C
P4 P.B.	FN	B(PB)	D(PB)	A(L)	C(L)
	SG/PS	V4,P4(WALK)	V4,P4(WALK)	V4,P4(WALK)	D,P4(WALK)
	DS	—	XSF1	A	C

NOTES

1. This site is SCATS linked.
2. Special STOP sign (R1-4) placed on posts 1 and 8.
3. Audio tactile push buttons are provided on all posts.
4. Red runner software added to detectors 1-8.
5. Bicycle lane to be in accordance with RMS Bicycle Guidelines.
6. Bicycle detectors to be installed in accordance with RMS drawings VC005-36 and VC005-38.
7. Bicycle lanterns to be 200mm with square visors and no target board.
8. Civil road works in accordance with AECOM drawing set 60737859.

SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE WHEN GREEN					STANDARD TABLE	REMARKS
	A	B	C	D	E		
V1	X		X		X	3	
V2	X		X		X	3	
V3						29	TIMED RA PROTECTION FOR P1 PEDS.
V4		X		X		3	
V5						30	TIMED RA PROTECTION FOR P1 PEDS.
V6						44	TIMED RA PROTECTION FOR P3 PEDS. PB ON POST 3 EXTENDS PROTECTION SUBJECT TO TIMER.
V7					X	1	BICYCLE LANTERN
V8					X	1	BICYCLE LANTERN
P1	X		X		X	33	AUTO INTRODUCTION IN THE PRESENCE OF XSF12.
P2	X		X		X	33	AUTO INTRODUCTION IN THE PRESENCE OF XSF13.
P3		X		X		33	AUTO INTRODUCTION IN THE PRESENCE OF XSF14.
P4		X		X		33	AUTO INTRODUCTION IN THE PRESENCE OF XSF15.

POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS	WEIGHT	MGA CO-ORDINATES ZONE 56 GDA2020 EASTING	NORTHING
1	14	-	1.0	New	-	307948.080	6244495.670
2	14	-	1.0	New	-	307945.021	6244502.422
3	14	-	1.0	New	-	307947.034	6244516.782
4	14	-	1.0	Existing	-	-	-
5	14	-	1.2	Existing	-	-	-
6	14	-	1.0	New	-	307968.565	6244513.801
7	14	-	1.0	New	-	307966.554	6244499.490
8	14	-	1.0	New	-	307959.961	6244493.951

A ORIGINAL ISSUE

PUBLIC UTILITY LEGEND		REFERENCE PLANS	
HYDRANT		SYMBOLS/ABRVS	VD003-6
STOP VALVE		STD POSN CMPT	VD001-5
GAS VALVE		INSTL STOP DET	VC035-17
SEWER MANHOLE		VEH GROUP OP	TS-TN-019
COMMS PIT		DET LOGIC OP	TS-TN-020
ELECT LIGHT POLE		PED MVT OP	TS-TN-021
POWER POLE			
STAY POLE			
TELEPHONE BOX		SURVEYOR : North Western Survey	
COMMS PILLAR		DATE : Apr 24	

U.B.D. Ref. Map 269 D3
I.S.G. COORDS E : 292 727 N : 1 251 337

DESIGNED : JIMMY WAN
CHECKED : SHARATH KOTHA
MARTIN MALLIA
SITE CHECKED
SHARATH KOTHA
RECOMMENDED

DESIGN APPROVAL	TFNSW RECOMMENDATION	TFNSW ACCEPTANCE
APPROVED	ROAD DESIGN ENGINEERING	ACCEPTED
NAME SHARATH KOTHA	NAME	NAME
POSITION PRINCIPAL TRAFFIC ENGINEER	POSITION	POSITION
DATE 29/05/2025	DATE	DATE
DESIGN PREPARED BY AECOM	NETWORK OPERATIONS	ACCEPTED BY
	NAME	SECTION
	POSITION	
	DATE	

TRANSPORT FOR NEW SOUTH WALES

LIVERPOOL COUNCIL AREA
TRAFFIC SIGNALS AT
MOORE STREET AND
NORTHUMBERLAND STREET
LIVERPOOL

DESIGN LAYOUT

EXISTING ☐ PROPOSED ☒

CADD FILE: VV2822_7E_DES.dgn

SCALE 5 0 (1:200) 5 10

FILE SF2014/012522

SUPERSEDES SHEET/ISSUE 7/E

ISSUE A

REG No. DS2014/003211

TCS No. 2822

SHEET 10

Revision 7 - August 2021

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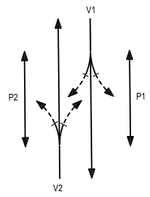
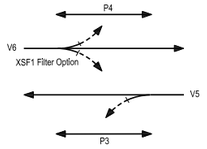
TCS 2869

DATE IN SERVICE : 09/09/1993

NSW GOVERNMENT Transport for NSW



A PHASE



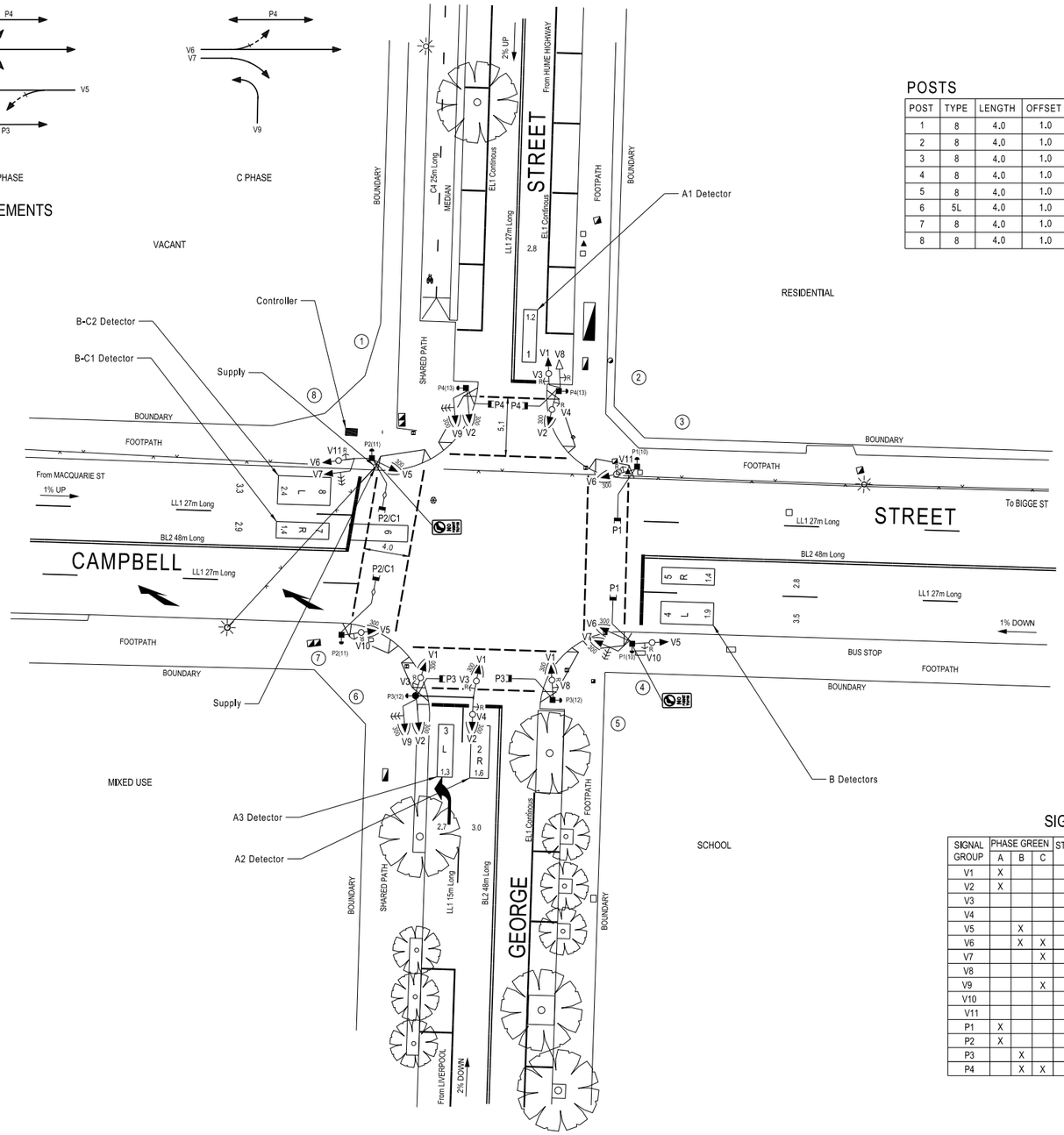
B PHASE

C PHASE

MOVEMENTS

DETECTOR SPECIFICATION

Detector	Specifications				
A1	FN	A(L)	A(E1)		
	SG/PS	$\overline{A}$	A		
	DS	—	—		
A2	FN	A(L)	A(E2)		
	SG/PS	$\overline{A}$	A		
	DS	—	—		
A3	FN	A(PR)	A(E3)		
	SG/PS	$\overline{A}$	A		
	DS	—	—		
B	FN	B(L)	B(E2)		
	SG/PS	$\overline{B}$	B		
	DS	—	—		
B-C1 Depart. & Approach	FN	C(PR)	C(E2)		
	SG/PS	B	C		
	DS	—	B(NEXT)		
B-C1 Approach	FN	B(L),C(L)	B(E3)		C(E3)
	SG/PS	$\overline{V6}$	B		C
	DS	—	$\overline{B\text{-}C1(PR)}$,$\overline{C(NEXT)}$		$\overline{B(NEXT)}$
B-C2	FN	B(L)	B(E1)	C(E1)	
	SG/PS	$\overline{V6}$	B	C	
	DS	$\overline{C}$	$\overline{C(NEXT)}$	$\overline{B(NEXT)}$	
P1 P.B.	FN	A (PB)	B(L)		
	SG/PS	$\overline{P1(WALK)}$	A,$\overline{P1(WALK)}$		
	DS	—	$\overline{B,C}$		
P2 P.B.	FN	A (PB)	B(L)		
	SG/PS	$\overline{P2(WALK)}$	A,$\overline{P2(WALK)}$		
	DS	—	$\overline{B,C}$		
P3 P.B.	FN	B(PB)	A(L)		
	SG/PS	$\overline{P3(WALK)}$	B,$\overline{P3(WALK)}$		
	DS	—	$\overline{A,C}$		
P4 P.B.	FN	B(PB)		A(L)	
	SG/PS	$\overline{V8,P4(WALK)}$		$\overline{V8,P4(WALK)}$	
	DS	$\overline{C}$		$\overline{A}$	



POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS	MGA CO-ORDINATES ZONE 56 GDA2020 EASTING	NORTHING
1	8	4.0	1.0	New	308250.902	6245011.405
2	8	4.0	1.0	New	308258.764	6245010.296
3	8	4.0	1.0	New	308264.728	6245003.162
4	8	4.0	1.0	New	308262.702	6244988.164
5	8	4.0	1.0	New	308255.430	6244984.116
6	5L	4.0	1.0	New	308243.825	6244985.722
7	8	4.0	1.0	New	308238.088	6244991.570
8	8	4.0	1.0	New	308242.275	6245006.298

NOTES

1. This site is SCATS linked.
2. Special STOP sign (R1-4) placed on posts 4 and 8.
3. Audio tactile push buttons are provided on all posts.
4. Civil road works in accordance with AECOM drawing set 60737859.
5. Trees to be regularly inspected and trimmed by Council to maintain lantern visibility.
6. Red runner software added to detectors 1-5 and 7-8.

SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE GREEN A	B	C	STANDARD TABLE	REMARKS
V1	X			1	–
V2	X			1	–
V3				29	Timed RA protection for 'P2' pedestrians.
V4				29	Timed RA protection for 'P1' pedestrians.
V5		X		1	–
V6		X	X	3	–
V7			X	41	XSF1 Filter Option. Timed RA protection for 'P3' pedestrians.
V8				30	Timed RA protection for 'P1' pedestrians. PB on post 4 extends RA subject to timer.
V9			X	12	Timed RA protection for 'P2' pedestrians. PB on post 8 extends RA subject to timer.
V10				30	Timed RA protection for 'P3' pedestrians. PB on post 6 extends RA subject to timer.
V11				30	Timed RA protection for 'P4' pedestrians.
P1	X			41	Auto introduction in the presence of XSF17
P2	X			41	Auto introduction in the presence of XSF18
P3		X		41	Auto introduction in the presence of XSF19
P4		X	X	42	Auto introduction in the presence of XSF20.

A ORIGINAL ISSUE

PUBLIC UTILITY LEGEND		REFERENCE PLANS	
HYDRANT	□	SYMBOLS/ABRVS	VD003-6
STOP VALVE	▲	STD POSN CMPT	VD001-5
GAS VALVE	#	INSTL STOP DET	VC005-17
SEWER MANHOLE	⊕	VEH GROUP OP	TS-TN-019
COMMS PIT	◪	DET LOGIC OP	TS-TN-020
ELECT LIGHT POLE	○	PED MVT OP	TS-TN-021
POWER POLE	○		
STAY POLE	⊘		
TELEPHONE BOX	T	SURVEYOR :	North Western Survey
COMMS PILLAR	◕	DATE :	Apr@24

U.B.D. Ref. Map 88 F2
L.S.G. CO-ORDS E : 293 030 N : 1 245 465

DESIGNED : JIMMY WAN
CHECKED : SHARATH KOTHA
MARTIN MALLIA
SITE CHECKED
SHARATH KOTHA
RECOMMENDED

DESIGN APPROVAL	TFNSW RECOMMENDATION	TFNSW ACCEPTANCE
APPROVED	ROAD DESIGN ENGINEERING	ACCEPTED
NAME SHARATH KOTHA	NAME	NAME
POSITION PRINCIPAL TRAFFIC ENGINEER	POSITION	POSITION
DATE 29/05/2025	DATE	DATE
DESIGN PREPARED BY AECOM	NETWORK OPERATIONS NAME / POSITION / DATE	ACCEPTED BY SECTION

TRANSPORT FOR NEW SOUTH WALES

LIVERPOOL COUNCIL AREA
TRAFFIC SIGNALS AT
GEORGE STREET AND
CAMPBELL STREET
LIVERPOOL

DESIGN LAYOUT

EXISTING ☐ PROPOSED ☒

CADD FILE: VV2869_1C_DES.dgn

SCALE 5 0 (1:200) 5 10

FILE SF2014/012221

SUPERSEDES SHEET/ISSUE 1/C

ISSUE A

REG No. DS2014/003258

TCS No. 2869

SHEET 4

Revision 7 - August 2021

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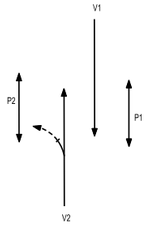
TCS 3315

DATE IN SERVICE : 06/06/97

NSW GOVERNMENT Transport for NSW



A PHASE

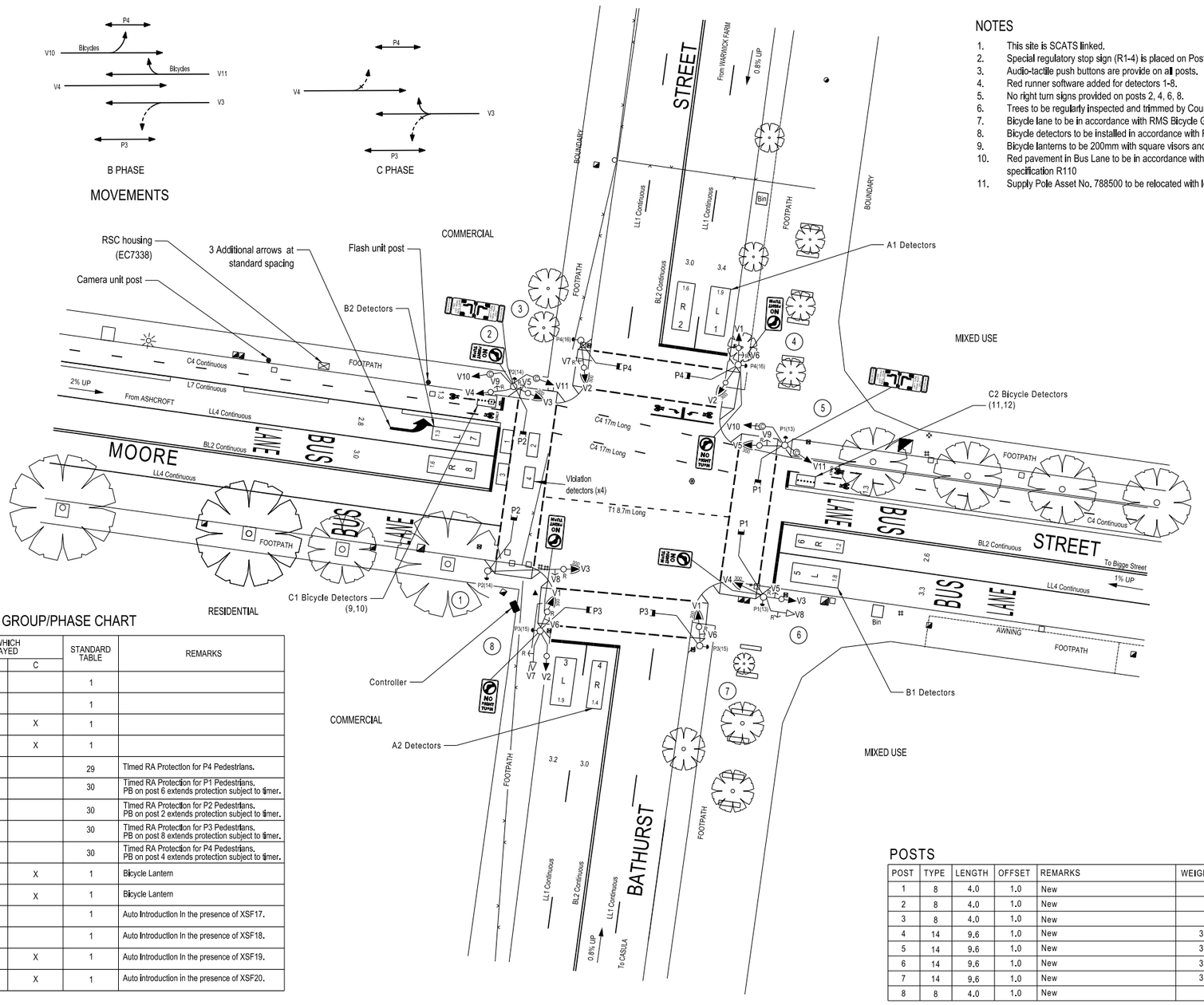
B PHASE

C PHASE

MOVEMENTS

NOTES

1. This site is SCATS linked.
2. Special regulatory stop sign (R1-4) is placed on Posts 4 and 8.
3. Audio-tactile push buttons are provide on all posts.
4. Red runner software added for detectors 1-8.
5. No right turn signs provided on posts 2, 4, 6, 8.
6. Trees to be regularly inspected and trimmed by Council to maintain lantern visibility.
7. Bicycle lane to be in accordance with RMS Bicycle Guidelines.
8. Bicycle detectors to be installed in accordance with RMS drawings VC005-36 and VC005-38.
9. Bicycle lanterns to be 200mm with square visors and no target board.
10. Red pavement in Bus Lane to be in accordance with RMS Delineation guide and RMS QA specification R110
11. Supply Pole Asset No. 788500 to be relocated with location to be determined.



DETECTOR SPECIFICATION

Detector	Specifications			
A1	FN	A(L)	A(E1)	
	SG/PS	$\bar{A}$	A	
	DS	-	-	
A2	FN	A(L)	A(E2)	
	SG/PS	$\bar{A}$	A	
	DS	-	-	
B1 (Bicycle)	FN	B(L)	B(E1)	
	SG/PS	$\bar{B}$	B	
	DS	-	-	
B2 (Bicycle)	FN	B(L)	B(E2)	
	SG/PS	$\bar{B}$	B	
	DS	-	-	
C1	FN	C(L)	C(E1)	
	SG/PS	$\bar{C}$	C	
	DS	-	-	
C2	FN	C(L)	C(E2)	
	SG/PS	$\bar{C}$	C	
	DS	-	-	
P1 P.B.	FN	A(PB)	B(L)	
	SG/PS	P1(WALK)	A.P1(WALK)	
	DS	-	$\bar{B}\,\bar{C}$	
P2 P.B.	FN	A(PB)	B(L)	
	SG/PS	P2(WALK)	A.P2(WALK)	
	DS	-	$\bar{B}\,\bar{C}$	
P3 P.B.	FN	B(PB)	A(L)	
	SG/PS	P3(WALK)	B.P3(WALK)	
	DS	-	$\bar{A}.\bar{C}$	
P4 P.B.	FN	B(PB)		B(L)
	SG/PS	V5P4(WALK)		V5.P4(WALK)
	DS	$\bar{C}$		$\bar{A}$

SIGNAL GROUP/PHASE CHART

SIGNAL GROUP	PHASE DURING WHICH GREEN IS DISPLAYED			STANDARD TABLE	REMARKS
	A	B	C		
V1	X			1	
V2	X			1	
V3		X	X	1	
V4		X	X	1	
V5				29	Timed RA Protection for P4 Pedestrians.
V6				30	Timed RA Protection for P1 Pedestrians. PB on post 6 extends protection subject to timer.
V7				30	Timed RA Protection for P2 Pedestrians. PB on post 2 extends protection subject to timer.
V8				30	Timed RA Protection for P3 Pedestrians. PB on post 8 extends protection subject to timer.
V9				30	Timed RA Protection for P4 Pedestrians. PB on post 4 extends protection subject to timer.
V10			X	1	Bicycle Lantern
V11			X	1	Bicycle Lantern
P1	X			1	Auto Introduction In the presence of XSF17.
P2	X			1	Auto Introduction In the presence of XSF18.
P3		X	X	1	Auto Introduction In the presence of XSF19.
P4		X	X	1	Auto introduction in the presence of XSF20.

POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS	WEIGHT	MGA CO-ORDINATES ZONE 56 GDA2020 EASTING	NORTHING
1	8	4.0	1.0	New	-	307832.595	6244517.086
2	8	4.0	1.0	New	-	307835.025	6244534.417
3	8	4.0	1.0	New	-	307841.290	6244538.583
4	14	9.6	1.0	New	380	307856.116	6244536.455
5	14	9.6	1.0	New	380	307860.496	6244528.896
6	14	9.6	1.0	New	380	307858.496	6244514.634
7	14	9.6	1.0	New	380	307852.507	6244510.058
8	8	4.0	1.0	New	-	307837.512	6244511.455

A ORIGINAL ISSUE

PUBLIC UTILITY LEGEND		REFERENCE PLANS	
HYDRANT	□	SYMBOLS/ABBRVS	VD003-6
STOP VALVE	▲	STD POSN CMPT	VD001-3
GAS VALVE	⌗	INSTL STOP DET	VC005-17
SEWER MANHOLE	Ⓢ	VEH GROUP OP	TS-TN-019
COMMS PIT	◪	DET LOGIC OP	TS-TN-020
ELECT LIGHT POLE	☾		
POWER POLE	○		
STAY POLE	⊘		
TELEPHONE BOX	🅃	SURVEYOR:	North Western Survey
COMMS PILLAR	◪	DATE :	April 24

U.B.D. Ref. MAP 269 C3
I.S.G. CO-ORDS E : 293615 N : 1244989

DESIGNED : JIMMY WAN
CHECKED : SHARATH KOTHA
MARTIN MALLIA
SITE CHECKED
SHARATH KOTHA
RECOMMENDED

DESIGN APPROVAL
APPROVED
NAME SHARATH KOTHA
POSITION PRINCIPAL TRAFFIC ENGINEER
DATE 29/05/2025
DESIGN PREPARED BY AECOM

TFNSW RECOMMENDATION
ROAD DESIGN ENGINEERING
NAME
POSITION
DATE
NETWORK OPERATIONS
NAME
POSITION
DATE

TFNSW ACCEPTANCE
ACCEPTED
NAME
POSITION
DATE
ACCEPTED BY
SECTION

TRANSPORT FOR NEW SOUTH WALES

LIVERPOOL COUNCIL AREA
TRAFFIC SIGNALS AT
MOORE STREET AND BATHURST STREET,
LIVERPOOL

DESIGN LAYOUT

EXISTING ☒ PROPOSED ☐
CADD FILE: VV3315_4F_DES.dgn
SCALE 5 0 (1:200) 5 10
FILE SF2014/012802
SUPERSEDES SHEET/ISSUE 4/E
ISSUE A
REG No. DS2014/003702
TCS No. 3315
SHEET 7

Revision 7 - August 2021

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Prepared for
Liverpool City Council
ABN: 84 181 182 471

DRAFT

AECOM

Road Safety Audit

Pre-Construction - Concept Design

23-May-2025
George Street and Moore Street Cycleways

aecom.com

Delivering a better world

D R A F T

Road Safety Audit

Pre-Construction - Concept Design

Client: Liverpool City Council

ABN: 84 181 182 471

Prepared by

AECOM Australia Pty Ltd
Gadigal Country, Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
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ABN 20 093 846 925

23-May-2025

Job No.: 60737859

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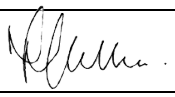
D R A F T

Quality Information

Document	Road Safety Audit
Ref	60737859
Date	23-May-2025
Originator	Shihui (Sara) Hu, Anoop Sridhar
Checker/s	Jacky Leung
Verifier/s	Jacky Leung

Revision History

Rev	Revision Date	Details	Approved	
			Name/Position	Signature
A	23-May-2025	Initial Issue	Martin Mallia Project Manager	

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Audit Summary

Audit Details	
RSA No.:	60737859
Audited project:	George Street and Moore Street Cycleways
Audit type:	Pre-Construction
Auditors:	Jacky Leung – Lead Auditor Auditor Level 3 Registered No: RSA-02-0319 Shihui (Sara) Hu – Audit team member Auditor Level 2 Registered No: RSA-02-1744 Anoop Sridhar – Audit team member (Observer) Auditor Level 0 Registered No: NA
Commencement meeting:	13 May 2025
Audit date:	15 May 2025
Completion meeting:	-
Sponsor Details	
Audit for:	Liverpool City Council
Contact name:	Ashlyn Narayan
Email:	narayana@liverpool.nsw.gov.au
Phone:	02 8711 7119

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1.0 Introduction

1.1 Project Background

Liverpool City Council commissioned AECOM to undertake a Road Safety Audit (RSA) of the concept design for the George Street and Moore Street Cycleways project (the Project).

Liverpool is located in Sydney's southwest and is emerging as the city's third CBD, positioned at the heart of major regional infrastructure investment. As a key metropolitan centre, Liverpool is undergoing significant urban transformation, with increasing population growth, development, and economic activity driving demand for enhanced transport and public domain infrastructure.

The George Street section forms a critical north-south connection between Scott Street and Copeland Street, linking significant civic, commercial, and cultural landmarks, including the Liverpool police station, courthouse, Westfield shopping centre, and the vibrant Little India precinct.

The Moore Street section of the cycleway serves as a key east-west link between Bigge Street and Copeland Street, connecting major destinations such as the University of Wollongong Liverpool campus, Macquarie Street pedestrian zone, and Liverpool's shopping precinct. It also integrates with Liverpool train station, local bus services, and the T-Way corridor, ensuring seamless multimodal access.

An overview of the Project site is shown in Figure 1.

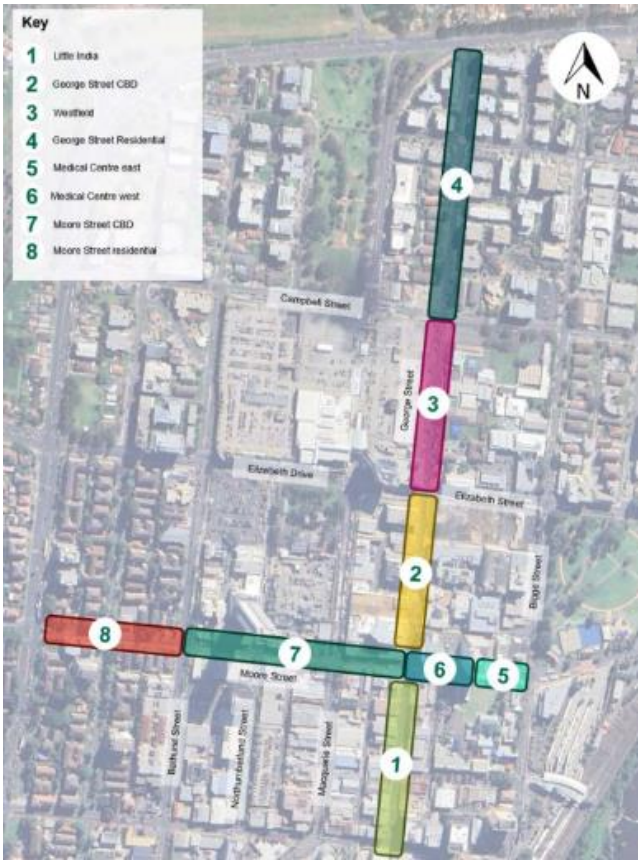

Figure 1 Project Overview

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1.2 Purpose

The purpose of this audit is shown in Table 1.

Table 1 Audit Purpose

Project Phase	Type of Road Safety Audit	Purpose of this Audit
Pre-construction	Strategic design	
	Concept design	✓
	Detailed design	
Construction	Roadworks	
	Pre-opening	
Post construction	Finalisation	
	Existing road	

1.3 Context

The project is strategically identified as key cycling corridors within Council's Liverpool CBD Active and Public Transport Study and Transport Strategy for the Liverpool City Centre. The project is intended to make it safer for all people to walk and cycle by providing two dedicated separated cycleways along the two key arterial streets George Street and Moore Street within the City Centre:

- George St between Hume Highway and Scott St
- Moore Street between Hume Highway and Bigge St

The Project will also introduce integrated urban design Improvements within the public domain. It is anticipated that this project will support the overall Liverpool CBD Masterplan that envisions a local city centre with functional and desirable open space as well as improved streets and connectivity.

The RSA extent for the Project is indicated in Figure 2.

Figure 2 RSA extent for the Project

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2.0 Road Safety Audit Process

The RSA was undertaken in accordance with the NSW Centre for Road Safety's Guidelines for Road Safety Audit Practices (July 2011) and with reference to Austroads Guide to Road Safety Part 6: Road Safety Audit (January 2022). The RSA methodology is based on the experience and skill of audit team members, rather than using checklists.

2.1 Scope of the RSA

This audit comprises a pre-construction (concept design) RSA. The RSA was conducted to ascertain potential risks to road safety for all road users.

Issues considered during the RSA were:

- Existing conditions
- Road alignment and cross-section
- Physical objects
- Existing lighting conditions
- Traffic control devices
- Proposed road upgrades

The objective of the RSA is to identify potential safety issues for all road users within the RSA study area, and to ensure that these are recognised and considered.

The following matters were considered:

- Have all of the movements of all the various road users been catered for in a safe way?
- Are the appropriate operational and control mechanisms in place to promote safety?
- Would the system operate to an acceptable level of safety in all situations, such as poor weather or during darkness?
- Are there opportunities to reduce the occurrence or severity of crashes?

Although the RSA has identified risks to road safety, the responsibility for assessing and implementing remedial measures remains with the designers, project managers and asset owners. It should be noted that it is not the role of the road safety auditor to provide solutions to the identified risks. However, identification of potential safety concerns may assist the project manager in reducing the incidence and severity of crashes.

2.2 Exclusions

The following items are excluded from the scope of this RSA:

- Areas outside of the RSA study area
- Service plan
- Swept path analysis
- Capacity of drainage facilities
- Construction staging and associated works
- Wet weather conditions, noting that it was cloudy on the day of the site visit

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2.3 Audit Team and Sponsor Details

Audit team and sponsor details are shown in Table 2.

Table 2 RSA Team and Sponsor Details

Role	Name	
Sponsor	Ashlyn Narayan	
Sponsor email	narayana@liverpool.nsw.gov.au	
Lead auditor	Jacky Leung	Level 3 - RSA-02-0319
Lead auditor email	jacky.leung2@aecom.com	
Audit team member	Shihui (Sara) Hu	Level 2 - RSA-02-1744
Audit team member (Observer)	Anoop Sridhar	Level 0

2.4 Information and Materials Supplied

The following materials were provided for consideration as part of this RSA:

- Design Drawing: 250515-60737859-SHT-00-1000-CI-GA-WIP, Dated 15 May 2025 (audited material)

2.5 Reference Materials

The RSA was undertaken with reference to:

- Transport for New South Wales, Guideline for Road Safety Audit Practices, (July 2011)
- Transport for New South Wales, Road Safety Audit Practices-L5 Road safety audit categories
- Transport for New South Wales, Guide for Risk Management, ILC-MI-TP0-201-G01, (June 2009)
- Austroads, Guide to Road Safety Part 6: Road Safety Audit (January 2022).

The potential risk(s) to road safety identified are based on a subjective assessment of the risk likelihood and crash consequence, as outlined in Section 3.0.

2.6 Meetings and Assessment Details

The key dates and the RSA timelines are presented in Table 3.

Table 3 RSA Timeline

Activity	Date	Attendees
Opening meeting	13 May 2025	Jacky Leung, Shihui (Sara) Hu, Anoop Sridhar, Martin Mallia
Daylight inspection	15 May 2025	Jacky Leung, Shihui (Sara) Hu
Night inspection	15 May 2025	Jacky Leung, Shihui (Sara) Hu
Closing meeting	-	-

In the opening meeting, Martin Mallia, the Project Manager, attended and acted as the project sponsor during the meeting.

Site inspections were undertaken on 15 May 2025 by the audit team during daytime and night-time to observe existing conditions on the road and road user behaviours. Site walks on the streets mentioned in Section 1.3 was undertaken and photo evidence collected.

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2.7 Completing the Road Safety Audit

As set out in the *Guidelines for Road Safety Audit Practices (TfNSW, July 2011),* responsibility for the road design always rests with the designer/project manager, and not with the Road Safety Auditor. A project manager is under no obligation to accept all the RSA findings. Also, it is not the role of the Road Safety Auditor to agree to or approve of the project manager's response to the RSA. Rather, the RSA provides the opportunity to highlight potential problems and have them formally considered by the project manager, in conjunction with all other project considerations.

This formal RSA report should be responded to in writing. If any findings in this report are rejected by the Project Manager, then in each case, reasons for this rejection should be included in the written response. Acceptance of a finding may require no further comment, but an explanation of how or when the action will be taken may be useful and should be provided where possible.

Further details are available in the Guidelines for Road Safety Audit Practices[1].

[1] NSW Centre for Road Safety, Roads and Traffic Authority of New South Wales (2011), *Guidelines for Road Safety Audit Practices*, Sydney.

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3.0 Risk Classification Methodology

The rating of the importance of risk in road safety has been undertaken based upon the crash probability and severity, in accordance with the risk matrix described in the following section. The crash likelihood and consequence are based on the auditor's assessment and are necessarily subjective on this basis.

The risk ratings have been based on the risk matrix presented in Table 4.

Table 4 Risk Matrix

Severity / Probability	Minor or property damage	Moderate	Serious	Fatal
Weekly	Medium	High	Extreme	Extreme
Monthly	Medium	Medium	High	Extreme
6 Monthly	Low	Medium	High	Extreme
Yearly	Negligible	Low	Medium	High
Every 5 years or less	Negligible	Negligible	Medium	High

The terms in Table 4 are described below.

Probability:

- Weekly: Is expected to occur in most circumstances
- Monthly: Will probably occur
- 6 Monthly: Might occur at some time
- Yearly: Might occur but doubtful
- Every 5 years or less: May occur but only in exceptional circumstances.

Severity:

- Minor or property damage: A person who suffers no injury or only requires minor first aid treatment
- Moderate: A person who attends an emergency department on the same day or on the day after a crash but was not killed or subsequently admitted to hospital
- Serious: A person who is admitted to hospital on the same day or the day after a crash and did not die within 30 days of the crash
- Fatal: A person who dies within 30 days from injuries received in a road traffic crash.

Priority:

- Extreme: Should be corrected immediately
- High: Should be corrected in the very near future, even if costs are high. Temporary mitigation measures should be considered until final correction action taken
- Medium: Should be corrected in the very near future, even if costs are moderate. A delay until the routine maintenance should be justified. Temporary mitigation measures should be considered until final correction action taken
- Low: Should be corrected at a suitable time
- Negligible: Should be corrected at a suitable time, if cost low.

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4.0 Audit Statement

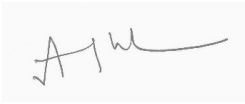
We, the undersigned, have undertaken a pre-construction (concept design) RSA of the George Street and Moore Street Cycleways project. The RSA was conducted in accordance with the *Guidelines for Road Safety Audit Practice, (TfNSW, July 2011),* for the purpose of identifying any features that potentially impair road safety. While every care and diligence has been taken to identify potential safety concerns, as detailed in this report, we do not warrant that every safety issue has been identified. Further, if all the findings in this report were to be addressed, this would not guarantee that the site is "safe"; rather, the level of safety of the facility should be improved.

Jacky Leung
Auditor Level 3
Registered No: RSA-02-0319

Date: 23 May 2025

Sara Hu
Auditor Level 2
Registered No: RSA-02-1744

Date: 23 May 2025



Anoop Sridhar
Auditor Level 0
Registered No: -

Date: 23 May 2025

4.1 Confidentiality and Copyright

The information in this RSA report is confidential and copyright.

This document does not form part of a contract.

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5.0 Audit Findings

General observations and assumptions that are to be noted as part of the RSA are presented in Table 5. These do not form part of the formal RSA findings but are considered worth noting by the RSA team.

Table 5 Observations and Assumptions

No.	Description of Observation or Assumption	Photos
1	The site inspection was undertaken on a cloudy day.	-
2	During PM peak period, the audit team observed southbound queuing on George Street near Scott Street. It was also observed that most of the on-street parking spaces are occupied.	
3	During PM peak period, the audit team observed westbound queuing on Moore Street between Hume Highway and Castlereagh Street.	

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No.	Description of Observation or Assumption	Photos
4	The current footpath near Westfield is designated as a high pedestrian activity area, where bicycles are not permitted.	
5	The audit team observed that individuals wheeled shopping trolleys to the taxi zone and left them unattended.	

The RSA findings are documented from Table 6 to Table 8, which provides details of the risks in road safety identified by the RSA team in relation to the supplied auditable material in conjunction with the site inspection, where applicable. The risks are not presented in order of relative importance to road safety.

The identified risks are assigned road safety categories to assist in the management of corrective actions by the Project Manager. Each risk is assessed with a rating as Extreme, High, Medium or Low, derived as a function of Probability and Severity, as outlined in Section 3.0.

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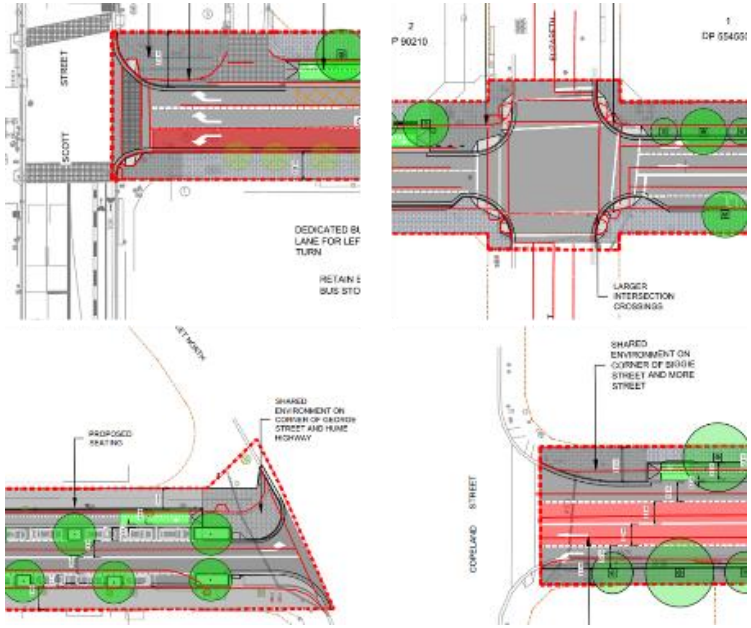
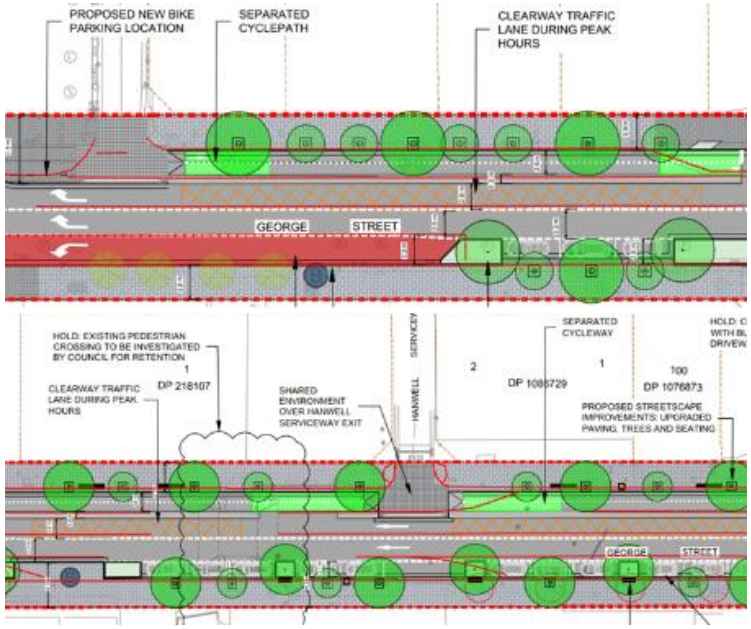
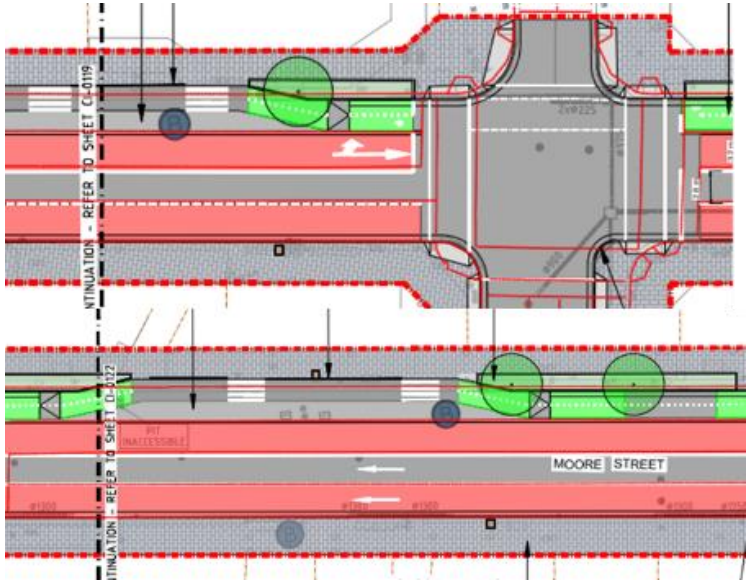
Table 6 Road Safety Audit Findings - General

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
1.		The cycleways are proposed to connect to a shared environment at multiple locations and at the end of the project scope. This design could be confusing to both cyclists and pedestrians, as they may not be aware of the environment changes and may fail to give way to each other. This could lead to cyclist/pedestrian crashes.	Cyclist infrastructure	6 Monthly	Moderate	Medium

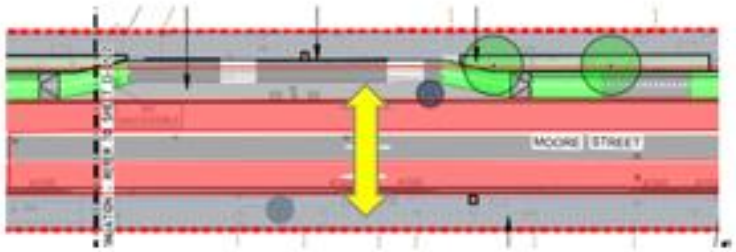
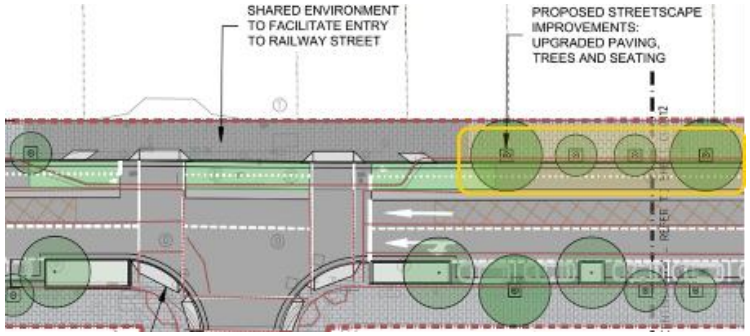
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
2.		At multiple locations, cycleways are proposed adjacent to timed on-street parking spaces. When drivers or passengers open car doors or get out of parked vehicles, they may not be aware of the adjacent cycleway and could fail to notice approaching cyclists. This could lead to collisions between cyclists and car doors or pedestrians.	Miscellaneous	6 Monthly	Moderate	Medium

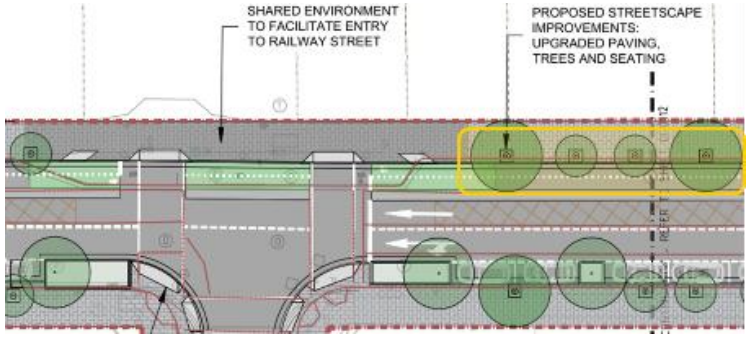
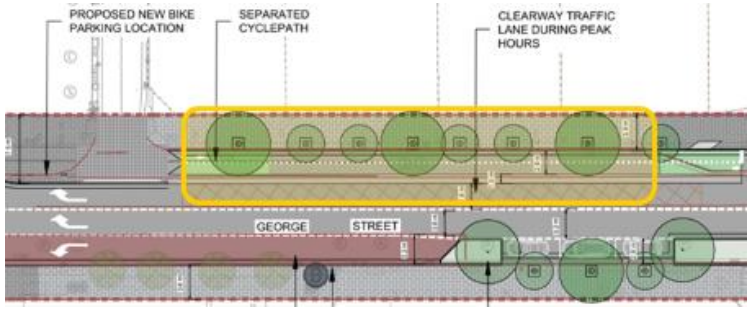
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
3.		Floating bus stops are proposed at multiple locations along Moore Street. Cyclists unfamiliar with this design might not notice the pedestrian crossings and could fail to give way to pedestrians. For example, pedestrians have priority at designated crossings, while cyclists are given priority in the areas between crossings, which are within short distances. Additionally, pedestrians crossing the cycleway to reach the bus stop may not notice approaching cyclists, especially when rushing to catch a bus. This could lead to cyclist / pedestrian crashes. .	Miscellaneous	6 Monthly	Moderate	Medium

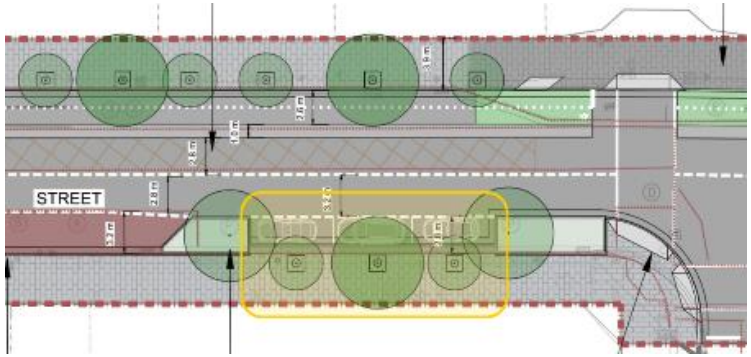
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
4.		The project proposes to remove one traffic lane and install floating bus stops at multiple locations along Moore Street. With fewer traffic lanes, the road may appear easier and quicker to cross, which encourages pedestrians to cross mid-block rather than the signalised pedestrian crossings at the intersection. This could lead to vehicle / pedestrian crashes.	Roadside hazards	Yearly	Serious	Medium
5.		At multiple locations, cycleways are proposed in close proximity to trees, street furniture, light poles and traffic signs. In narrow sections, cyclists may ride too close to these objects, increasing the chance of accidental contact or loss of balance. There is a risk that cyclists might strike these roadside objects, resulting in head-on or side impact crashes.	Roadside hazards	Yearly	Moderate	Low

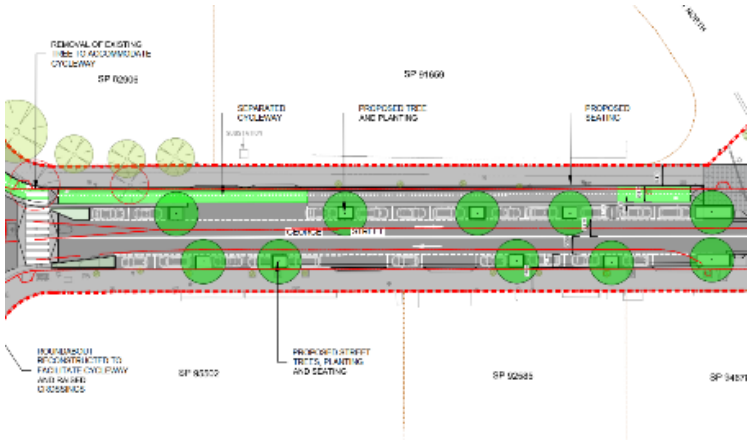
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
6.		At multiple locations, existing or proposed trees are located near the cycleways. During certain seasons, fallen leaves on the cycleway could potentially cause bicycles to lose traction, particularly during or after wet weather, when leaves may become slippery. This could lead to cyclists slipping or falling, resulting in minor injuries.	Roadside hazards	Yearly	Minor or Property damage	Negligible
7.		At multiple locations, cycleways are proposed between trees and timed on-street parking spaces. Trees may obstruct sight lines between cyclists and pedestrians walking between the footpath and parked vehicles. This could lead to cyclist / pedestrian crashes.	Roadside hazards	Yearly	Moderate	Low

D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
8.		At multiple locations, line-marked on-street parking spaces are proposed near trees. The location of the trees may obstruct car door opening. This could result in minor damage to the car doors and / or the trees.	Roadside hazards	Yearly	Minor or Property damage	Negligible

D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
9.		At multiple locations, inconsistent cycleway pavement treatments are proposed. This inconsistency may cause confusion for cyclists and make it difficult to interpret changes in pavement markings. This may affect wayfinding or lead to hesitation while riding. This could lead to unpredictable cyclist behaviour, potentially resulting in conflicts with other road users or cyclists slipping / falling.	Road pavement	Yearly	Minor or Property damage	Negligible

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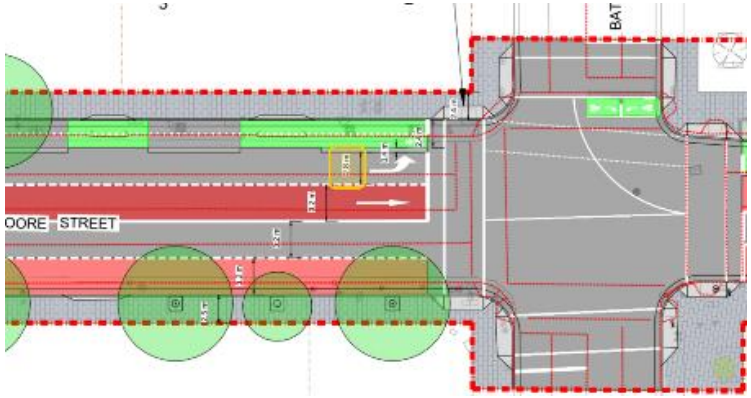
Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
10.		Along Moore Street, 2.8m wide travel lanes are proposed adjacent to bus lanes. This width may be insufficient to accommodate truck movements or to safely allow buses to travel side by side. This could lead to side-swipe crashes between buses and trucks.	Road alignment and cross section	6 Monthly	Moderate	Medium

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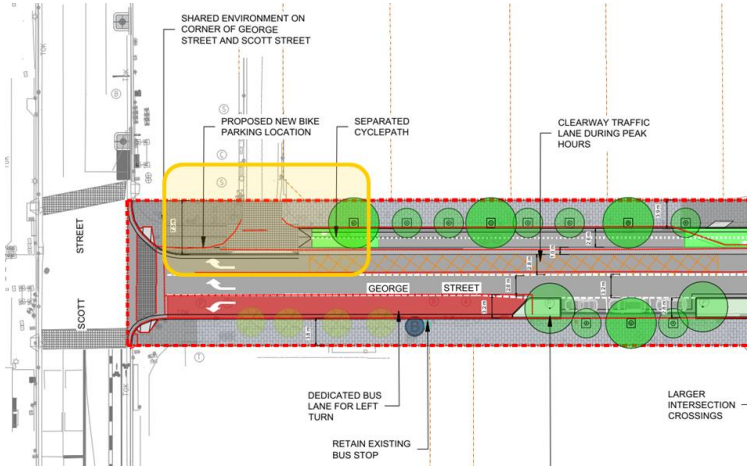
Table 7 Road Safety Audit Findings – George Street

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
1.		Cycleway is proposed adjacent to timed on-street parking along George Street, near the intersection with George Lane. When vehicles turn right onto George Lane, the parked vehicles may obstruct drivers' sight lines to the cycleway and footpath. Drivers may have limited visibility of approaching cyclists or pedestrians, particularly when parked vehicles are large or closely spaced. This could lead to vehicle and cyclist / pedestrian crashes.	Miscellaneous	Yearly	Serious	Medium

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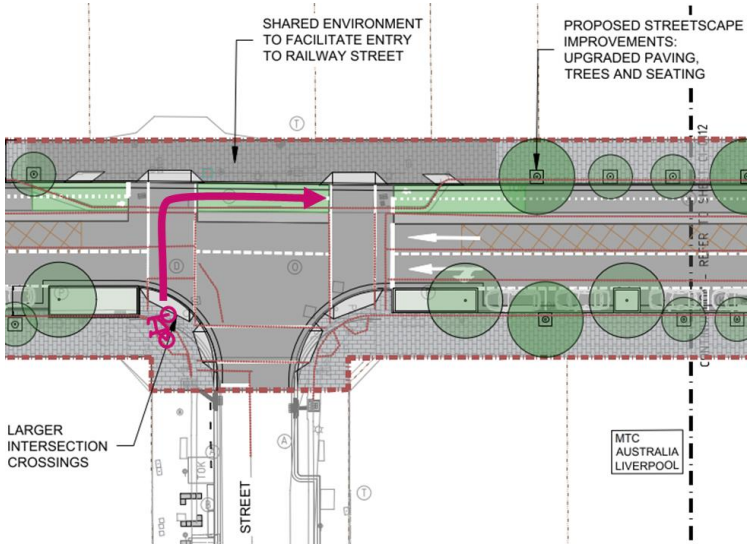
Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
2.		Future connection will be provided between the proposed cycleway and Railway Street. Cyclists travelling from Railway Street south and turning right may enter the cycleway via the pedestrian crossing, rather than via the shared environment. This could lead to conflicts between pedestrians travelling north-south and cyclists turning right at the pedestrian crossing, resulting in to cyclist / pedestrian crashes.	Miscellaneous	Yearly	Moderate	Low

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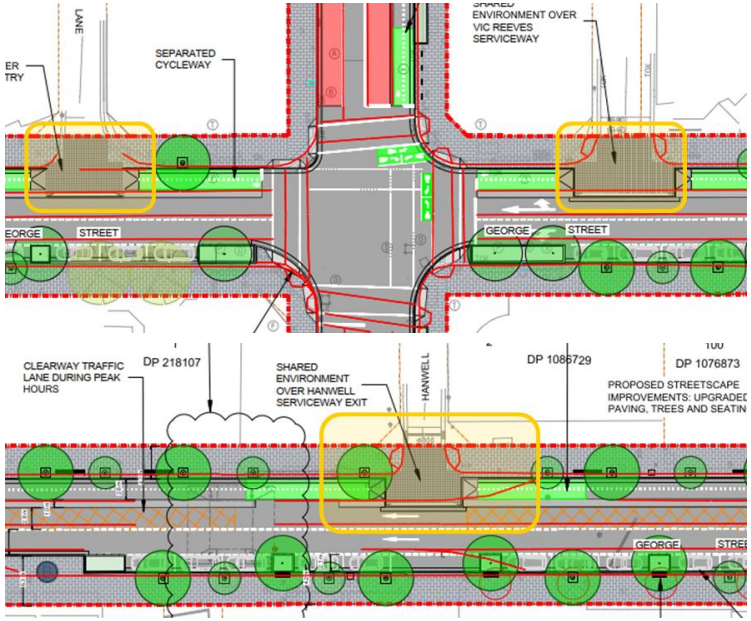
Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
3.		At multiple locations along George Street, shared environments are provided at the intersection with service lanes, car parks and minor roads. Priority between vehicles and cyclists / pedestrians may be unclear in these areas. Additionally, drivers exiting service lanes or car parks may not expect cyclists to be travelling through and may have limited visibility. This could lead to vehicle and cyclist/pedestrian crashes.	Intersections	Yearly	Serious	Medium

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Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
4.		Cyclist storage areas are proposed at the signalised intersection of George Street and Moore Street. There is a risk that cyclists may collide with the kerb and lose balance due to the alignment of the intended travel path (as illustrated). This could lead to cyclists slipping or falling, resulting in minor injuries.	Cyclist infrastructure	Yearly	Minor or Property damage	Negligible

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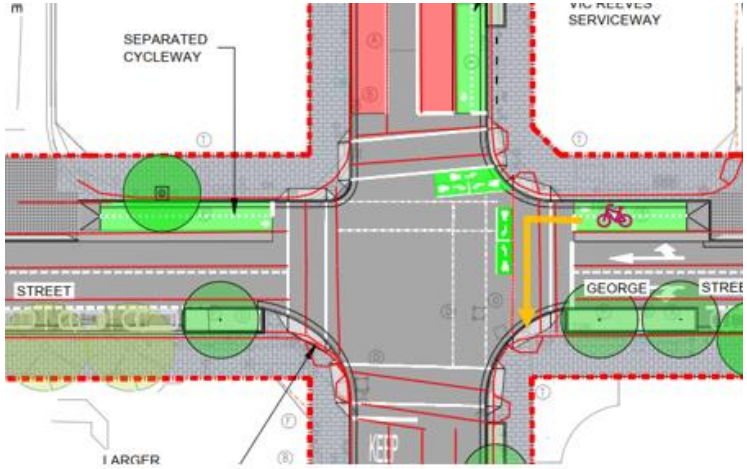
Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
5.		Cyclist storage areas are proposed at the signalised intersection of George Street and Moore Street. There is a potential risk that some cyclists may attempt to make a left turn during the pedestrian green phase, rather than waiting for the designated cyclist signal and using the storage area as intended. This could lead to pedestrian / cyclist crashes. .	Cyclist infrastructure	Yearly	Minor or Property damage	Negligible

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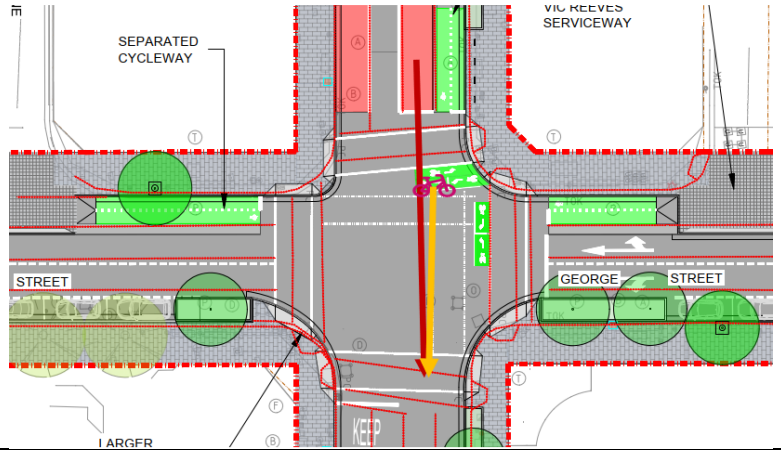
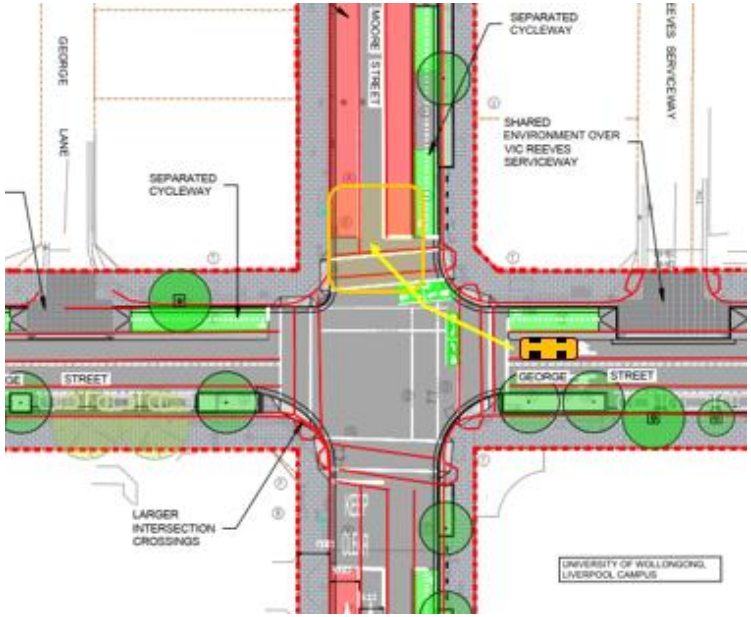
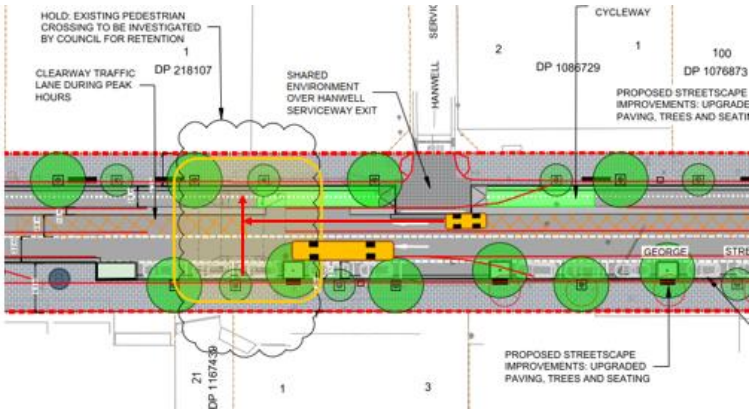
Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
6.		Cyclist storage areas are proposed at the signalised intersection of George Street and Moore Street. Cyclists from the storage box heading east towards Moore Street might stray into the middle lane, conflicting with the buses heading east. This could result in side-swipe crashes between cyclists and buses.	Cyclist infrastructure	Yearly	Serious	Medium

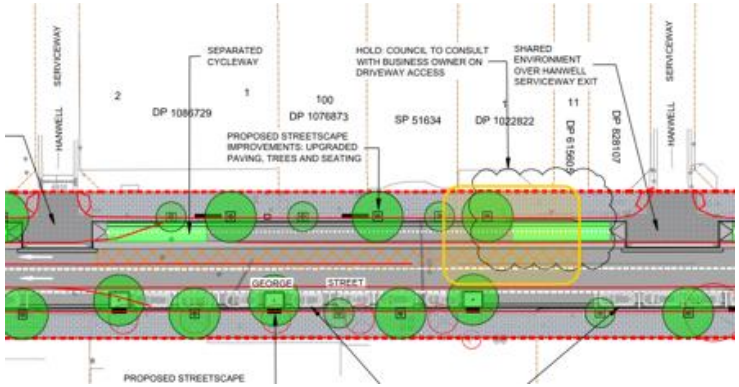
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
7.		Cyclist storage areas are proposed at the signalised George Street / Moore Street intersection. If the vehicle green phase on George Street follows the cyclist green phase, there is a potential safety risk of cyclists waiting in the storage area being struck by turning vehicles. This could lead to vehicle/cyclist crashes.	Cyclist infrastructure	6 Monthly	Moderate	Medium

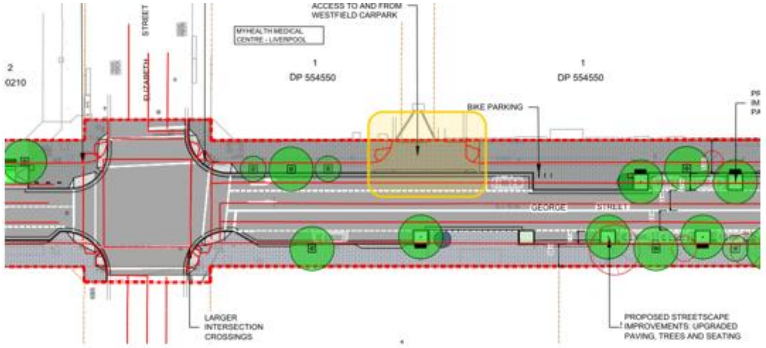
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
8.		The project proposes to retain the existing pedestrian crossing across two traffic lanes travelling in the same direction. When a vehicle, particularly a bus or truck, stops in the kerbside lane to give way to pedestrians, it may obstruct the view of drivers in the adjacent lane. This limited visibility can prevent those drivers from seeing pedestrians entering the crossing in time to stop safely. This will increase the risk of vehicle/pedestrian crashes at this location.	Pedestrian infrastructure	6 Monthly	Serious	High

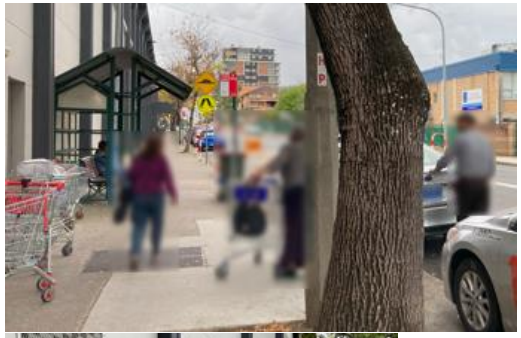
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
9.	 	The proposed installation of a cycleway along George Street intersects with several existing driveways, including the driveway servicing the funeral home located south of Hanwell Serviceway. On-site observations indicate that a designated parking area for funeral vehicles is currently provided in front of Max Perrams Funerals. It is unclear whether this parking space will be retained under the proposed project. If funeral vehicles are required to park on George Street during designated 'clearway' periods, they may obstruct the kerbside traffic lane and create potential conflicts with cyclists, particularly when accessing or exiting the driveway. There is a risk of increasing conflicts between cyclists and vehicles at this location, which may result in cyclist/vehicle crashes.	Access impacts	Yearly	Moderate	Low

D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
10.		Shared path is proposed in front of the Westfield shopping centre car park driveway. The introduction of the proposed cycleway in the precinct is likely to increase the cyclist activity across this car park driveway. There is a risk of increasing conflicts between pedestrians, cyclists and vehicles at this location, which may result in cyclist/vehicle crashes.	Access impacts	6 Monthly	Moderate	Medium

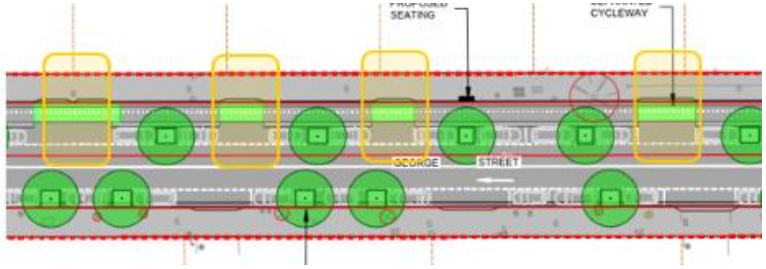
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
11.		The project proposes the northern footpath along George Street between Elizabeth Street and Campbell Street to be a shared path for both pedestrians and cyclists. It was observed on site that numerous shopping trolleys were abandoned or left unattended on the footpath. This suggests that pedestrians are leaving empty trolleys behind after using nearby taxi or bus services. The presence of these trolleys reduces the available circulation space for both pedestrians and cyclists. This issue is exacerbated in the vicinity of the Westfield shopping centre, where pedestrian activity is high due to the adjacent bus stop, taxi zone, and nearby school. This could lead to cyclist/pedestrian crashes, or cyclists slipping / falling.	Cyclist infrastructure	Monthly	Minor or Property damage	Medium

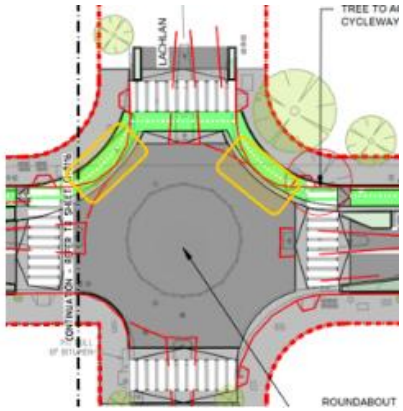
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
12.		The project proposes the northern footpath along George Street between Elizabeth Street and Campbell Street to be a shared path for both pedestrians and cyclists. It was observed on site that visibility along the footpath is poor at night. Limited lighting may prevent cyclists and pedestrians from seeing each other in advance during periods of low light. There is a risk of potential collisions between cyclists and pedestrians.	Lighting	Monthly	Minor or Property damage	Medium

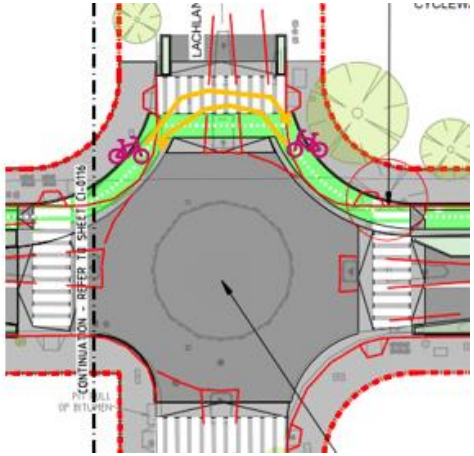
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
13.		The proposed installation of a cycleway along George Street intersects with several existing driveways. The presence of trees and parked vehicles along the corridor may obstruct sight lines for drivers exiting these driveways, particularly when giving way to oncoming cyclists. Additionally, vehicles waiting to merge into traffic may encroach upon the cycleway, potentially creating conflicts with cyclists. There is a risk of vehicle/cyclist crashes.	Access impacts	Yearly	Moderate	Low

D R A F T

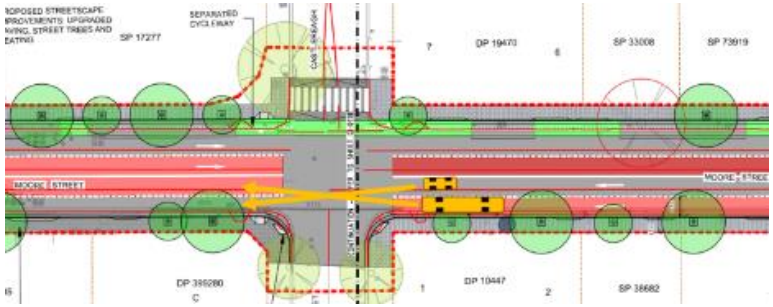
Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
14.	 	The project proposes the installation median to separate the cycleway from the traffic lane at the roundabout located at George Street / Lachlan Street intersection. It was observed on site that the footpath at the corner of George Street/ Lachlan Street has significant tyre marks. This indicates the occurrence of vehicles mounting the kerb while negotiating turns at the roundabout. There is a risk of conflict between vehicles and cyclists at corners where space is constrained. This could lead to cyclist/vehicle crashes.	Cyclist infrastructure	Yearly	Moderate	Low

D R A F T

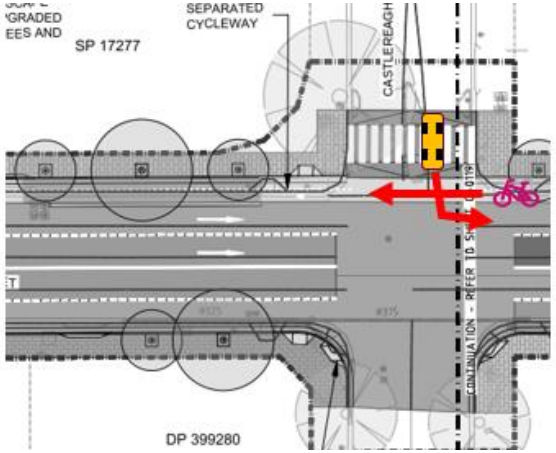
Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
15.		The project proposes the installation of a cycleway adjacent to a pedestrian crossing at Lachlan Street. Cyclists using the proposed cycleway are required to make a sharp turn when crossing Lachlan Street. This geometry may lead to cyclists unintentionally encroaching onto the pedestrian crossing, particularly when navigating around oncoming cyclists. This could lead to cyclist/pedestrian crashes.	Cyclist infrastructure	Yearly	Minor or Property damage	Negligible

D R A F T

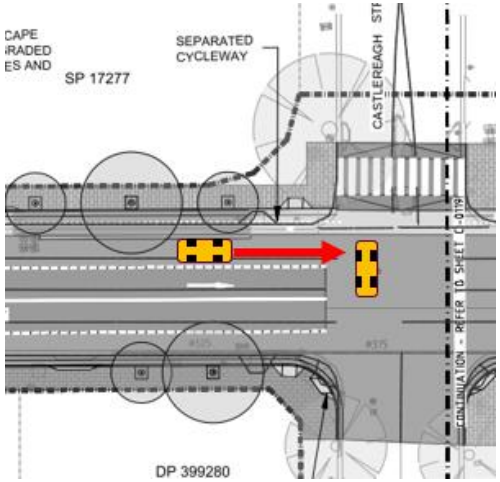
Table 8 Road Safety Audit Findings – Moore Street

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
1.		The project proposes the installation of a dedicated bus lane on the kerbside lane east of Castlereagh Street, transitioning to the median lane west of Castlereagh Street. Westbound drivers traveling in the median lane will be required to merge into the kerbside lane immediately after crossing the intersection. Similarly, buses using the kerbside bus lane east of the intersection will need to transition into the median bus lane on the west side. This lane configuration may lead to weaving movements immediately downstream of the intersection, increasing the risk of sideswipe collisions between buses and general traffic.	Delineation	Monthly	Serious	High

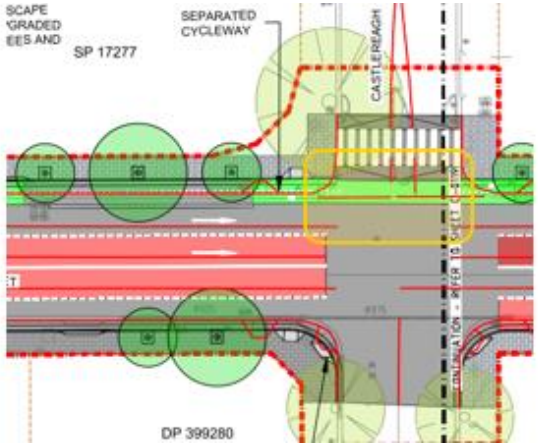
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
2.		The project proposes the installation of bi-directional cycleway along Moore Street at Castlereagh Street intersection. Drivers turning left from Castlereagh Street north will primarily look west to negotiate a gap in traffic, while some cyclists will approach from the east. There is a risk that drivers fail to give way to cyclists, resulting in vehicle/cyclist crashes.	Cyclist infrastructure	Yearly	Moderate	Low

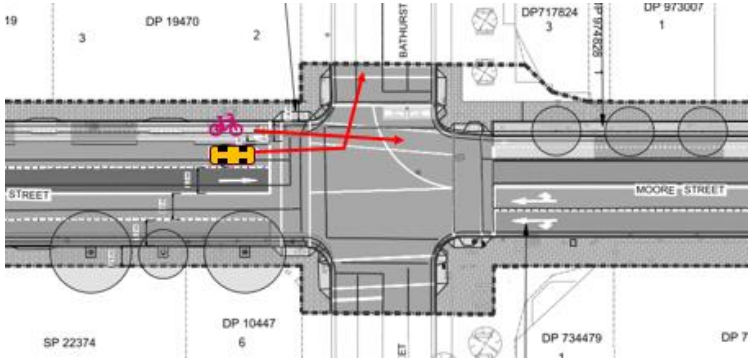
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
3.		The project proposes installing a bidirectional cycleway along Moore Street and adding a pedestrian crossing at the Castlereagh Street intersection. Drivers travelling along Castlereagh Street may stop at the intersection to give way to cyclists and pedestrians. However, motorists travelling along Moore Street may not anticipate a stationary vehicle at this location and could hit the stopped vehicle. There is a risk of vehicle collisions at this intersection.	Intersections	Yearly	Moderate	Low

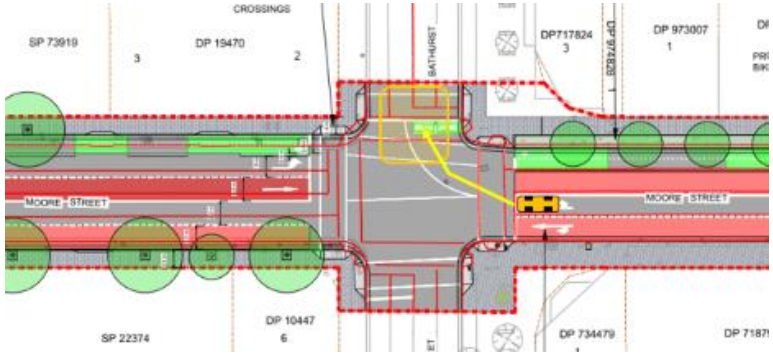
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
4.		The project proposes installing a bidirectional cycleway along Moore Street and adding a pedestrian crossing at the Castlereagh Street intersection. Drivers from Castlereagh Street may misinterpret the right-of-way of the cycleway, leading to a failure to give way to cyclists. In addition, it is not clear how cyclists turn from the cycleway to Castlereagh Street south. There is a risk of vehicle/cyclist crashes at this location.	Cyclist infrastructure	Yearly	Serious	Medium

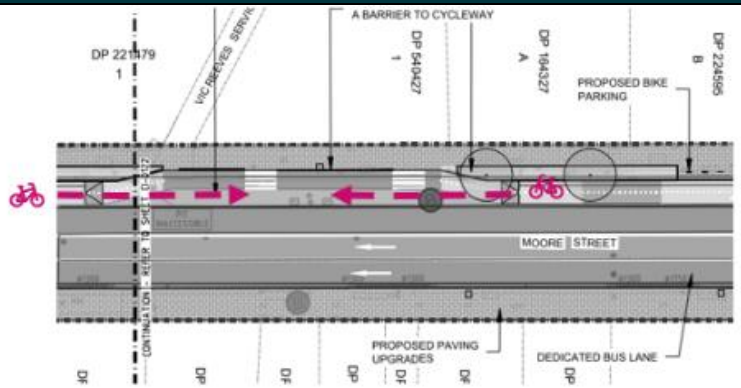
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
5.		The project proposes the installation of a bi-directional cycleway along Moore Street. If cyclists are given a green signal concurrently with vehicles travelling on Moore Street, left-turning vehicles may cross the path of cyclists. This could lead to vehicle/cyclist crashes.	Cyclist infrastructure	6 Monthly	Moderate	Medium

D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
6.		Cyclist storage areas are proposed at the signalised intersection. If the vehicle green phase on Moore Street follows the cyclist green phase, there is a potential safety risk of cyclists waiting in the storage area being struck by turning vehicles. This could lead to vehicle / cyclist crashes.	Cyclist infrastructure	6 Monthly	Moderate	Medium

D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
7.		The project proposes to raise the cycleway to the bus stops and the pedestrian crossings. Cyclists may run into the pedestrians waiting at median bus stops. This could increase the risk of collisions between cyclists and pedestrians.	Bus infrastructure	6 Monthly	Moderate	Medium

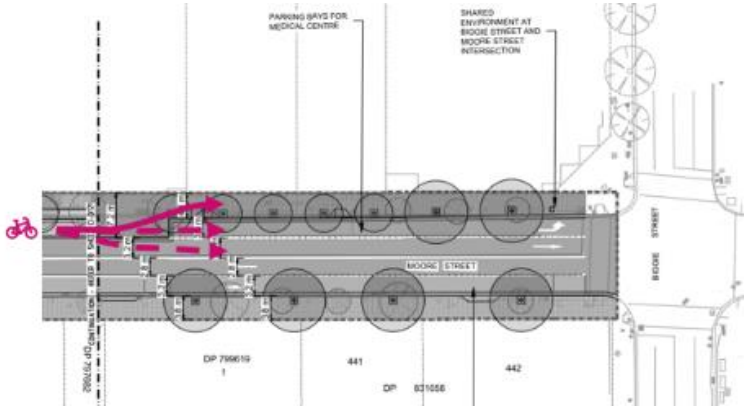
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
8.		The existing sign may partially block the future traffic signals after the stop line is set back. Drivers stopped at the setback line may have difficulty seeing the traffic signals clearly and may not stop at the setback line. This could lead to rear-end crashes or vehicle / pedestrian crashes.	Cyclist infrastructure	Yearly	Moderate	Low

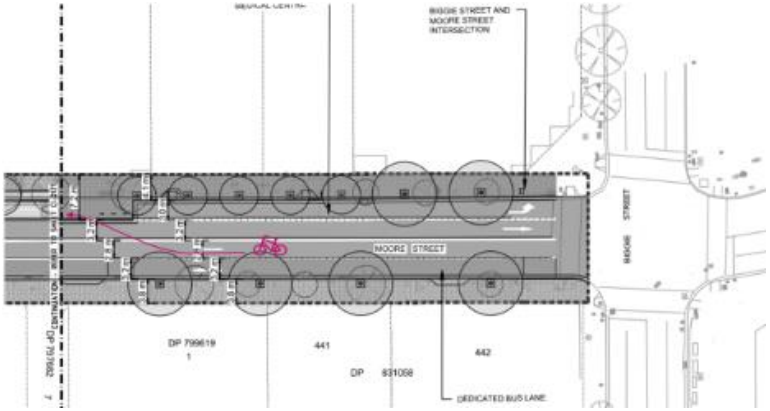
D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
9.		The stop line at the west of Moore Street / George Street intersection is set back from the intersection. Drivers stopped at the setback line may have difficulty seeing the traffic signals clearly. In addition, unfamiliar drivers may not expect the stop line to be set back and could brake suddenly when they realise it. This could lead to rear-end crashes between vehicles.	Intersections	Yearly	Moderate	Low

D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
10.	 *(Ref: 60737859-SHT-00-1000-CI-0122)*	The project proposes connecting the cycleway to a shared path at the eastern end of Moore Street. If the cyclists miss the left turn to get onto the shared path or attempt to avoid the pedestrians near the medical centre, they may continue straight into the traffic lanes. Drivers may not anticipate cyclists entering the road at this location, increasing the likelihood of conflicts. This could lead to cyclist/vehicle crashes.	Cyclist infrastructure	Every 5 Years	Serious	Medium

D R A F T

Item No.	Photos	Description	Road Safety Audit Category	Probability	Severity	Risk Rating
11.	 *(Ref: 60737859-SHT-00-1000-CI-0122)*	Cyclists travelling westbound on Moore Street, turning from Biggie Street South, are required to cross the eastbound traffic lane to access the proposed cycleway. There is a potential risk that drivers may not anticipate cyclists crossing at this location, increasing the likelihood of conflicts. This situation may result in head-on collisions with eastbound vehicles or rear-end collisions involving westbound traffic.	Cyclist infrastructure	Yearly	Serious	Medium

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Memorandum

To	Ashley Narayan	Page	1
CC	Ariz Ashraf		
Subject	Wayfinding Plan		
From	Martin Mallia		
File/Ref No.	250523_60737859_Wayfinding Plan	Date	23/05/2025

1.0 Introduction

The cyclist wayfinding and signage strategy for the Liverpool CBD has been developed to support the delivery of the proposed separated cycleways on George Street and Moore Street. This strategy provides a high-level framework that responds to Liverpool City Council's aspiration for an integrated, legible, and user-friendly cycling network, which can be used to develop a fully integrated wayfinding strategy during the detail design phase of the project. It aligns with the Liverpool Bike Plan 2018–2023 and broader active transport planning principles, including future connections delivered under the Western Sydney Infrastructure Grant (WSIG) projects and identified strategic routes in the TfNSW Cycleway Finder.

1.1 Purpose and scope

The strategy offers strategic recommendations on signage types, indicative placement locations, line marking treatments for shared paths, and network integration principles. Its purpose is to provide a framework to enhance route legibility, improve user confidence, and reinforce the coherence of the cycling network in Liverpool. The elements including detailed graphic design, final sign placement, and mapping of all focal points are anticipated to be delivered in future stages alongside broader corridor upgrades and interagency coordination. This plan is however limited in scope to cycling infrastructure and does not currently integrate with broader wayfinding initiatives for pedestrians or vehicles.

1.2 Strategic wayfinding objectives

The strategy is guided by the following core objectives:

- Enhance cyclist safety, comfort, and confidence through clear and consistent messaging
- Promote intuitive navigation that encourages broader uptake of active transport
- Integrate seamlessly with existing and planned cycling infrastructure
- Align with design standards including Austroads AP-R492-15, Australian Standard AS17429-2018, NSW Bicycle Guidelines, City of Sydney guidelines, and the Liverpool Bike Plan 2018–2023
- Reinforce the identity and continuity of Liverpool's cycle network through consistent visual language and treatment

2.0 Signage types and locations

A robust suite of signage types is proposed to meet the diverse wayfinding, safety, and network integration needs of cyclists traversing the George Street and Moore Street cycleways. The intent is to support intuitive and legible navigation, reinforce route coherence, and deliver a consistent cyclist experience. The signage strategy should be finalised in the detailed design phase with input from Council, TfNSW, and accessibility and cycling advocacy groups.

In alignment with the Liverpool Bike Plan, a range of bicycle regulatory and directional signage types have been identified to support the proposed wayfinding strategy. These signage types are outlined in Table 1 and have been selected to ensure consistency with established guidance while enhancing route legibility and user confidence across the network.

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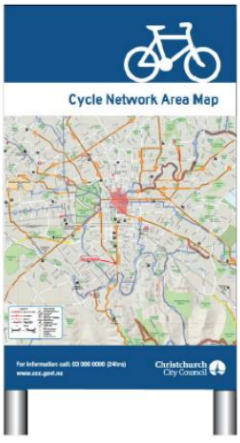
Table 1 Signage types

Sign	Reference	Sign Type	Description	Typical Locations
	NSW Bicycle Guidelines R7-1-4	Regulatory	Bicycle Lane Mark the beginning or end of a dedicated cycling facility	Cycleway entries / exits at Scott Street, Hume Highway, Bigge Street, and Copeland Street. Transitions between dedicated cycling facilities and shared path facilities at Westfield, Medical Centre and cycleway entries / exits.
	NSW Bicycle Guidelines R8-2	Regulatory	Shared Path Mark the beginning or end of a shared path cycling facility	At all locations where shared path facilities are provided at Westfield, Medical Centre and cycleway entries / exits
	AP-R492-15 – Bicycle Wayfinding FBP-2	Directional	Intersection Fingerboard Provide turn-by-turn navigation to guide users through the network, especially at decision points and preferred routes.	Major intersections, predominantly George Street / Moore Street, and side-street connections that have focal points or destinations. *(See section 2.1 for further information)*
	AP-R492-15 – Bicycle Wayfinding MSP	Directional	Map sign Identify key civic, community and transport-related destinations. POIs support trip-making confidence and encourage exploration.	At key start or end destinations and at key bicycle parking/storage locations. These are to enable users to enter and navigate the cycle network. Considerations at Liverpool Train Station and Westfield.

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A plan illustrating the indicative locations for wayfinding signage along the George Street and Moore Street corridors is provided in Appendix A. This plan serves as a guide to inform the detailed design phase, where final placement will be refined in consultation with key stakeholders to ensure optimal visibility, legibility, and network integration.

2.1 Key destinations and focal points

Wayfinding should prioritise signage toward the key local destinations and focal points identified in *Section 6.2 of the Liverpool Bike Plan*, particularly where they are proximate to George and Moore Streets. The focal points and destination points are presented in Table 2.

Table 2 Key focal points and destination points

Focal Points	Destination Points
• Liverpool CBD • Liverpool Station • Liverpool Hospital • Warwick Farm Station • Chipping Norton Shops • Market Plaza – Chipping Norton • Moorebank Shopping Centre • Wattle Grove Plaza • Casula Mall • Miller Shopping Centre • Cecil Hills Shopping Centre • Carnes Hill Market Place	• Holsworthy Station • Canterbury Bankstown LGA • Cecil Hills • Hoxton Park • Horningsea Park • Edmondson Park Station • Casula Station • Glenfield Station (Inter-LGA destination) • Leppington Town Centre (future) • TAFE NSW Liverpool • Westfield Liverpool

Source – Liverpool Bike Plan 2018 - 2023

2.2 Design considerations for the detailed design phase

To ensure signage is functional, legible, and integrates seamlessly with the public domain, the design and planning principles presented in Table 3 should be applied throughout the detailed design phase.

Table 3 Design consideration for detailed design

Design Aspect	Key Considerations
Sign Mounting & Clearances	• Mount signs at 2.5 m height (min) and no higher than 4 m • Maintain 0.5 m lateral clearance from the edge of the cycleway • Avoid overhanging signs near roadways and turning paths • Utilise existing poles to reduce clutter where feasible (e.g. parking or utility poles)
Placement & Integration	• Position signs for optimal visibility and comprehension at decision points and intersections • Avoid sign clutter and interference with existing road signage • Do not co-locate cycle signage with main/arterial road signs • Ensure signs do not create ambiguity for other road users
Sight Distance & Visibility	• Provide adequate advance warning of directional changes • Consider slope and sight distance for placement, especially in hilly areas • Separate poles may be required where one corner does not offer adequate sight lines
Legibility & Lighting	• Ensure signs are easily legible in both daylight and night-time conditions • Prefer locations near existing street lighting in urban areas • Avoid visual clutter or background distractions that diminish legibility
Stack Mounting Order (Fingerboards)	• Mount fingerboard pairs for a continuous route at the same level where possible • Organise stacked signs logically from top to bottom by direction or route hierarchy • Account for approach angles at intersections to maximise visibility

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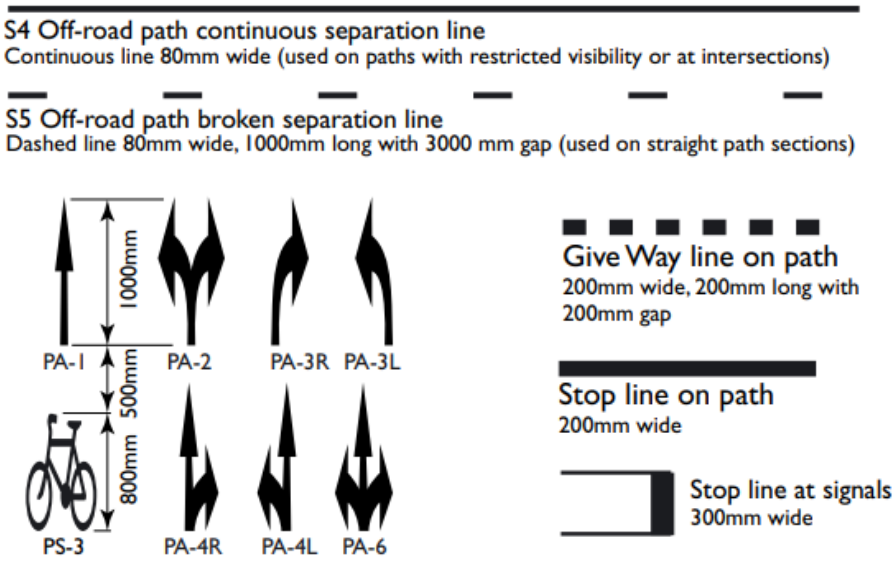
3.0 Line marking and pavement treatments

To complement the signage strategy and reinforce intuitive wayfinding, a suite of pavement marking treatments is proposed. These treatments are designed to communicate priority, enhance user awareness, and ensure the cycleway is visually integrated into the surrounding urban fabric. The following treatments are recommended:

3.1 General line marking for separated cycleway

Line marking for the separated cycleway will be designed in accordance with the *NSW Bicycle Guidelines* and *Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths*. Treatments will include centre line markings to separate opposing directions of travel, directional arrows to reinforce movement flow, and bicycle symbols at regular intervals to clearly identify the facility as a dedicated cycling space. These markings will promote safe, predictable behaviour and enhance legibility for all users. Examples of these line markings are illustrated in Figure 1.

Figure 1 Separated cycleway line markings



Source – NSW Bicycle Guidelines, 2005

3.2 Shared path treatments

As presented in the Liverpool Bike Plan, it is proposed that the *City of Sydney Shared Pathways Pavement Markings guidance* is implemented for the proposed shared paths for the project. This involves implementing the primary tier treatments, which include a continuous blue edge line along the route, accompanied by a shared path pavement marker to denote the start of the shared path, a typeface with the wording 'Shared Path' and smaller scale pedestrian and cyclist symbols. Examples of these treatments are illustrated in Figure 2.

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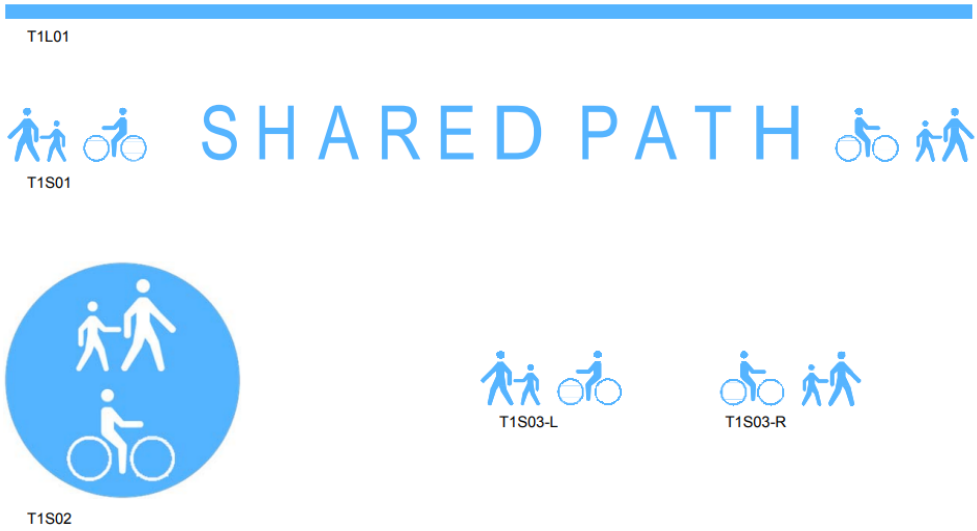
Figure 2 City of Sydney shared pathways pavement markings



Source – City of Sydney Shared Pathways Pavement Markings, 2009

For this project, this treatment is proposed at the following locations:

- George Street – along the shared path segment between Elizabeth Street and Campbell Street, where delineation between cyclists and pedestrians is critical due to higher foot traffic volumes and adjacent land uses.
- Moore Street – between the medical centre and Bigge Street, supporting shared zone navigation and cyclist visibility in a constrained corridor.
- Entry and exit points – including Scott Street, Hume Highway, and Copeland Street, where clear visual cues are required to reinforce route entry, transition, and connection with broader active transport links.

3.2.1 Contrasting surface treatments and urban art integration:

There is an opportunity for the design to explore the incorporation of bespoke pavement art in strategic locations to raise awareness of the shared path environment. One such location is the Westfield entrance on George Street, where surface artwork could be used to draw attention to the shared nature of the path, signal caution to all road users to help improve safety and help to reinforce local identity. Examples of bespoke pavement art used on shared paths facilities include the rainbow crossings in Darlinghurst, the junction box style treatments around the Bay Run around Parramatta River, pavement art at the Parramatta Valley Cycleway and the proposed aboriginal pavement artwork for the Sydney Harbour Bridge cycleway project currently in design

Figure 3 Rainbow crossing – Darlinghurst

Source – Google Maps, 2025

Figure 4 Junction box treatment – Bay Run

Source – Google Maps, 2025

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Figure 5 Pavement art – Parramatta Valley Cycleway

Figure 6 Pavement art –Harbour Bridge

Source – https://atparramatta.com/discover/see-and-do/nature-and-parks/top-cycling-tracks-parramatta, 2025
Source – https://www.transport.nsw.gov.au/projects/current-projects/sydney-harbour-bridge-cycleway-ramp, 2025

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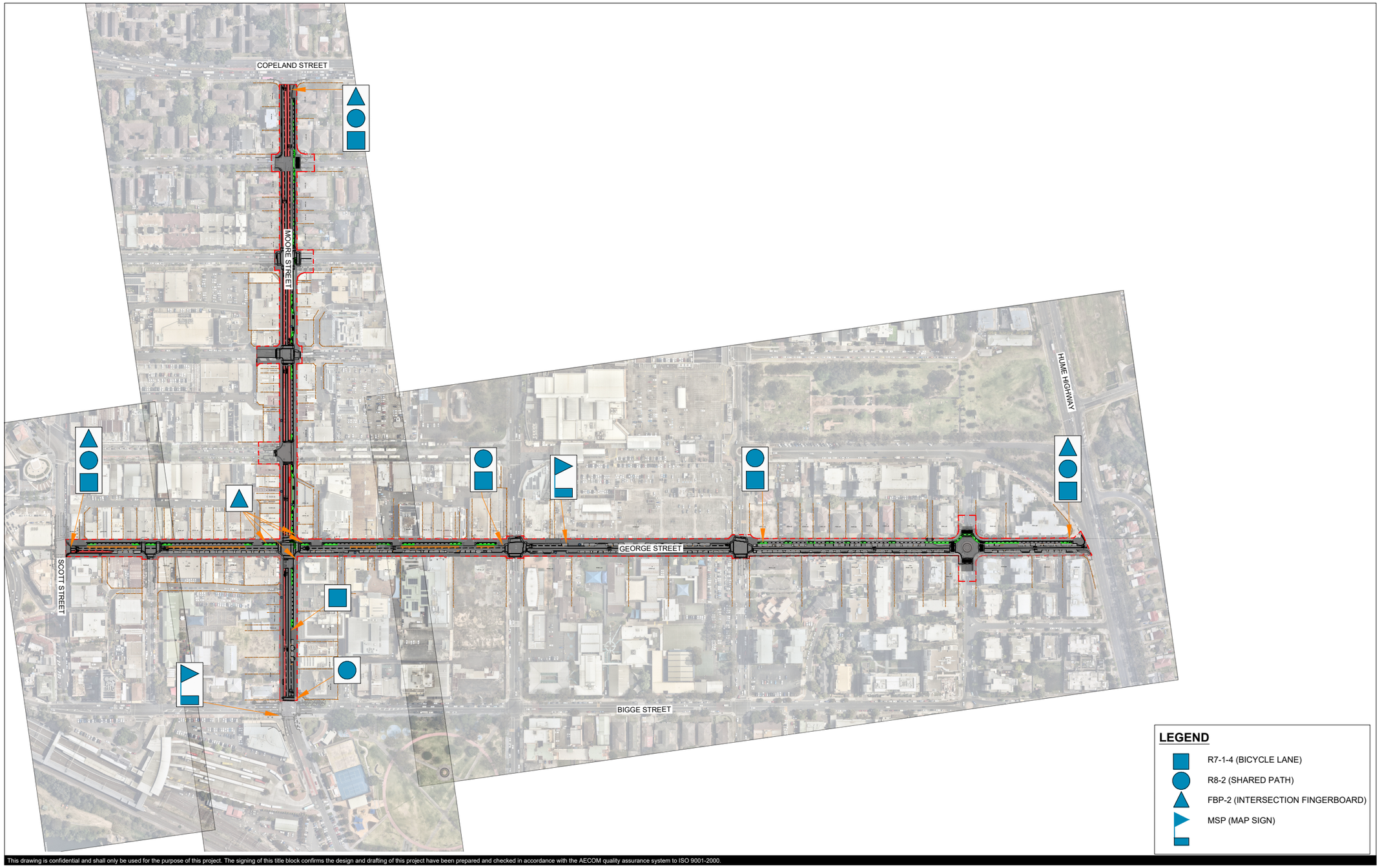
Appendix A – Wayfinding Plan Map

ISO A1 594mm x 841mm



LEGEND

- R7-1-4 (BICYCLE LANE)
- R8-2 (SHARED PATH)
- FBP-2 (INTERSECTION FINGERBOARD)
- MSP (MAP SIGN)

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the AECOM quality assurance system to ISO 9001-2000.

CONSULTANT

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PROJECT

MOORE STREET AND GEORGE STREET CYCLEWAY

CLIENT

LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR

0 50 100 m
1:2000

PROJECT MANAGEMENT INITIALS

P.VU	P.SHIELS	M.MALIA
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

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MATT SHUTER + ASSOCIATES

Access for People with Disabilities

Design Compliance Report

Initial Concept Design Review

Public Domain – LCC Moore Street & George Street Cycleway Upgrade

Report Number & Revision:	**MSA2670_DDA_LCC_PublicDomain_1.0**
Prepared For:	**AECOM**
Date of Issue:	**9th April 2025**

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Definitions, Abbreviations & Acronyms

Term	Definition
ACAA	Association in Access Consultant Australia (the accreditation body for Accessibility / DDA Consultants)
Accessible	Accessible means having features to enable use by people with a disability.
Accessway or Accessible Path	Accessway means a continuous accessible path of travel (as defined in AS 1428.1) to, into or within a building – see 4.9 of this report for detailed requirements
Ambulant disabilities (people with)	People who have a mobility disability but are able to walk.
Adoption of Accessibility Australian Standards	BCA Part I2 (formerly H2) references Australian Standards that have been superseded in part including AS1428.2-1992. The requirements of AS1428.2-1992 have generally been adopted, except where the newer AS1428.1-2009/2021 requirements now supersede the AS1428.2-1992 requirements. In this circumstance, the AS1428.1-2009/2021 requirements have been recommended to be in-line with accessibility best practice and to meet the objectives of DSAPT to "to eliminate discrimination as far as possible against people with disabilities using stations". In summary AS1428.1-2009/2021 requirement have been adopted for: - Stair Nosings - Step & Kerb Ramps - Door Threshold Ramps - Door Circulation & Widths - Accessible Toilet Dimensions - Accessible Toilet Signage Requirements - Ambulant Toilet Dimensions - Ambulant Toilet Signage Requirements - Tactile Indicators - Hearing Augmentation - Controls
AS	AS means Australian Standard published by Standards Australia
AS1428.1	AS1428.1 contains various technical requirements for accessible features in the buildings, and can include differing versions (years of release) including 2001, 2009 & 2021. *AS1428.1-2009 has been used generally as the most recent version to be adopted by the BCA.*
Assembly Building	Means a building where people may assemble for transit purposes including a bus station, railway station, airport of ferry terminal.
Back-of-House / Staff Areas	Including offices, multi-purpose rooms, meal rooms or similar areas used in conjunction with office type use must comply with the standard access provisions, being Part D3 "Access for People with Disabilities" (except where exempt under BCA D3.4, such as plantrooms and electrical rooms).
BCA	BCA is the Building Code of Australia, part of the National Construction Code.
Braille	Braille is a system of touch reading for the blind, which employs raised dots that are evenly arranged in quadrangular letter spaces or cells.

Term	Definition
Circulation space	A clear unobstructed area, to enable persons using mobility aids to manoeuvre.
Continuous accessible path of travel	An uninterrupted path of travel to, into or within a building providing access to all accessible facilities (same as accessway)
DDA	The DDA is the (Federal) Disability Discrimination Act, 1992
Desirable (Recommendations or Requirements)	Are recommendations / requirements that are considered DDA "Best Practice" (though not necessarily detailed in any specific accessibility technical standard). These recommendations are also intended to assist in minimising the potential of DDA claims and promote enhanced inclusivity, functionality and broader access for all including those with disabilities.
Disability	The definition of "disability" in the DDA includes physical, intellectual, psychiatric, sensory, neurological, and learning disabilities, as well as physical disfigurement, and the presence in the body of disease-causing organisms. This broad definition is meant to ensure that everyone with a disability is protected.
Deemed-to-Satisfy (DTS)	Deemed-to-Satisfy provisions means provisions which are deemed to satisfy the Performance Requirements and sometimes referred to as prescriptive requirements.
DSAPT	The Disability Standards for Accessible Public Transport 2002
Encroachment	The intrusion of a building component, fixture or fitment into a continuous accessible path of travel or circulation space.
Essential (Recommendations or Requirements)	Are mandatory recommendations / requirements to meet statutory technical access legislation including Premises Standard, BCA or Australian Standards when considered against the scope.
Handrails (Accessible)	Handrails that are accessible contain additional technical features to promote ease of use by occupants, including those with disabilities. The technical requirements are contained within AS1428.1 for use on stairs, ramps, some walkways and other locations to assist in passive guidance and support.
Hazard	Any area or fixed object in or immediately adjacent to a direction of travel, which may place people at risk of injury
Landing	A resting place on a path of travel, typically flat at a crossfall of no greater than 1:40 to assist with rest or to allow function of control (lift button, door hardware)
Luminance Reflective Value (LRV)	LRV standard for "luminance reflective value", which is the value then used to express contrast between two surfaces to assist with visual identification (such as tactile indicators, stairs nosings or doors)
Passenger Use Areas	Passenger use areas are the public areas of the station used by day-to-day public passengers which must comply with the enhanced access provisions of BCA, being Part I2 (formerly H2) "Public Transport Buildings". Where there is a difference between the requirements of Part I2 and those of Part D4 (formerly D3), the provisions of Part I2 prevail
Performance Requirement	Performance Solution means a method of complying with the Performance Requirements other than by a Deemed-to-Satisfy Solution.
Principal Pedestrian Entrance	Principal pedestrian entrance means the main and typically conspicuous entrance that occupants would use to access a building.

Term	Definition
Public Domain	Is land in beyond the building or development allotment which may include public forecourts, footpaths, street crossings and mode interchange areas. The technical requirements of the BCA, DSAPT and Premises Standard 2010 do not strictly apply to these areas, though the objectives of the DDA do.
Ramp (Accessible)	An inclined surface on a continuous accessible path of travel between two landings with a gradient steeper than 1 in 20 but not steeper than 1 in 14.
Ramp, kerb	An inclined surface on a continuous accessible path of travel with a maximum rise of 190 mm, a length not greater than 1520 mm and a gradient not steeper than 1 in 8, located within or attached to a kerb.
Ramp, step	An inclined surface on a continuous accessible path of travel with a maximum rise of 190 mm, length not greater than 1900 mm and a gradient not steeper than 1 in 10.
Ramp, threshold	An inclined surface on a continuous accessible path of travel with a maximum rise of 35 mm, length not greater than 280 mm and a gradient not steeper than 1 in 8.
Sensory impairment	Any significant loss of hearing or vision.
Sole occupancy unit	A room or other part of a building for occupation by one or joint owner, lessee, tenant, or other occupier to the exclusion of any other owner, lessee, tenant or other occupier and includes— (a) a dwelling; (b) a room or suite of rooms in a Class 3 building, as defined in the BCA, which includes sleeping facilities; (c) a room or suite of associated rooms in a Class 5, 6, 7, 8 or 9 building, as defined in the BCA; or (d) a room or suite of associated rooms in a Class 9c aged care building, as defined in the BCA, which includes sleeping facilities and any area for the exclusive use of a resident.
Tactile ground surface indicator (TGSI)	TGSIs are truncated cones and/or bars installed on the ground or floor surface, designed to provide pedestrians who are blind or vision-impaired with warning or directional orientation information.
Tactile signs	Signage incorporating raised text, and/or symbols and Braille to enable touch reading by people who are blind or who are vision-impaired.
Walkway	Any surface on a continuous accessible path of travel with a gradient not steeper than 1 in 20.

Executive Summary & Recommendations

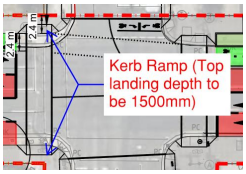
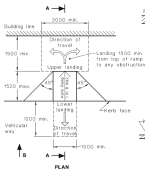
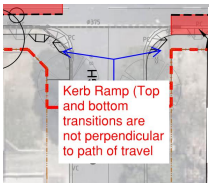
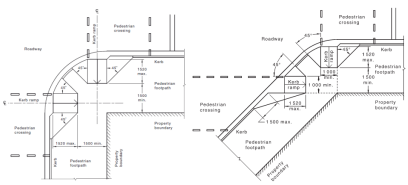
This report has assessed the **Initial Concept Design Review** for the proposed **Public Domain – LCC Moore Street & George Street Cycleway Upgrade** under the relevant requirements relating to "Access for People with Disabilities.

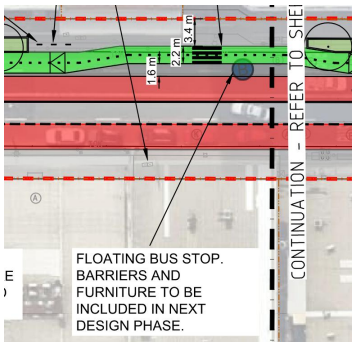
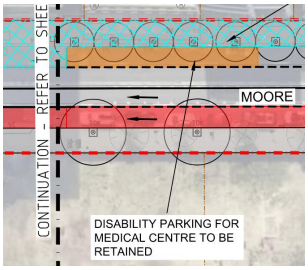
The primary purpose of the report is to assess the design documentation for specified scope works and to provide suitable recommendations to ensure the design will meet the appropriate accessibility requirements.

Subject to the recommendations of this report, the development demonstrates an ability to comply with appropriate accessibility requirements for the new scope of works.

Significant Recommendations are summarised below in **Table 1.0** and **Table 8.0** contains further detailed requirements.

Table 1.0 – Significant DDA Recommendations

#	Clause	DDA Recommendation	Status
1.	Clause 10.7 of AS1428.1-2009	**Kerb Ramps** There are several new/altered kerb ramps throughout the precinct which do not comply in terms of landing circulation and alignment including the following. • The footpath width on Moore Street at the intersection of Bathurst Street has a width of less than 3020mm which is insufficient to accommodate a 1520mm long kerb ramp with a top landing depth of 1500mm.   • The top and bottom of kerb ramps at certain locations do not align at 90° to the path of travel so that the top and bottom transitions are not perpendicular to the path of travel.  	**DOES NOT COMPLY**

#	Clause	DDA Recommendation	Status
2.	Clause 8.1 of DSAPT	**Floating Bus Stops** The proposed floating bus stops, having a depth of 1600mm, are insufficient depth to allow for compliant wheelchair circulation to access a deployed boarding ramp (2070mm minimum 2870mm preferred). 	**DOES NOT COMPLY**
3.	DDA Best Practice AS2890.5 & AS2890.6	**Accessible Street Parking** It is recommended the design consider upgrading the existing on street accessible carparking bays to achieve accessible dimensions of 7.8m long by 3.2m wide with a kerb ramp to allow wheelchair access between the footpath and the parking bay  	**Further Detail Required**
4.	Various	**Design Detail** Further to the above matters, those items that are indicated as *"Can Readily Comply – (Subject to Detail) or Further Detail Required"* in Table 8.0 also require further detailed to allow full assessment by the DDA Consultant. As the design continues to progress.	**Further Detail Required**

1.0 Introduction

This report has assessed the **Initial Concept Design Review** for the proposed **Public Domain – LCC Moore Street & George Street Cycleway Upgrade** under the relevant requirements relating to "Access for People with Disabilities".

Public domain areas (beyond the allotment boundary) are not strictly bound by the accessibility provisions of the BCA, Premises Standard 2010 or DSAPT 2002, however are still considered a "place and premises" under Section 23 of the Disability Discrimination Act, 1992, so assessment against reasonable accessibility compliance benchmarks such as AS1428.1 are used to provide for inclusive and accessible environments as well as mitigating against risk of DDA claim.

On that basis, the reports intention is to provide suitable requirements and recommendations for the development to meet compliance with the technical accessibility codes and standards that sit under the DDA. The purpose of the DDA being to eliminate, as far as possible, discrimination against persons on the ground of disability and ensure, as far as practicable, that persons with a disability have the same rights of access to premises and facilities as the rest of the community.

2.0 Assessed Information

This report is based on assessment of the following information:

- Desktop assessment of the Initial Concept Design Review documentation and supporting design plans and information - refer Attachment A – Assessed Plans:
  - General Arrangement Plans (Preferred Option) – Issue B Dated 21.03.25
  - Liverpool City Council Public Domain Technical Manual Draft May 2024 as a guiding document
- Disability Discrimination Act ("DDA") related technical regulations, codes and standards as detailed in Section 4.0 below.

3.0 Purpose of Report

The purpose of this report is to:

- Assess the specified design documentation against the accessibility related requirements of the Building Code of Australia, principles of the Disability Discrimination Act, 1992 and technical accessibility standards as specified in Section 4.0 of this report,

- Clearly identify any areas of the design documentation where accessibility compliance is not achieved and provide recommendations to provide for, as far as is reasonable, safe, equitable and dignified access and use to the development / building,

- Identify accessibility "best practice" opportunities to promote better fulfilment of the DDA's objectives to eliminate, as far as possible, discrimination against persons on the ground of disability and ensure, as far as practicable, that persons with a disability have the same rights of access to premises and facilities as the rest of the community.

4.0 Limitations of the Report

The report is subject to the following limitations:

- This report is limited to the public domain area as captured under the landscaping and civil packages but does not cover the architectural package for the stations (which is separately reported on).

- The assessment is limited to the proposed project scope only as depicted in the assessed information referred to in Section 2.0 of this report and does not consider any aspects beyond that specified to MSA in our scope of services brief.

- The information provided to MSA as nominated in Section 2.0 is accepted in good faith as accurate and correct.

- Some accessibility requirements are recognised as being interpretive in nature. Where these matters are encountered, interpretations are the professional opinion of MSA, with specific interpretations relevant to this assessment are included throughout where required.

- The Disability Discrimination Act, 1992 is complaints-based legislation. Whilst recommendations of this report are intended to cover assessments against technical accessibility standards and provide recommendations to advocate for better access within the limitations of the scope and our client brief, compliance with the recommendations of this report does not assure or guarantee compliance with the provisions of the DDA. This report does not constitute legal advice or opinion.

- Stakeholder consultation with disability and industry bodies is beyond the direct scope of this report.

5.0 Accessibility Legislation, Codes & Standards

The key legislative requirements, codes and standards that have been considered under this assessment are as follows:

5.1. Commonwealth Disability Discrimination Act 1992 ("DDA")

The DDA provides protection for everyone in Australia against discrimination based on disability. It applies to both areas on the building / development allotment as well as public domain areas.

Disability discrimination happens when people with a disability are treated less fairly than people without a disability. Disability discrimination also occurs when people are treated less fairly because they are relatives, friends, carers, co-workers or associates of a person with a disability.

People who design, build, own, manage, lease, operate, regulate and use premises have responsibilities and rights under the Disability Discrimination Act, 1992 (DDA). The DDA is a Commonwealth Act which seeks to eliminate bias against people with disabilities and protect their rights. The DDA states that failure to provide equal access is unlawful, unless to do so would impose an unjustifiable hardship.

Notably the DDA is a complaints-based legislative instrument. The Disability Discrimination Act 1992 seeks to eliminate discrimination, 'as far as possible', against people with disabilities though does not contain specific building regulations or design requirements.

The Disability Discrimination Act 1992 covers a range of disabilities, including the following:

(a) partial or total loss of sight;

(b) partial or total loss of hearing;

(c) partial or total loss of speech;

(d) disfigurements or deformities;

(e) difficulties in walking (including partial or total loss of use of legs);

(f) difficulties in fully using arms (including gripping);

(g) learning and orientation difficulties;

(h) sensitivity to chemicals causing malfunction of a person's body;

(i) chronic diseases, illnesses or other medical conditions;

(j) emotional or behavioural conditions.

5.2. The Disability Standards for Accessible Public Transport 2002 ("DSAPT")

The Disability Standards for Accessible Public Transport 2002 ("DSAPT") seek to remove discrimination for people with disability in relation to public transport services to provide equality and independence.

DSAPT applies to specified trains, light rail, tram, bus and coach, ferry, taxi and aviation services and are designed to provide certainty to people with disability and providers and operators of public transport services and infrastructure about their rights and responsibilities under the Disability Discrimination Act 1992 (DDA).

DSAPT requires all of Australia's public transport networks and associated infrastructure to be fully accessible by 2022 (with the exception of trains and tram conveyances, which have until 2032).

The majority of the building / premises requirements for passenger use areas of public transport buildings were shifted to both the Access to Premises Standard 2010 and BCA Part H2 in 2010 (now known as BCA Part I2).

DSAPT still contains several applicable requirements including those for conveyances, infrastructure, waiting areas, rest points, boarding points and passenger information. The purpose of these standards is to enable public transport operators and providers to remove discrimination from public transport services.

5.3. Disability (Access to Premises - Buildings) Standards 2010

This federal legislative instrument often referred to as "The Premises Standard" was developed to detail accessibility requirements in new buildings as well as existing buildings that are undergoing upgrade. It does not relate to existing buildings otherwise.

The requirements contained within it "the Access Code" largely align with the accessibility requirements contained in the BCA, but also including additional requirements in existing buildings to upgrade any existing accessible path between the building entry and the area being upgraded as well as toilets and lifts to meet certain technical benchmarks.

Additionally, there are mandated timetables of compliance for owners and operators of existing public transport buildings to provide for compliant accessibility features in their buildings with an end date for all to be upgraded by 31st December 2022.

Clause 3.1 of the Premises Standard stipulates certain accessible features that are required to be installed by certain target dates for existing public transport buildings. The Table in Clause 3.1 expresses these figures as a percentage of the overall existing buildings in which the features

must be installed. That is, the percentage figures are an overall strategic objective for the existing public transport buildings under control of the owner / operator.

The obligation to meet the upgrade requirements of the Disability (Access to Premises – Building) Standard 2010 lies with both the owner and operator as defined under the Transport Standards.

5.4. The Building Code of Australia

The Building Code of Australia (BCA) forms part of the National Construction Code (NCC) contains accessibility requirements for new building works, namely:

- BCA Part D4 (formerly BCA Part D3) "Access for People with Disabilities" – this part contains general accessibility requirements for all types of buildings.
- BCA Part E3 "Lift Installations" – this part specifies lift types, sizes and features required in all buildings
- BCA Part F4 (formerly BCA Part F2) "Sanitary & Other Facilities" – this part includes requirements for sanitary facilities, including numbers vs populations, and accessible and ambulant facilities.
- BCA Part I2 (formerly BCA Part H2) "Public Transport Buildings" – this part contains enhanced accessibility requirements for passenger use areas of public transport buildings, where a contradiction occurs with other parts of the BCA, these enhanced requirements prevail.

5.5. Australian Standards

Australian Standards (AS) – these are technical design standards published by Standards Australia. to provide for appropriate accessibility in buildings, including:

- Relevant parts of AS1428.1-2001/2009/2021 "Design for Access and Mobility – Part 1: General Requirements for Access New Building Works"
- Relevant parts of AS1428.2-1992 "Design for Access and Mobility – Enhanced and Additional Requirements – Buildings and Facilities"
- Relevant parts of AS1428.4-1992 "Design for Access & Mobility – Part 4 Tactile Ground Surface Indicators for Orientation of People with Visual Impairment"
- Relevant parts of AS1428.4.1-2009 "Design for Access & Mobility–Part 4.1 Means to Assist the Orientation of People with Vision Impairment – Tactile Ground Surface Indicators"

- AS1680.2.0 - 1990 "Interior lighting - Recommendations for specific tasks and interiors"
- AS1735.12-1999 "Lifts, Escalators & Moving Walkways – Part 12 – Facilities for Persons with Disabilities"
- AS2890.5-2020 "On-street Parking
- "AS2890.6-2009 "Parking Facilities - Off Street Parking for People with Disabilities"

5.6. Other Accessibility Guidelines & Policies

The principles contained in the following guidelines have also been considered in the provision of recommendations in this report:

- Disability Standards for Accessible Public Transport Guidelines 2004 (No. 3)
- Australian Human Rights Commission Guideline on the Application of the Premises Standards 2013
- Australian Human Rights Commission Advisory Note on streetscape, public outdoor areas, fixtures, fittings and furniture February 2013

5.7. Accessibility Best Practice

Beyond compliance with the above technical standards are the principles of accessibility best practice, universal design, inclusive environments and the overarching objective to reduce discrimination to the greatest extent possible.

This report includes recommendations that extend beyond compliance to promote broad functional, equitable and dignified access and use of the building in the opinion of the author.

Simple design principles that are identified early on can provide for significantly enhanced function and use of the building for all people, including those with varying ranges of disabilities. Identification of the various occupant needs including the various disability types / groups in consultation with the owner / operator can then drive the decision making for specific additional building features that can be considered in the development design.

Although beyond the scope of this report, it is suggested that the relevant stakeholders engage with disability industry besides and user groups to allow broad consideration of the various needs as relevant to the project to promote best outcomes.

6.0 Application of Accessibility Requirements to Different Areas

6.1. Context of Accessibility Requirements for Buildings & Precincts

Not all accessibility legislation, codes and standards apply equally across all parts of buildings or precincts. The following details broadly how the various accessibility requirements are intended to be applied:

6.1.1 Passenger Use Areas of Public Transport Buildings

Passenger use areas or "front of house" areas of stations are required to be accessible and are also subject to enhanced accessibility requirements to provide for improved / superior accessibility to these spaces. The following enhanced codes and standards apply specifically to these areas:

- Disability Standards for Accessible Public Transport 2002
- Building Code of Australia Part I2 "Public Transport Buildings"
- AS1428.2-1992 which contains enhanced provisions including: width of accessways to be 1200mm (instead of 1m), passing bays every 6m (instead of 20m) and landings on ramps every 6m (instead of 9m).

6.1.2 Offices and Staff Facilities (back-of-house)

These areas are required to be fully accessible, but are subject to the 'standard' accessibility requirements contained in the following codes and standards:

- Building Code of Australia Part D4 "Access & Facilities for People with Disabilities"
- Building Code of Australia Part F4 "Sanitary Facilities including Accessible and Ambulant Facilities"
- AS1428.1-2009 which contains "standard" accessibility requirements for commercial buildings (but not the enhanced requirements contained for passenger use areas in DSAPT and BCA Part I2)

6.1.4 Services & Maintenance Areas

Generally, services and maintenance rooms containing electrical &/or mechanical equipment, cleaners stores etc are exempt from compliance with accessibility requirements by the applying the exemption in BCA Clause D4D5, though each room/area, use and occupant profile should be assessed on a case-by-case basis for appropriate application of the below exemption:

BCA Clause D4D5 Exemptions

The following areas are not required to be accessible:

(a) An area where access would be inappropriate because of the particular purpose for which the area is used.

(b) An area that would pose a health or safety risk for people with a disability.

(c) Any path of travel providing access only to an area exempted by (a) or (b).

6.1.4 Public Domain (beyond building allotment)

Areas beyond the site boundary of the allotment ie "the public domain" are not as strictly bound by the accessibility requirements of the Disability Access to Premises Standard 2010, Building Code of Australia &/or DSAPT (or subsequently AS1428.2 & AS1428.1) as those codes and standards are not generally applicable beyond the allotment boundary that's under control by the owner / operator.

In these locations, Section 23 of the Disability Discrimination Act, 1992 requires non-discriminatory access to a 'premises' to which the public or section of the public is entitled to or allowed to use. The Australian Human Right Commission has confirmed that a 'premises' and 'place' by definition under the DDA includes a public footpath &/or facilities in these areas. Section 24 of the DDA also requires non-discriminatory access to 'services', which would include public transport services.

For public domain locations, every attempt should be made by the provider to achieve compliance against known accessibility benchmarks such as AS1428.1 & AS1428.2 to allow for independent, safe, dignified and equitable access through these areas, particularly to mode interchange facilities and main pedestrian routes and facilities.

The Australian Human Rights Commission has recognised in various publications that full accessibility compliance may not always be possible in public domain areas due to existing constraints such as street topography. Though, in these instances, every effort should be made to achieving compliance against known standards for accessibility "best practice" and better meeting the broader objectives of the DDA.

7.0 Development Characteristics

7.1. Development Description

7.1.1 Public Domain – LCC Moore Street & George Street Cycleway Upgrade

The proposed development is the Public Domain – LCC Moore Street & George Street Cycleway Upgrade which a cycleway along Moore Street And Liverpool Street in the Liverpool CBD.

The development also includes street and public domain / footpath works which includes footpath re-grading, modifications and pedestrian crossings which are the subject of this report.

Figure 1 - Site Plan of LCC Moore Street & George Street Cycleway Upgrade

7.2. DDA Accessibility Assessment Data

The following table/s provide information on the key DDA/BCA Assessment Data relevant to the development:

Table 7.2 BCA & Access Assessment Data

BCA Clause		The Shared Path
A6G1	**Classification**	*Class 9b/10a - bus shelters (Public Transport Building) **Class 10b – non-habitable structures

** The bus stop shelters have been classified as Class 9b/10a assembly buildings which includes a building where people may assemble for transit purposes.*

*** Public Domain Areas beyond the allotment boundary of the stops do not carry any specific BCA classification.*

8.0 Access Assessment & Recommendations

The following DDA Compliance Schedule details the relevant requirements and provides recommendations to provide for appropriate and compliant accessibility with regard to the project scope. Table 8.0 is a summary of requirements only and referenced documents and standards should always be referred to for full dimensions and requirements.

The following notations are made in the below table:

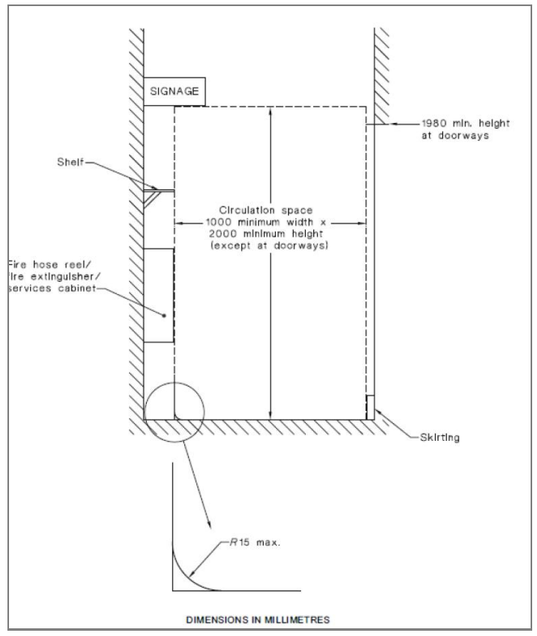
Table 8.0 – Status Key for DDA Compliance Assessment Table

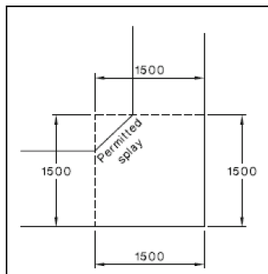
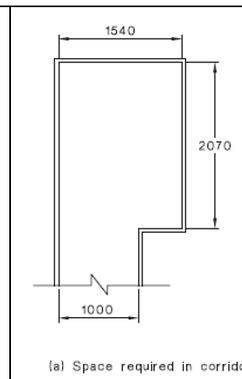
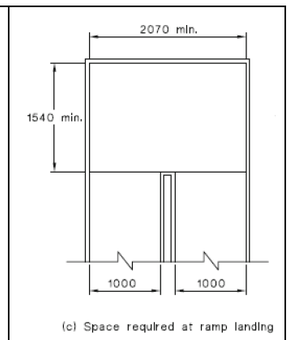
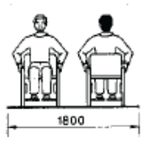
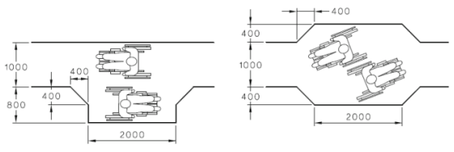
Status	Description
Complies	The design documentation for new building works demonstrates compliance with the relevant deemed-to-satisfy accessibility / DDA requirement as relevant to the project scope
Further Details Required or Can Readily Comply - Detail	Though strict & full compliance can't necessarily be ascertained on the current level of documentation detail, compliance can be readily achieved within the constraints of the design. This may be in the form of a plan or specification note, or further detailed information at this or a later design stage prior to AFC.
Does Not Comply	There is an apparent or foreseeable non-compliance with the accessibility / DDA deemed-to-satisfy provisions indicated on the design documentation that will require re-design or further consideration.
NA / Informational	The matter is not applicable to the item of the project scope or the clause is informational only. No specific action required.
Client Confirmation Required	The matter requires specific input from the client, principal, owner or operator in relation to scope clarification / expectations or user requirements.
Fire Engineering	A Fire Engineering Report (for emergency egress of people with disabilities) is required to address the DTS non-compliance (or re-design). The recommendations of the fire engineering report must be incorporated into the design.
BCA / DDA Performance Solution	A BCA / DDA Performance Solution Report (for an accessibility issue) is required to address the DTS non-compliance (or re-design). The recommendations of the performance solution report must be incorporated into the design.
Certification by Designer or Specialist.	Detailed assessment / confirmation is required from the relevant designer, design engineer or specialist to confirm compliance with the nominated accessibility requirement/s. This may be technical advice at early design stages or design compliance certification at detailed design stages.

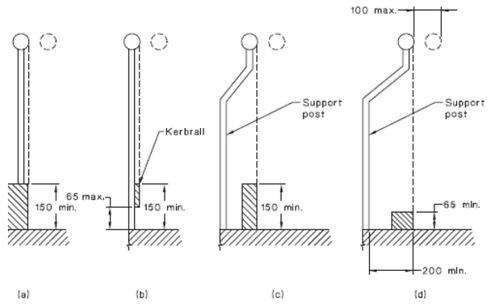
Table 8.0 provides a summary of the technical accessibility / DDA compliance requirements and should be read in conjunction with the full terms, wording and requirements of the relevant accessibility legislation, BCA and Australian Standards.

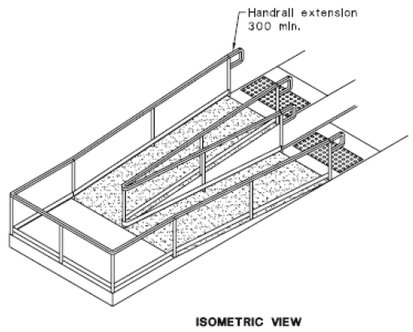
Table 8.0 – DDA Compliance Schedule

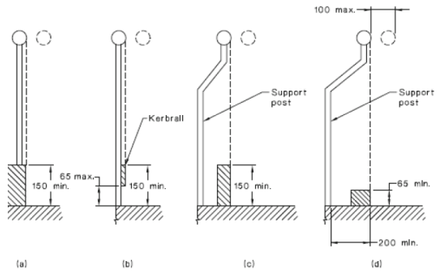
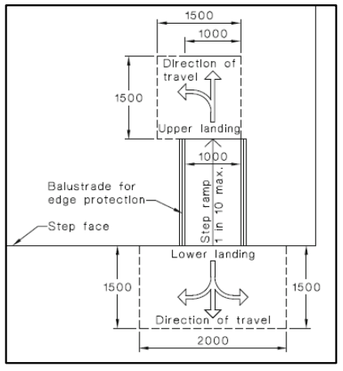
Clause	Accessibility Requirement	Compliance Comment	Status
Shared Paths & Accessways			
Guide to Road Design Part 6A: Paths for Walking and Cycling, AS1428.2 & AS1428.1	**Shared Cycle Paths & Accessways – General Requirements** Shared paths must meet the following: • Accessways along shared paths should have a crossfall of 2.5% (1 in 40) or 3.3% (1 in 33) if the path is asphalt. • A two-way crossfall on a path with a central crown, may provide an opportunity for wheelchair users to obtain relief from one-way crossfalls. (Desirable) *cl5.6 of Ausroads* • A clear height of no less than 2000mm for wheelchair use (AS1428.1) and 2500mm for cyclists (5.5.2 of Ausroads and AS 1742.2:2009). • Where a shared path in provided on one side of the road, safe access to the path should be provided by an at-grade crossing or providing overpasses and underpasses. (cl 8.3 of Ausroads) • The minimum width of a shared path is dependent on the paths predominant use and purpose. Predominant path purpose include: A. Local access (low use) – 2000mm B. Commuting and local access (regular use) – 2500mm C. Commuting (frequent and concurrent use in both directions) – 3000mm D. Recreation (regular use) – 3000mm E. Commuting and recreation (frequent and concurrent use both directions) – 3500mm F. Major recreation (group rides, high and concurrent use) – 4000mm	The main sections of 'shared path' appear to have a minimum width of 4000mm which generally complies with the requirements of this clause The overall width of each section of 'shared path' shall be detailed on the plans based on the predominant use and purpose. *See also below for detailed requirements of the accessible path.*	**Further Detail Required**
The Accessible Path			
BCA I2D2, BCA D4D3, DSAPT & AS1428.1-2009 & AS1428.2-1992	**What is the Accessible Path?** The accessible path, sometimes referred to an the 'accessway' is a barrier free path that meets certain dimensional requirements and gradients to allow for ease of use by a broad section of passengers including those with disabilities and wheelchair users. All parts of a class 9b station building that are ordinarily used by the occupants are required to be accessible. An accessible path should ultimately be provided throughout all passenger use areas: • extending from mode interchange facilities (bus stop, taxi, Kiss & ride & accessible carparking) to accessible station entry points • extending from all pedestrian points of entry at the property boundary to the accessible station entry points • through the principal pedestrian entrances to the station • lead to and within all passenger use areas of the station concourse, footbridge, underpass & platform levels • lead to all passenger facilities including waiting rooms, ticketing, wide access gate (where installed), opal readers and top up machines, toilets, telephones, vending machines, help points and water fountains etc • lead to nominated accessible boarding points on each platform	An accessible path is required to the following key areas: • On public footpath 'shared zones' and pedestrian crossings (desirable / best practice where beyond allotment boundary) • The cycleways are nominated as 'bike only' and are **not** considered to be relied upon as an accessible pedestrian path on that basis. *See below for detailed requirements of the accessible path.*	**Informational**
BCA I2D2, AS1428.2 & 10.1 of AS1428.1	**Accessible Path Crossfall** • Maximum crossfall of 1:40 is required for any accessible path / accessway. • Notably, this can be increased to 1:33 where bitumen is used with the support of a BCA Performance Solution (as BCA H2.2 does not yet recognize AS1428.1-2009 and the 1:33 bitumen concession)	**Accessible Path Crossfalls** A maximum crossfall of 1:40 (or 1:33 for bitumen) is to be achieved or otherwise confirm that existing constraints will not allow compliance for further consideration by MSA. *Note: As the footpaths are primarily in the public domain, there is some regulatory flexibility where strict compliance cannot be achieved.*	**Further Detail Required**

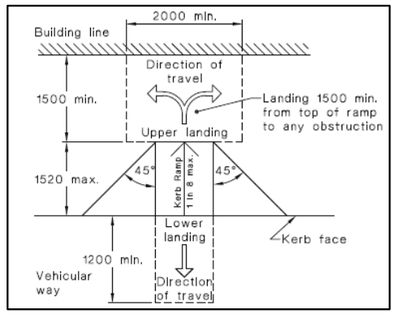
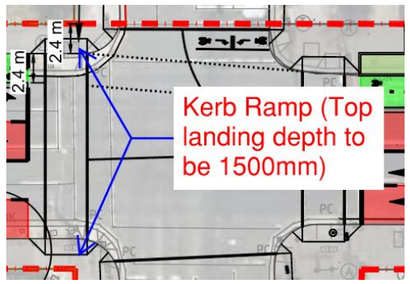
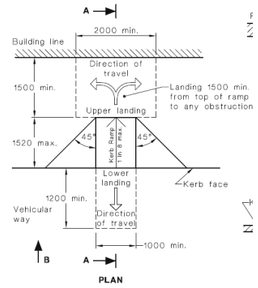
Clause	Accessibility Requirement	Compliance Comment	Status
BCA I2D2 AS1428.2 and Clause 6.2 & 6.3 of AS1428.1	**Accessible Path - Key Dimensions** Accessible paths meeting AS1428.2 must be: • A minimum 1200mm wide (or 1800mm minimum to avoid passing bays) and free of any protruding obstructions. *Note: This can be reduced to 850mm at doorways and moving walkways only.* • Unobstructed clear height of no less than 2000mm and 1980mm at doorways 	The design can readily comply as relevant to the scope and subject to detail in the ongoing design.	**Can Readily Comply**
BCA I2D2(4) DDA Best Practice	**Accessway Obstructions** Poles, columns, stanchions, bollards and fixtures must not project into an accessway	This requirement is mandatory when associated with bus shelters, but desirable / best practice where in the public domain. It is a desirable / best practice recommendation that any obstructions are confirmed to have a minimum 30% contrast to the floor / path surface.	**Further Detail Required**
BCA I2D2(5) DDA Best Practice	**Contrast of Abutting Obstacles** Obstacles that abut an accessway must have a luminance contrast with a background of not less than 30%.	This requirement is mandatory when associated with bus shelters, but desirable / best practice where in the public domain. It is a desirable / best practice recommendation that any abutting obstacles (such as bike hoops, bins and water fountains) are confirmed to have a minimum 30% contrast to the floor / path surface.	**Further Detail Required**

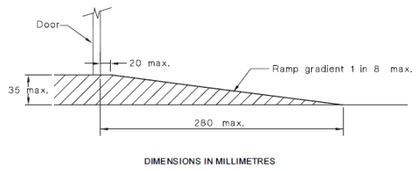
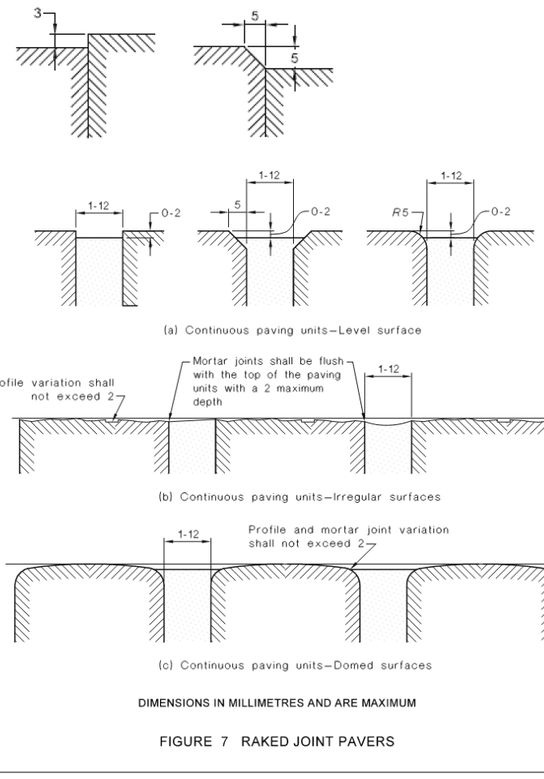
Clause	Accessibility Requirement	Compliance Comment	Status
Maneuvering Areas			
BCA I2D2(6), D4D4 & 6.5 of AS1428.1	**Circulation space** Must be provided in front of key accessible features and along the accessible path to allow the following turns • 90 degree turn - 1500mm x 1500mm • 180 degree turn - 2070mm x 1540mm • 360 degree turn – 2250mm x 2250mm (2450mm x 2450mm preferred/desirable)  90 Degree Turn  180 Degree Turn – Example 1  180 Degree Turn – Example 2	The design can readily comply as relevant to the scope and subject to detail in the ongoing design. Where a 90 degree turn is required, the landings to the tops of kerb ramps should be clearly confirmed as a minimum of 1500mm in depth.	**Can Readily Comply**
Passing Bays			
BCA I2D2(7) & 6.4 of AS1428.1	**Passing Bays** • *Passenger Use Areas of Public Transport Buildings* - A passing area must be provided at least every 6 m along any two-way accessway that is less than 1800 mm wide (to allow two wheelchairs to pass) • *General / Public Domain* – It is recommended that an 1800mm wide passing bay is provided to public footpaths at least every 20m where a clear line of sight is not available, or that footpaths otherwise maintain a minimum 1800mm width. • An intersection of an accessway must satisfy *both* passing bay and turning space dimensions  (d) To allow two wheelchairs to pass comfortably, a clear width of 1800 mm is required  	The design can readily comply as relevant to the scope and subject to detail in the ongoing design.	**Can Readily Comply**

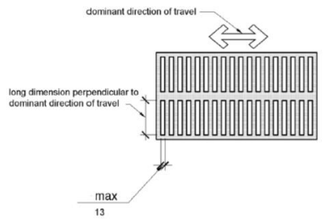
Clause	Accessibility Requirement	Compliance Comment	Status
Walkways			
BCA D4D4 & Clause 10 of AS1428.1	**Walkway Design** • Walkway gradients must not be steeper than 1:20 • Landings that are min. 1200mm deep spaced no greater than 15m apart for 1:20 grades and every 25m for 1:33 • For walkways between 1:20 and 1:33 the gradient is calculated by linear interpolation • The landing spacing can be increased by 30% if at least one side is bound by a handrail and kerb/wall • No landings are required if shallower than 1:33 • Sharp transitions shall be provided between the planes of landings and ramps • Landings shall be provided at all changes in direction • 1800mm minimum width, or passing bays every 6m where less • Crossfalls to shed water up to 1:40 max, or 1:33 if bitumen	Walkway landings only applies to footpaths where the linear gradient is greater than 1:33 and shallower than 1:20 (considered a "ramp" if steeper). The longitudinal gradient of footpaths and shared zones shall be confirmed during ongoing design.	**Further Detail Required**
BCA D4D4 & Clause 10.2 of AS1428.1	**Walkway Edge Protection & Handrails** Side protection to both sides being: • A kerb at least 150mm in height (cannot be 75mm-150mm in height) • A kerb & handrail (where kerb alone could be a trip hazard) • Wall > 450mm, or • Where not bound on the sides, the surface adjacent to the walkway must be a differing material that is firm and at the same crossfall for at least 600mm either side  *Example of Kerb & Handrail Side Protection*	This only applies to footpaths where the linear gradient is greater than 1:20. The longitudinal gradient of footpaths and shared zones shall be confirmed during ongoing design.	**Further Detail Required**

Clause	Accessibility Requirement	Compliance Comment	Status
Ramps			
BCA I2D3 8 of AS1428.2 BCA D4D4(a) cl 10.3 & 10.8 of AS1428.1	**Ramp Design** • Ramp gradients must be between 1:14 and less than 1:20 • Ramp gradients must be constant and max. 3% variance • Crossfall no greater than 1:40 • Landings at least 1200mm deep must be provided: o For ramp gradients of 1 in 14, at intervals not greater than 6 m (for passenger use areas) and 9m (for public domain, staff and back of house accessible areas) o For ramp gradients steeper than 1 in 19, at intervals not greater than 14 m. o For ramp gradients between 1 in 14 and steeper than 1 in 19, at intervals that shall be obtained by linear interpolation. • Landings at changes in direction being 1500mm x 1500mm for 90 degrees and 2070mm x 1540mm for 180 degrees • Landings at doors at least the size of the required circulation space • 1800mm minimum width, or passing bays every 6m where less • Setback to avoid handrails protruding into traverse paths • Setback to avoid tactiles crossing allotment boundaries (at street) • Tactile Indicators to the top and bottom.  *Example of Ramp Design – Isometric View*	This only applies to footpaths and shared zones with a longitudinal gradient of between 1:20 and 1:14. The longitudinal gradient of footpaths and shared zones shall be confirmed during ongoing design.	**Further Detail Required**

Clause	Accessibility Requirement	Compliance Comment	Status
BCA I2D3 8 of AS1428.2 BCA D4D4(a) 10.3 & 10.8 of AS1428.1	**Ramp Edge Protection & Handrails** • Continuous accessible handrails provided to both sides of ramp at a constant height between 865mm-1000mm • 300mmm handrail extensions to top and bottom • Accessible handrail terminations - return to floor, wall or 180 degrees • 35-50mm diameter with 50mm minimum clearance • Free of any obstruction in top 270 degrees of handrail radius • Kerb >150mm in height to both sides, or a 65-75mm kerb with balusters setback at least 200mm (a 75mm-150mm height kerb is prohibited). • There shall be no longitudinal gap or slot over 20mm between 75mm-150mm in height  *Example of Ramp Handrail & Kerb Side Prtotection*	This only applies to footpaths and shared zones with a longitudinal gradient of between 1:20 and 1:14. The longitudinal gradient of footpaths and shared zones shall be confirmed during ongoing design.	**Further Detail Required**
BCA D4D4(a) BCA D4D12(b) 10.6 of AS1428.1	**Step Ramps** Step ramps shall have: • a maximum rise of 190mm; • a length not greater than 1900 mm; and • a gradient not steeper than 1 in 10 • top landings of at least 1500 x 1500mm or increased if at doors • A landing for a step ramp must not overlap a landing for another step ramp or ramp.  ***Example of Accessible Kerb Ramp Design***	NA – the footpaths and shared zones do not propose any step ramps.	**Not Applicable**

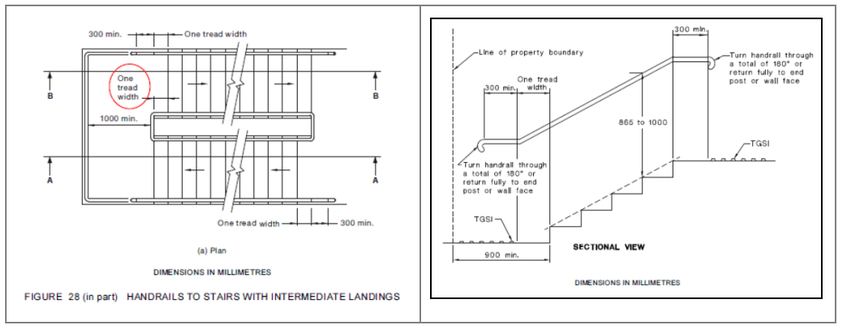
Clause	Accessibility Requirement	Compliance Comment	Status
BCA D4D4(a), & 10.7 of AS1428.1	**Kerb Ramps** Kerb ramps shall have: • a maximum rise of 190 mm; • a length not greater than 1520 mm; and • a gradient not steeper than 1 in 8, located within or attached to a kerb • Contrast to the surrounding surface or provided with 50mm perimeter junction stripe • Align with opposing kerb ramps where crossing vehicle ways  ***Example of Accessible Kerb Ramp Design***	There are several new/altered kerb ramps throughout the precinct which do not comply in terms of landing circulation and alignment including the following. • The footpath width on Moore Street at the intersection of Bathurst Street has a width of less than 3020mm which is insufficient to accommodate a 1520mm long kerb ramp with a top landing depth of 1500mm.   • The top and bottom of kerb ramps at certain locations do not align at 90° to the path of travel so that the top and bottom transitions are not perpendicular to the path of travel. 	**DOES NOT COMPLY**

Clause	Accessibility Requirement	Compliance Comment	Status
BCA D4D4(a), & 10.5 of AS1428.1	**Door Threshold Ramps** • Door threshold ramps must be contained in the door threshold • Must not exceed 1:8, 35mm in RL change and 280mm in length 	NA – there are no door threshold ramps affected by the design /scope.	**Not Applicable**
Floor Surfaces			
BCA I2D2(8) & Clause 7 of AS1428.1	**Abutting Floor Surfaces** Provide a smooth transition between abutting surfaces (including recessed mats). A construction tolerance of +/- 3mm for vertical differences is allowable or +/- 5mm where edges are rounded or beveled. Gaps must not exceed 5mm in width.  FIGURE 7 RAKED JOINT PAVERS	**Floor Surfaces** Confirmation must be indicated on plan confirming that floor surfaces will meet Clause 7.2 including Figure 6 & 7 of AS1428.1-2009, particularly within regard to abutment of paved and raked surfaces which limits 'edges' to 2mm - 5mm (dependent on the corner finish) to ensure smooth accessible paths.	**Further Detail Required**

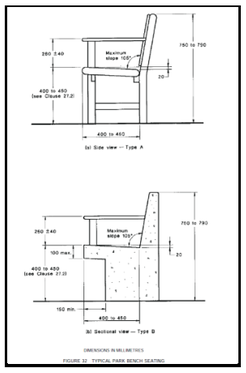
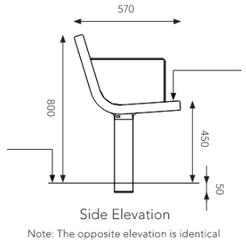
<table>
<tr><th>Clause</th><th>Accessibility Requirement</th><th>Compliance Comment</th><th>Status</th></tr>
<tr><td>BCA I2D2(8) & Clause 7.5 of AS1428.1</td><td>Floor Grates
Surface grates must have circular openings not greater than 13mm, or slotted openings not greater than 13mm traverse to the direction of travel.
NOTE: Where slotted openings are less than 8 mm, the length of the slots may continue across the width of paths of travel.
 

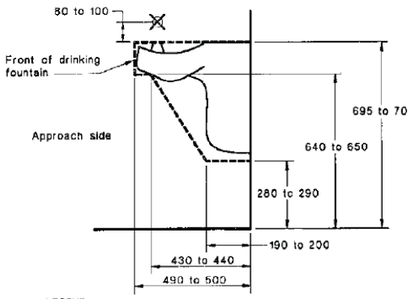
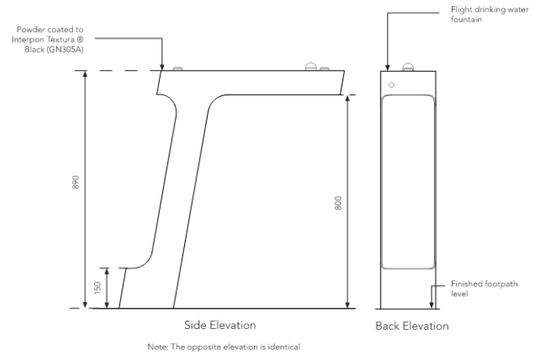
Example of slotted Grate with 13mm max</td><td>All floor grates that are part of pedestrian pathways should comply.
Provide further detail on aperture size of all specified grates confirming compliance with</td><td>Further Detail Required</td></tr>
<tr><td>BCA Table D3D15</td><td>Slip Resistance
The following slip resistance levels must be met per AS4586-2013
<table><tr><th rowspan="2">Application</th><th colspan="2">Surface Conditions</th></tr><tr><th>Dry</th><th>Wet</th></tr><tr><td>Ramp steeper than 1:14</td><td>P4 (W) or R11</td><td>P5 (V) or R12</td></tr><tr><td>Ramp steeper than 1:20 but not steeper than 1:14</td><td>P3 (X) or R10</td><td>P4 (W) or R11</td></tr><tr><td>Tread or Landing Surface</td><td>P3 (X) or R10</td><td>P4 (W) or R11</td></tr><tr><td>Nosing or landing edge strip</td><td>P3 (X)</td><td>P4 (W)</td></tr><tr><td>General</td><td>P3(X) or R10</td><td>P4 (W) or R11</td></tr></table>Specification notes &/or test reports for proposed materials required to confirm compliance.</td><td>Slip resistance information should be provided for all pedestrian surfaces confirming compliance with the slip resistance requirements of the adjacent table.</td><td>Further Detail Required</td></tr>
<tr><td colspan="4">Stairs</td></tr>
<tr><td>BCA I2D7, AS1428.2 & AS1428.1</td><td>Stair Design
• Not more than 18 and not less than 2 risers in each flight
• Constant goings and risers throughout the flight (+/- 5mm between consecutive and max +/- 10mm through flight)
• Going dimensions of 275mm-300mm and riser dimensions of 150mm-165mm
• Bottom riser may vary when meeting a public road only
• Closed / Opaque risers
• No winders for public stairs
• Landings no steeper than 1:50 at the top and bottom extending no less than 750mm, 900mm preferred to accommodate tactiles
• Setback so the accessible handrails do not protrude into pedestrian crossflow generally
• Setback 900mm at property boundaries so tactiles also do not protrude past boundary</td><td>Where the project involves footpath resurfacing affecting existing stairs leading to a building (see courthouse example below), full details of the proposed extent of stair / handrail upgrade works to be detailed on plan and provided to MSA for assessment.

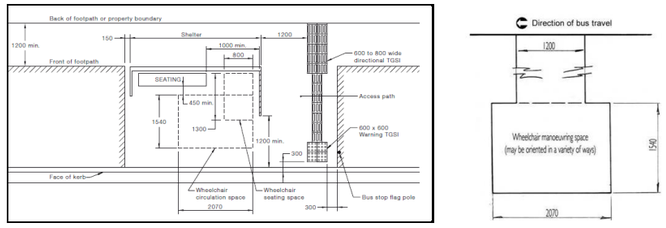
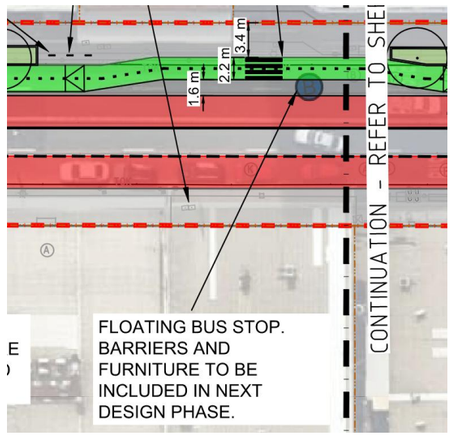
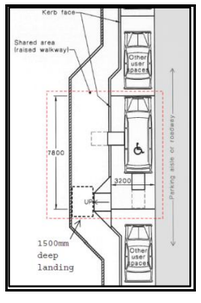
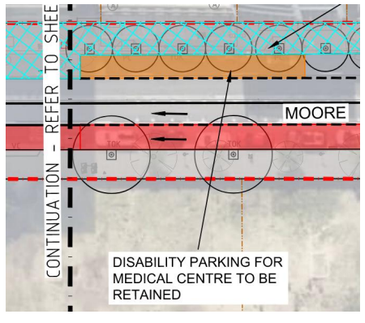
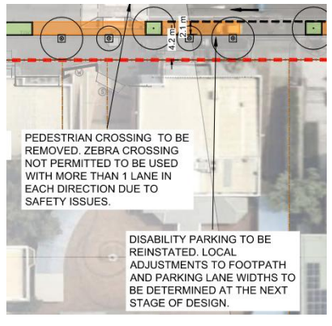
</td><td>Further Detail Required</td></tr>
</table>

Clause	Accessibility Requirement	Compliance Comment	Status
BCA I2D4, AS1428.2 & AS1428.1	**Stair Handrails** • Handrails provided to both sides of all accessible stairs (only one side in fire isolated stairs) • 865mm-1000mm above nosing line • Continuous through flights and landings • Consistent height throughout • Handrails shall have no vertical sections and shall follow the angle of the stairway nosings • Risers must be offset at any mid-landings to avoid vertical sections in handrails • Handrail at top of stair to extend 300mm past top riser • Handrail at bottom of stair to extend one tread depth (at angle) plus 300mm horizontal • Accessible terminations - return to floor, wall or 180 degrees • 35-50mm diameter with 50mm minimum clearance • Free of any obstruction in top 270 degrees of handrail radius  FIGURE 28 (in part) HANDRAILS TO STAIRS WITH INTERMEDIATE LANDINGS	As above for stair design	**Further Detail Required**
Signage			
BCA Clause I2D10, AS1428.2-1992 & AS1428.1-2009	**Symbols & Signs** • The international symbols for accessibility and deafness in accordance with clauses 14.2 and 14.3 of AS 1428.1 must be used to identify an *accessway* and which facilities and boarding points are *accessible*. • Signs must be placed in accordance with clause 17.4 of AS 1428.2. • The size of accessibility symbols must comply with Table 1 of AS 1428.2. • The symbol for accessibility must incorporate directional arrows and words or, if possible, pictograms, to show passengers the way to *accessible* facilities such as toilets. • Signs must comply with clause 17.1 and Figure 30 of AS 1428.2. • If a sign incorporates raised lettering or symbols, they must be at least 0.8 mm above the surface of the sign. • If an operator or provider supplements a notice with braille characters, they must be placed to the left of the raised characters. *Note: Scope wayfinding and signage requirements may exceed DDA.*	NA – there are no specific affected areas that require statutory signage under these requirements. Wayfinding signage requirements may exceed statutory minimums and is beyond the scope of this report.	**Not Applicable**

Clause	Accessibility Requirement	Compliance Comment	Status
Tactile Ground Surface Indicators			
BCA I2D11, D4D9 & AS1428.4.1	**Tactile Ground Surface Indicators** TGSI are a valuable wayfinding tool for those with vision impairment. TGSIs provide a distinct tactile cue to alert people with vision impairment when they are approaching hazardous situations and to provide directional guidance. There are two types of TGSIs currently used in Australia: *Warning TGSIs (mandatory)* • Tactile ground surface indicators (TGSI) complying with AS1428.4.1must be provided to: • Stairs, escalators, ramps, moving walkways • Trafficable areas where an overhead obstruction is less than 2m in height *Directional TGSIs (desirable)* • Used to provide directional guidance towards key features of buildings • Useful for wide open forecourts and spaces where there is an absence of 'shorelines' or other cues	Informational	**Informational**
BCA I2D11, D4D9 & AS1428.4.1	**Warning Tactile Ground Surface Indicators** Are a series of truncated domes which alert vision-impaired people to impending hazards that could not be reasonably expected or anticipated and are typically installed at: • Stairs Approaches • Escalator Approaches • Ramp Approaches (steeper than 1:20) • Top of step and kerb ramps (never place on ramps) • To indicate overhead obstructions below a height of 2000mm • Where accessways approach a vehicular way • Tactiles are typically a 600mm deep pad extending the width of the hazard, but may be reduced in depth at smaller landings.	The location of warning tactiles shall be detailed during future design stages including at the following locations: • Pedestrian Crossings • Kerb Ramps • Where the footpath meets a vehicle way at grade (driveways) • Bus Stop head *See also Contrast of Tactiles below.*	**Can Readily Comply**
BCA I2D11, AS1428.4 & AS1428.4.1	**Directional Tactile Ground Surface Indicators** Directional tactile indicators are required at changes of direction to provide for improved wayfinding for people with vision impairment in combination with appropriate intuitive design including: • Shorelines (uninterrupted structure in the built environment) should be provided where possible to allow for wayfinding to key building features (entry, drop off points, vertical transport etc) • In the absence of adequate shorelines, Directional Tactile indicators should be considered where a change in direction is required between key building features such as drop off points and the principal pedestrian entry (especially across open forecourts etc) • Directional Tactile indicators should comply with AS1428.4.1	The location of warning tactiles shall be detailed during future design stages including at the following locations: • Leading to Bus Stop head *See also Contrast of Tactiles below.*	**Can Readily Comply**

Clause	Accessibility Requirement	Compliance Comment	Status
BCA I2D11, D4D9 & AS1428.4.1-2009	**Contrast of Tactiles** TGSIs are recommended to have a Luminance Reflective Value (LRV) contrast dependant on the type of tactiles used as follows: • Pad / Tile Tactiles – minimum 30% to surrounding surface • Discrete / Individual Tactiles – minimum 45% contrast to the adjacent path of travel • Composite Colour (Two toned) Discrete Tactiles – 60% contrast to adjacent path of travel	**Tactile Ground Surface Indicators - Contrast** The luminance contrast of TGSI's shall comply with the following: • 60% minimum for composite type (two tone) • 45% minimum for discreet (individually drilled) • 30% minimum for integrated (tiles)	**Can Readily Comply**
BCA Clause I2D12 19.1 of AS1428.2	**Lighting** Lighting for public domain areas should generally comply with *AS1158.3.1 Part 3.1: Pedestrian area (Category P) lighting—Performance and installation design requirements.*	Lighting designer to certify compliance with relevant parts *AS1158.3.1 Part 3.1: Pedestrian area (Category P) lighting—Performance and installation design requirements* as required under the scope.	**Certification by Designer or Specialist**
Accessible Furniture & Fittings			
Clause 27 of AS1428.2-1992	**Accessible Seating Requirements** • Seats shall be a minimum of 500 mm away from the path of travel. • Seats shall have a contrasting Luminance Reflective Values of not less than 30% to the surrounding surface • Seats should generally be 400-450 mm high *Note: where a high proportion of elderly users are anticipated, heights up to 520 mm are preferred. Children and small people may prefer seats as low as 350 mm high. Where possible, a range of seat heights should be provided* • The front of the seat shall have a clear space between any legs at ground level to within 150 mm of the front edge of the seat, and to within 100 mm of the seat height to allow for rearward adjustment of feet when rising • Where armrests are provided, the top surface of the armrests shall be at a height of 260 ±40 mm above the seat. *Note: Armrests should be provided for all seats.* *Note: The armrest should be within the centre of gravity of the seat.* • The front edge of the seat shall have a minimum radius of 30 mm. • No edge or projection shall have a radius of less than 5 mm unless protected from contact with the user. • The seat shall drain free of water  	The location of seating shall be detailed during future design stages. It is recommended (desirable) that seating with an adjacent wheelchair waiting bay is provided at a minimum 60m intervals along accessible paths to allow sufficient resting spaces. *Note: The bench seat within the Liverpool City Council Public Domain Technical Manual has minor departures from the dimensions specified in AS1428.2.* *Notably, any recommendations to meet AS1428.1-1992 for public domain furniture are discretionary / best practice consideration as beyond the building allotment boundaries, so the matters are raised for the information / consideration of stakeholders only.*  Seat - Plan and Elevations (1:20)	**Can Readily Comply** (Desirable / Best practice)

Clause	Accessibility Requirement	Compliance Comment	Status
27.3 of AS1428.2-1992 6.5 of AS1428.1	**Water Fountains - Access** • Where provided, at least one water fountain at each location should be suitable for accessible use • It should be provided with a circulation space of 2070mm x 1540mm in front of it to allow approach to the fountain to allow both left and right hand operation by users • Connected with an accessible path to the main path **Water Fountains - Design** With complying with AS1428.2 or otherwise providing manufacturers details confirming accessible design has been considered. AS1428.2 requires the following key dimensions (for consideration): • Clear circulation space of 1540mm x 2070mm circulation space in front (2250mm x 2250mm preferred) with a maximum 1:40 crossfall • 2070mm x 1540mm circulation space in front (2250mm x 2250mm preferred) and a maximum 1:40 crossfall • Top of Basin at 695mm-700mm • Spout located as close to front as possible • Controls centrally at front of unit or both sides at 80-100mm above top of basin / spout  DIMENSIONS IN MILLIMETRES FIGURE 33 DRINKING FOUNTAINS AND WATER COOLERS	Where the design proposes water fountains, the following details are required to confirm appropriate compliance of the proposed water fountains: • Clear circulation space of 1540mm x 2070mm in front of the water fountain and a side clearance of no less than 500mm to allow access for users with either hand / side • Manufacturers Details confirming all relevant dimensions. *Note: The water fountain within the Liverpool City Council Public Domain Technical Manual has minor departures from the dimensions specified in AS1428.2 including the height of the water outlet.* *Notably, any recommendations to meet AS1428.1-1992 for public domain furniture are discretionary / best practice consideration as beyond the building allotment boundaries, so the matters are raised for the information / consideration of stakeholders only.*  Drinking Fountain - Plan and Elevation (1:20)	**Can Readily Comply** (Desirable / Best practice)

Clause	Accessibility Requirement	Compliance Comment	Status
Mode Interchange Facilities			
8.1 of DSAPT	**Bus Stops** The project scope must ensure that any existing bus stops are not obstructed by the bollards or barriers (see below required clearances): • Contain a minimum 1200mm wide unobstructed accessible path between its boarding point and the station entry • Contain a firm and level circulation space of 2070mm (d) x 1540mm (w) to allow 180 degree turn in close proximity to the bus boarding point. • Maintain a level allocated space measuring 800mm x 1300mm must be provided outside of ordinary pedestrian paths • Contain a level allocated space measuring 800mm x 1300mm and an accessible seat • Where a kerb is installed /affected it must be at least 150mm higher than the road surface 	**Floating Bus Stops** The proposed floating bus stops, having a depth of 1600mm, are insufficient depth to allow for compliant wheelchair circulation to access a deployed boarding ramp (2070mm minimum 2870mm preferred). 	**DOES NOT COMPLY**
DDA Best Practice AS2890.5 AS2890.6	**Accessible Taxi Ranks, Kiss n Ride Bays & Carparking** The project scope must ensure that any existing accessible taxi ranks, kiss n ride bays or accessible carparking are not obstructed by the proposed bollards or barriers (see below required clearances): • Contain a minimum 1200mm wide unobstructed accessible path between the bay and the station entry • Be provided with a kerb ramp with clear 2000mm x 1500mm landing meeting AS1428.1 • Design of the bays and clearances should meet AS2890.6 • The bay and shared zone must have a cross fall of no more than 1:40 (1:33 bitumen) • Parallel - 7.8m length x 3.2m width with 1600mm wide side share zone (free of obstruction) • Angled - 5.4m x 2.4m with a 2.4m wide adjacent shared zone (free of obstruction)  *Example of Accessible Parallel Taxi Rank / Kiss n Ride / Parking Bays*	**Accessible Street Parking** It is recommended the design consider upgrading the existing on street accessible carparking bays to achieve accessible dimensions of 7.8m long by 3.2m wide with a kerb ramp to allow wheelchair access between the footpath and the parking bay  	**Further Detail Required**

9.0 Conclusion

This report has assessed the **Initial Concept Design Review** for the proposed **Public Domain – LCC Moore Street & George Street Cycleway Upgrade** under the relevant requirements relating to "Access for People with Disabilities".

The primary purpose of the report is to assess the design documentation for specified scope works and to provide suitable recommendations to ensure the design will meet the appropriate accessibility requirements.

Subject to the recommendations of this report, the development demonstrates an ability to comply accessibility requirements for the new scope of works.

Significant Recommendations are summarised in **Table 1.0** (Executive Summary) and **Table 8.0** (Body of Report) contains further detailed requirements.

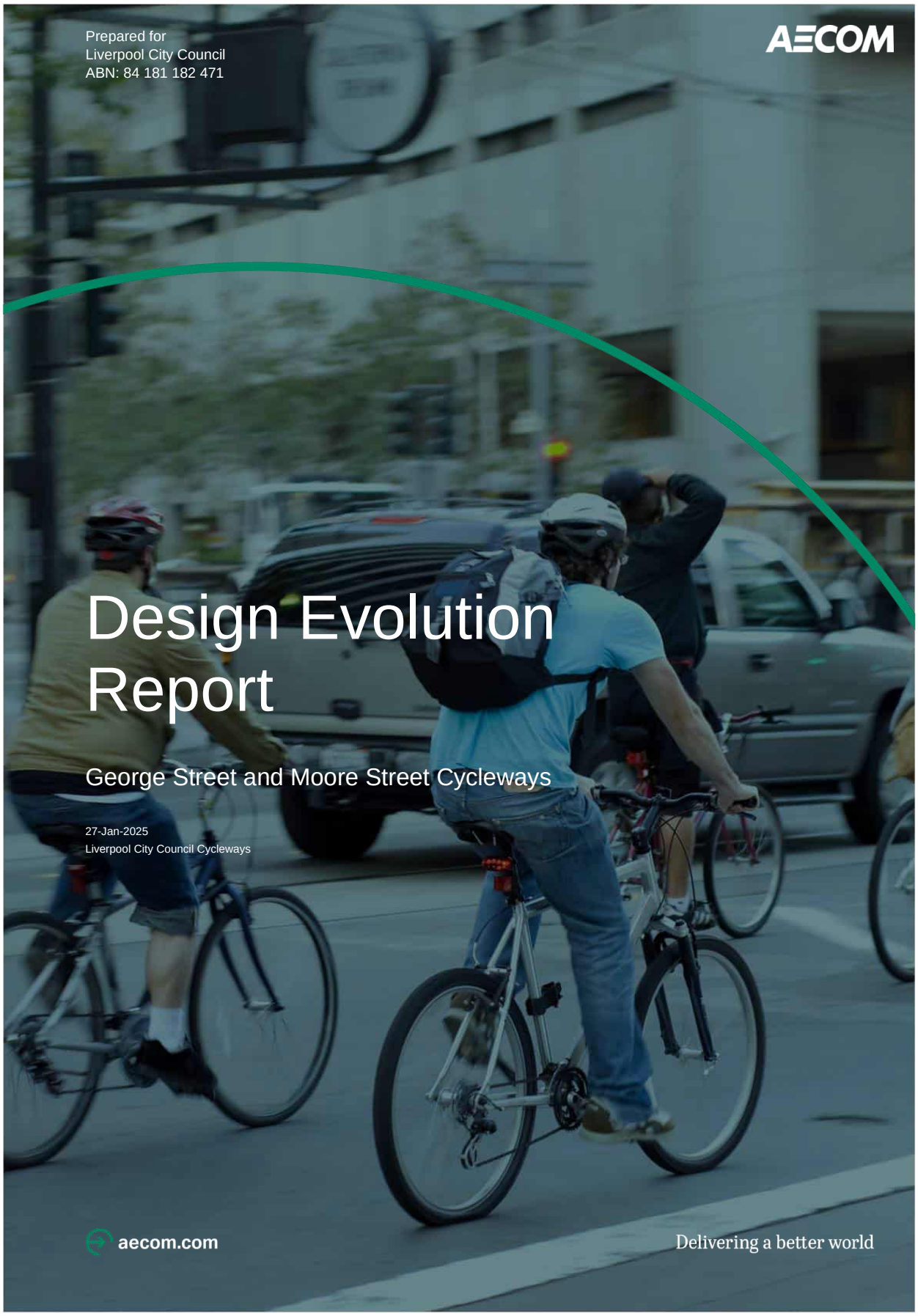
The design is to be subject to further detailed DDA assessment throughout subsequent design phases where more design detail will be available for assessment.

Attachment A – Assessed Plans

DRAWING LIST

DRAWING NUMBER	DRAWING TITLE
General	
60737859-SHT-00-1000-CI-0001	COVER SHEET AND DRAWING INDEX
60737859-SHT-00-1000-CI-0011	OVERALL KEY PLAN
Arrangements	
60737859-SHT-00-1000-CI-0101	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0102	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0103	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0104	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0105	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0106	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0107	GENERAL ARRANGEMENT PLAN

Liverpool City Council Public Domain Technical Manual DRAFT May 2024 as a guiding document only


Prepared for
Liverpool City Council
ABN: 84 181 182 471
AECOM
Design Evolution Report
George Street and Moore Street Cycleways
27-Jan-2025
Liverpool City Council Cycleways
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Delivering a better world

Design Evolution Report

George Street and Moore Street Cycleways

Client: Liverpool City Council

ABN: 84 181 182 471

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1.0 Introduction

Liverpool City Council (LCC) engaged AECOM to develop a concept design for cycleways along Moore Street and George Street in the Liverpool CBD (the Project). This Design Evolution Report outlines the process undertaken to develop the preferred option. This report presents the design evolution process for the Project, structured as follows:

1.0 Introduction: Overview of the project background, policy, objectives, vision, and stakeholders.

2.0 Existing conditions: An analysis of factors such as safety, public transport provision, car parking, air and noise quality, and services.

3.0 Case studies: Leveraging insights from comparable projects to inform and guide the design, drawing on established precedents and best practices.

4.0 Multi-criteria Analysis: Justification and scoring of the design options based on key criteria.

5.0 Design evolution: A detailed review of the design alternatives developed during the process.

6.0 Preferred cross sections and alignment summary: The selected designs and reasoning why they were chosen.

7.0 Next Steps: Overview of the next steps including schedule of service and key deliverables

1.1 Background

Liverpool is located in Sydney's southwest and is emerging as the city's third CBD. Positioned at the heart of significant regional infrastructure investment, Liverpool plays a pivotal role in the growth and transformation of the region, establishing itself as a hub for economic, social, and cultural opportunities. The city centre is undergoing rapid change and development, driven by increasing population and urbanisation, reflecting Liverpool's importance in meeting the needs of its expanding community.

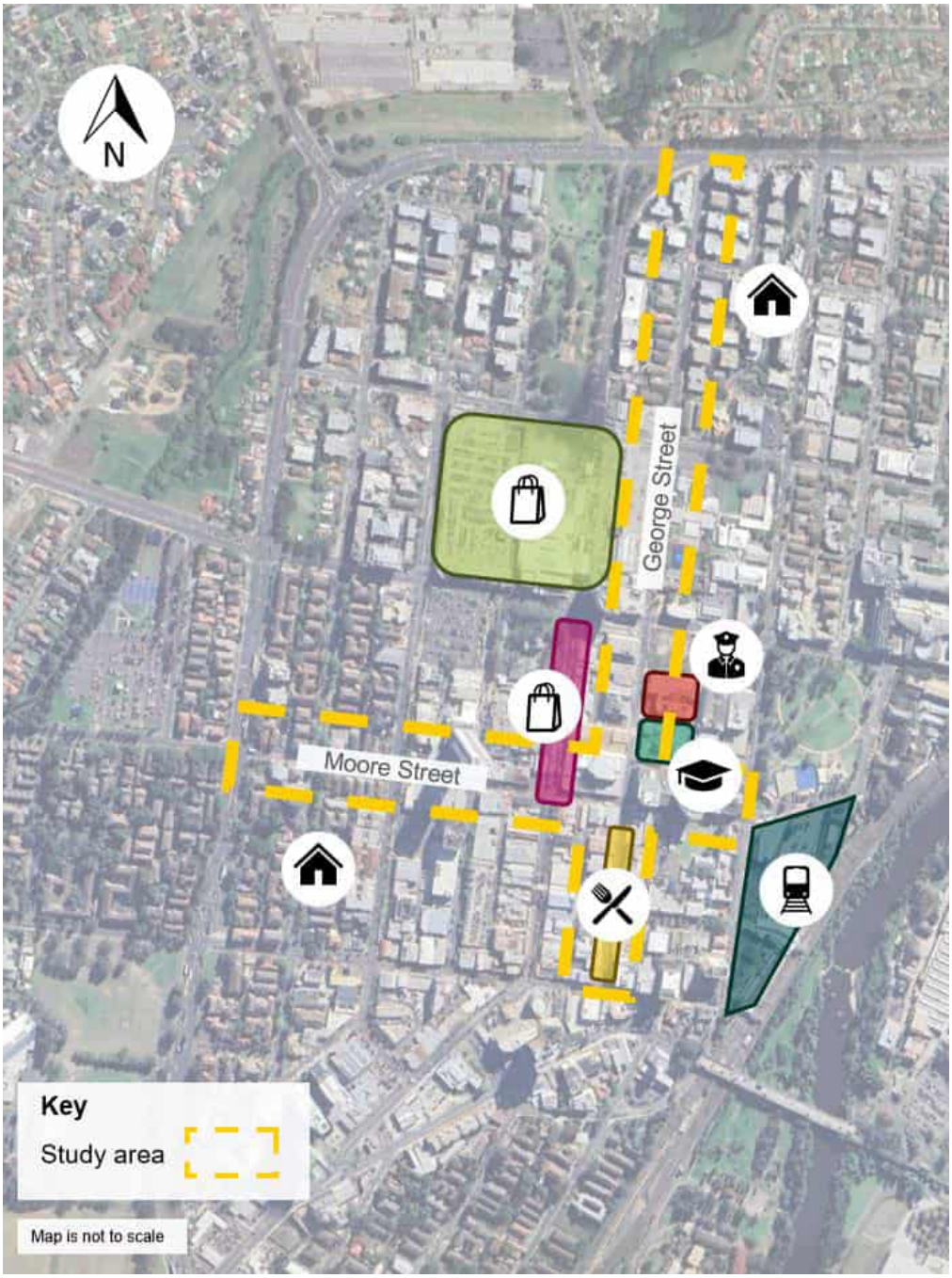
The study area for the Project focuses on central Liverpool, specifically Moore Street and George Street.

The Moore Street section of the cycleway serves as a key east-west connection between Bigge Street and Copeland Street. The segment between Bigge Street and Bathurst Street traverses the CBD, linking significant trip generators such as the University of Wollongong Liverpool campus, the Macquarie Street pedestrian zone, and the shopping precinct. This section is adjacent to Liverpool train station across Bigge Street and is characterised by a mix of commercial units, shops, and restaurants, fostering a lively environment. Further east, the route continues through a multi-story residential area between Bathurst Street and Copeland Street. Transit infrastructure, including local buses and the T-Way, also services this section of Moore Street.

The George Street section of the cycleway provides a critical north-south link between Scott Street and Copeland Street. The corridor between Scott Street and Campbell Street encompasses a bustling part of Liverpool, home to key landmarks such as the Liverpool police station and courthouse, the University of Wollongong Liverpool campus, and the Westfield shopping centre. At the southern end of George Street lies Little India, a vibrant precinct featuring Indian shops and restaurants, contributing to the unique character and appeal of the CBD.

Figure 1 provides an overview of the study area.

Figure 1 The Project study area



1.2 Policy and strategic context

1.2.1 Get NSW Active

LCC secured funding through the Get NSW Active program from Transport for NSW to develop a concept design for dedicated cycle facilities along Moore Street and George Street within the CBD. This funding underscores the NSW Government's commitment to promoting walking and cycling as everyday modes of transport.

The Get NSW Active program supports projects that aim to:

- Create continuous and connected walking and cycling networks across NSW, linking communities to key local destinations.
- Encourage more people to safely walk and cycle as part of their daily travel routines.
- Improve safe walking and cycling options for children and young people, supporting their independent mobility for travel to and from school.
- Facilitate multimodal journeys by integrating active transport with public transport.
- Deliver quality outcomes that contribute to vibrant places and liveable neighbourhoods, supporting local lifestyles.
- Drive behaviour change and shift community perceptions towards walking and cycling as practical and preferred options for short trips.
- Provide inclusive walking and cycling connections that enable all people, regardless of gender, to move freely within their communities.

1.2.2 Liverpool city centre public domain Master Plan, 2020

The Liverpool City Centre Public Domain Master Plan (2020) outlines Council's vision to transform public spaces in the city centre into greener, more vibrant, and active environments. The Master Plan recommends enhancements such as wider footpaths, dedicated cycleways, additional street trees and vegetation, public art installations, improved street furniture, pedestrian lighting, and upgraded paving materials. These improvements aim to enhance accessibility and amenity throughout the city centre.

The principles of the Master Plan are informed by best practices in urban design and align with the objectives of the following strategic documents:

- The Greater Sydney Commission's *Liverpool Collaboration Area Place Strategy*, as part of the *A Metropolis of Three Cities Greater Sydney* Region Plan.
- Council's Community Strategic Plan, *Our Home Liverpool* 2027.
- Council's Local Strategic Planning Statement.
- *Connected Liverpool 2040*.
- The Government Architect NSW's *Good Urban Design* Guideline.

Liverpool Council's Master Plan key principles are found in Table 1.

Table 1 Liverpool Council's Master Plan key principles

LCC Masterplan Principles	How they respond to Get active and the Project principles
Improve Connectivity	Creating a Liverpool CBD that will be well-connected, accessible, and inclusive. By increasing cycle facilities in the CBD, there will be improvements in cycle connectivity between key destinations, supporting east–west and north–south movements, and connecting to TfNSW's future strategic cycleway network.
Enhance Liveability	Liverpool CBD and the public domain will be designed to better meet the needs of the community and reflect the unique character of the city. Providing cycle infrastructure through the CBD will also result in streetscape improvements, including widening footpaths, increasing planting and vegetation, and reducing car parking. These changes will contribute to creating vibrant places and liveable neighbourhoods for locals and visitors.
Increase Productivity	The public domain within the CBD will be designed to meet the needs of everyone, encouraging them to spend more time there and support local businesses. The cycleway will reallocate space to active modes, prioritising it in some areas and encouraging people to travel to the CBD by walking and cycling.
Achieve Sustainability	Sustainability will be achieved within the CBD through social, environmental, economic, and leadership initiatives that will increase the resilience of the city centre. By providing facilities for cycling and making improvements for walking, it is expected there will be a mode shift to more sustainable modes of transport in the CBD, having positive impacts on air quality, temperature, noise, and native flora and fauna.
Deliver Governance	LCC will have a clear vision for the city centre and will provide information to deliver the masterplan. There will be proposals to deliver cycle infrastructure along George Street and Moore Street, and the Get Active funding will help LCC deliver their vision.

1.3 Objectives of the Project

The project objectives were developed in line with the design brief for the cycleways, while incorporating the broader placemaking ambitions for Liverpool CBD:

- **Develop a separated two-way cycleway** along George and Moore Streets within Liverpool CBD to enhance connectivity and accessibility for residents, workers, and visitors.
- **Improve safety** by creating a secure environment for micromobility users, encouraging greater uptake of active travel.
- **Integrate with the wider strategic cycleway network**, ensuring seamless connections and bolstering the region's active transport infrastructure.
- **Deliver a future-ready design** that accommodates Liverpool's anticipated population growth and evolving mobility demands.
- **Enhance the sense of place** by introducing improved amenities and fostering a welcoming, vibrant atmosphere for all users.

1.4 Project vision

A Vision Workshop, conducted in partnership with LCC, was key to defining the project objectives and aligning the design approach with LCC's aspirations. The resulting vision for Liverpool city cycleway is as follows:

"The vision for this project is to transform Liverpool's city centre into a more inclusive, accessible, and vibrant urban space. By delivering separated cycleways along George Street and Moore Street, the aim is to enable the safe movement of people, while building a stronger sense of community and connectivity.

This project will enable people to be prioritised by creating opportunities for increased tree canopy, greenery and seating to provide cool, comfortable spaces. These improvements aim to attract visitors and encourage longer stays in the CBD, supporting local businesses and community spaces.

The design will also accommodate private vehicle parking while promoting micromobility options to encourage more people to access the city. This approach supports a safe, attractive and vibrant CBD that is prepared for the planned future population of Liverpool."

1.5 Stakeholders and engagement

To ensure the success of the Project, AECOM is engaging with key stakeholders within Council directly and supporting indirect engagement with other stakeholders by providing content for Council-led interactions. Key internal stakeholders include the Urban Design and Transport teams, as well as the Western Sydney Infrastructure Grants (WSIG) team, all of whom have been actively involved in the design process. These teams have participated in design presentations, including vision-setting, optioneering, and preferred alignment workshops. Regular communication with Council has been maintained throughout the project.

LCC teams have utilised content provided by AECOM to consult with external stakeholders, including local bus operators, Transport for NSW (network operations and bus/T-way operations), and Council Directors. On 16th December, the preferred option was presented to Council Directors by LCC's internal project teams.

The views of the local community are essential to ensure the design meets the needs of residents, business owners, and community groups. Existing feedback has informed the initial design approach, with additional consultation materials to be prepared by AECOM for Council's use in future engagement activities. Community consultation will take place during the dedicated Community Engagement Period in Stage 2, coordinated and conducted by LCC, with AECOM providing supporting materials and visuals.

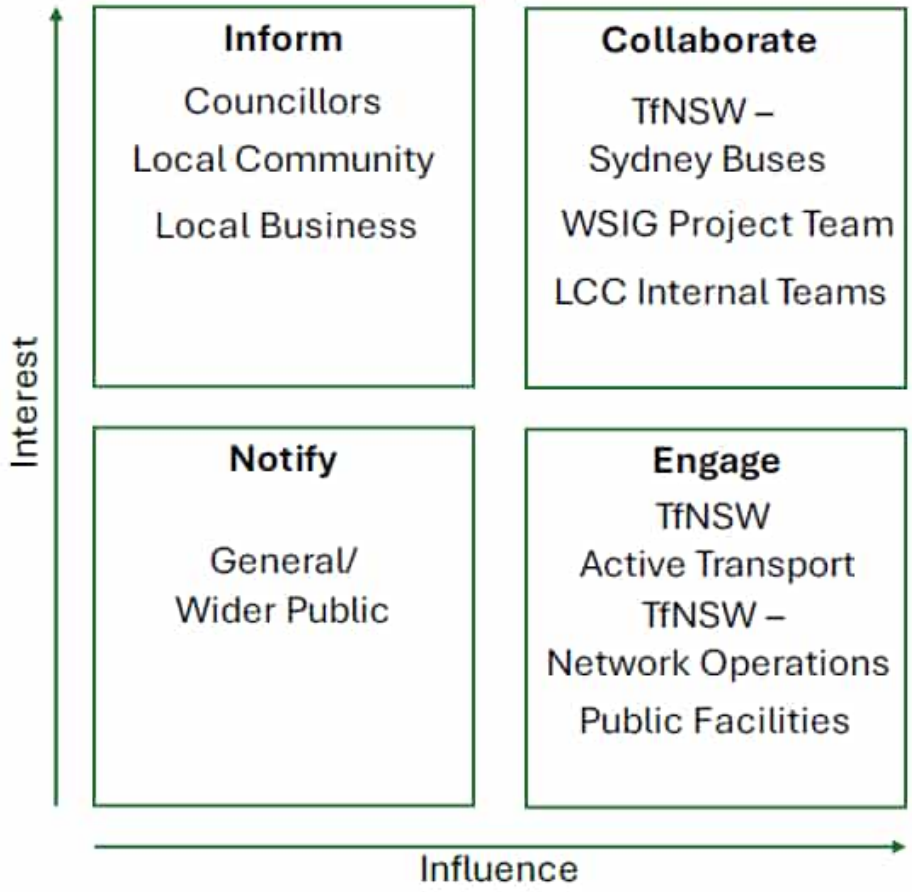
LCC's internal teams will remain key stakeholders throughout the concept design development, contributing local knowledge, identifying potential issues, and ensuring alignment with both project objectives and the broader goals for Liverpool CBD. AECOM is conducting fortnightly Project Working Group meetings via Teams and providing Monthly Progress Reports to outline key tasks and address risks. LCC's internal teams and the WSIG team will be invited to relevant design meetings during stages 1-3, with ongoing communication maintained throughout the project.

The key stakeholders are listed below:

- Liverpool City Council (Urban Design, Traffic and Transport, and Design & Infrastructure Planning teams);
- Council Directors
- Councillors

- WSIG (Western Sydney Infrastructure Grant) Project Team
- Transport for NSW (Network Operations, Active Transport, Sydney Buses and Operations)
- Local Community

Figure 2 Stakeholder mapping



2.0 Existing conditions

Understanding the existing environment is essential to the design evolution of the Project. This section analyses the physical and environmental constraints influencing the Project's development.

Key considerations include safety, public transport provision, active travel, car parking, and air and noise quality, all of which significantly impact urban planning and development. These factors affect liveability, sustainability, and the functionality of the urban environment, making them critical in shaping the design response.

By addressing these constraints and leveraging opportunities, the Project aims to enhance the urban environment while delivering a safe, accessible cycleway that promotes active travel and aligns with Liverpool's broader strategic objectives.

2.1 Traffic incidents

Traffic incident data was accessed from Transport for New South Wales. The data is compiled from the years 2019-2023. Overall Moore Street had 9 reported incidents within the project boundary, and George Street had 13 reported incidents. Minor/other injury was the most common degree of crash along Moore Street, whilst non-casualty (towaway) was most common on George Street.

Traffic incident data gathered from Transport for New South Wales was analysed for the years 2019 to 2023. Within the project boundaries, Moore Street recorded nine reported incidents, while George Street recorded 13.

On Moore Street, the most common crash severity involved minor or other injuries. In contrast, on George Street, non-casualty (towaway) incidents were the most frequently reported.

A summary of the data for Moore Street is in Table 2 and George Street in Table 3.

Table 2 Traffic incident data for Moore Street

Year	Degree of crash	Surface condition	RUM code	RUM description
2019	Moderate Injury	Dry	2	Ped far side
2019	Minor/Other Injury	Dry	0	Ped nearside
2020	Non-casualty (towaway)	Wet	73	Off road right => obj
2020	Minor/Other Injury	Wet	42	Leaving parking
2020	Minor/Other Injury	Dry	30	Rear end
2020	Non-casualty (towaway)	Dry	47	Emerging from drive
2021	Minor/Other Injury	Dry	0	Ped nearside
2022	Minor/Other Injury	Wet	10	Cross traffic
2023	Serious Injury	Dry	21	Right through

Table 3 Traffic incident data for George Street

Year	Degree of crash	Surface condition	RUM code	RUM description
2019	Non-casualty (towaway)	Dry	30	Rear end
2019	Serious Injury	Dry	30	Rear end
2019	Moderate Injury	Dry	81	Off left/rt bend=>obj
2019	Minor/Other Injury	Dry	30	Rear end
2019	Minor/Other Injury	Dry	9	Ped other
2020	Non-casualty (towaway)	Dry	34	Lane change right
2021	Moderate Injury	Dry	49	Other manoeuvring
2021	Non-casualty (towaway)	Wet	34	Lane change right
2022	Non-casualty (towaway)	Dry	71	Off road left => obj
2022	Minor/Other Injury	Wet	3	Ped on carriageway
2023	Moderate Injury	Dry	48	From footpath
2023	Moderate Injury	Dry	90	Fell in/from vehicle
2023	Non-casualty (towaway)	Dry	87	Off left/left bend=>obj

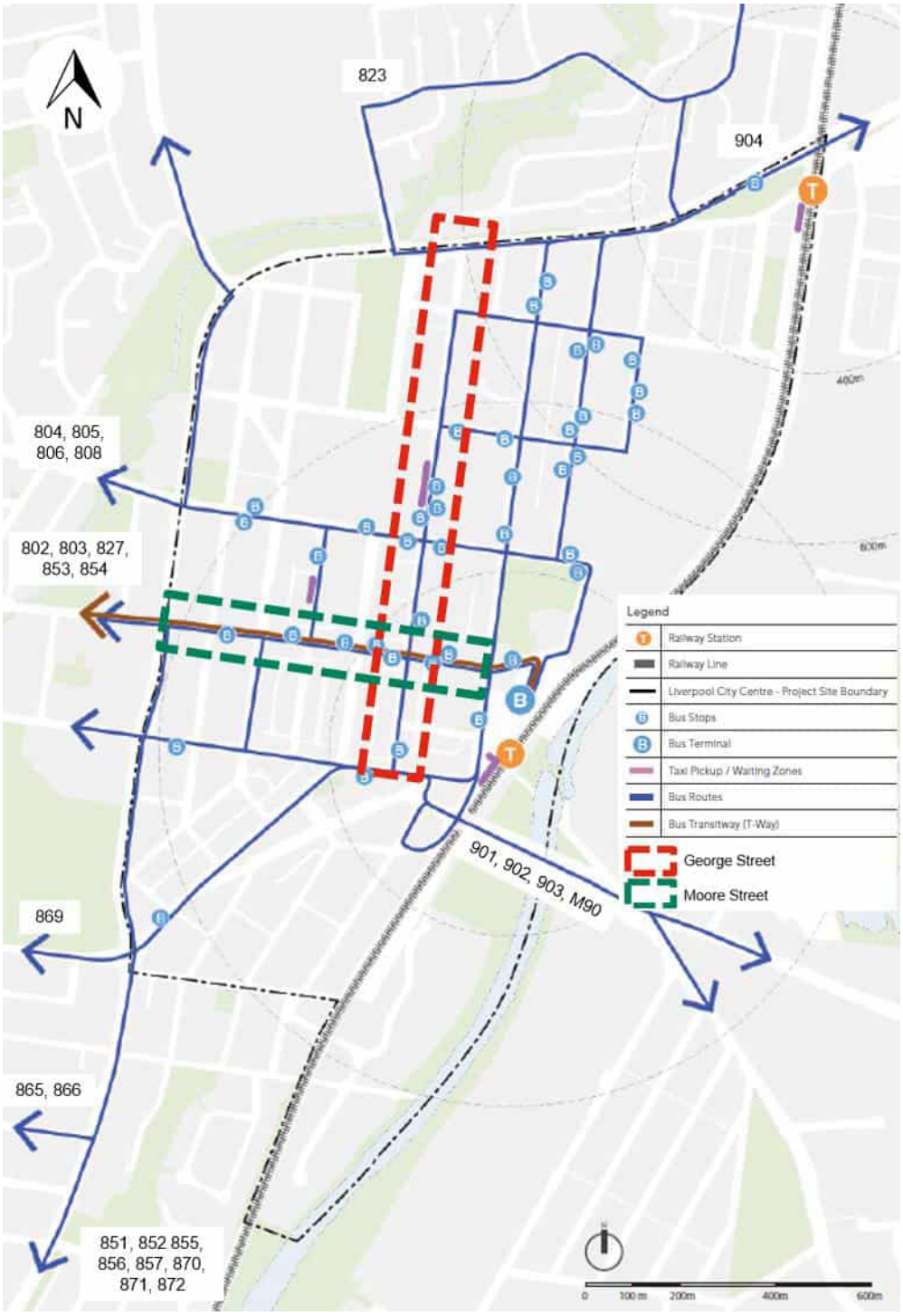
2.2 Bus movements

Liverpool city centre benefits from frequent and accessible public transport options, all within walking distance of Liverpool and Warwick Farm Railway Stations. Liverpool Railway Station serves as a major transit hub, integrating rail and bus services alongside a taxi pick-up zone.

The city centre boasts extensive bus coverage, with George Street accommodating seven routes and Moore Street serving as a critical corridor with 20 bus routes, as illustrated in Figure 3.. Moore Street is strategically significant as part of the Liverpool to Parramatta Transitway and is poised to support a future rapid transit corridor (T-Way), enhancing connectivity between Liverpool and Western Sydney Airport.

Public transport services are well-distributed across the region. Northern routes connect to Warwick Farm, Cabramatta, and Parramatta, while eastern routes link to Burwood and Chipping Norton. Southern routes provide access to Holsworthy, Casula, and Campbelltown, and western services cover Carnes Hill and Bringelly.

Figure 3 Transit overview in Liverpool city centre. Source: Liverpool City Council Masterplan



2.3 Existing and proposed cycleways

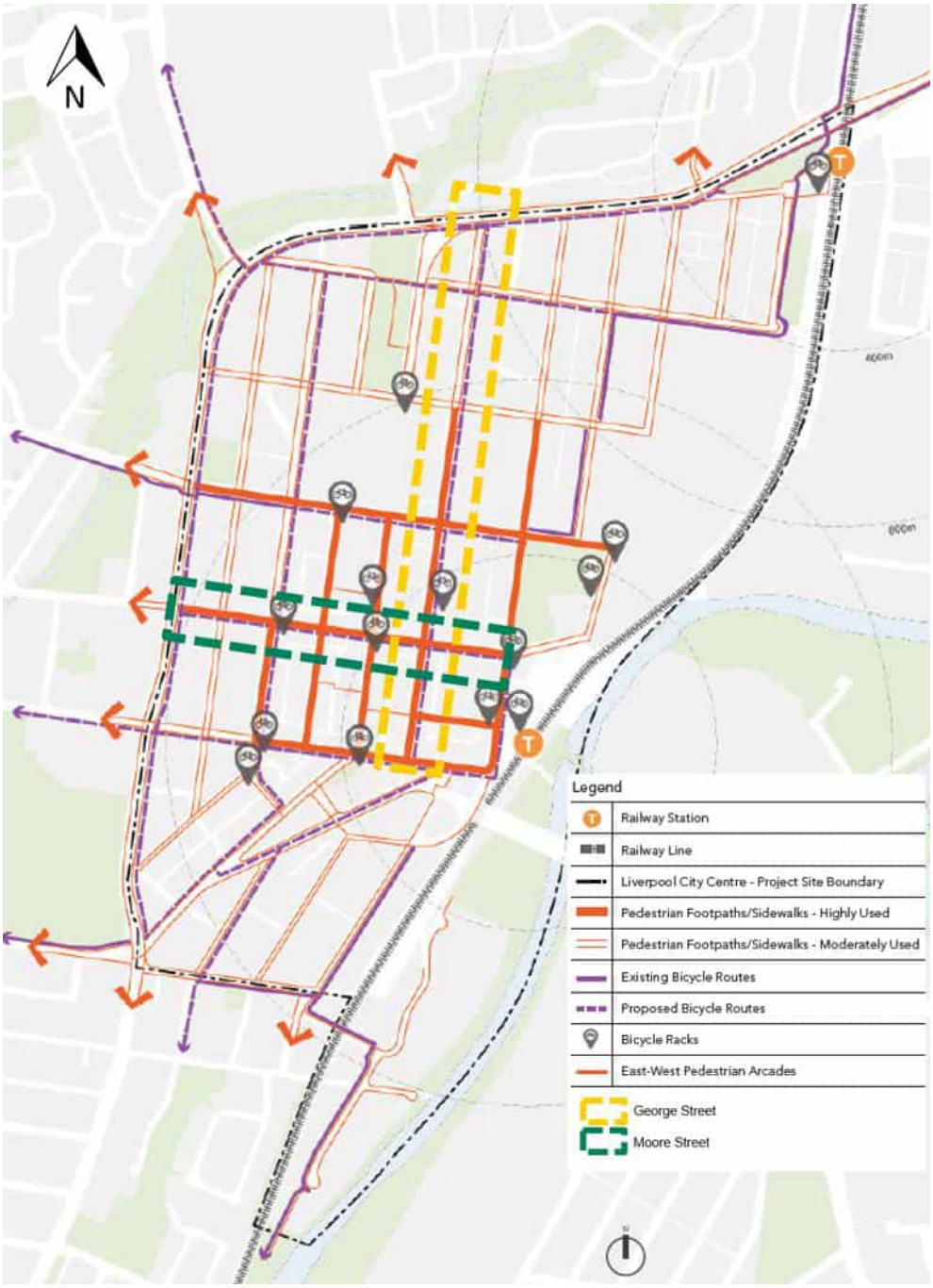
Liverpool city centre offers a combination of off-road and on-road cycle paths. The existing off-road paths are primarily located on the eastern side of the city, forming part of the Parramatta to Liverpool "Rail Trail," which runs parallel to the railway line. These paths are separated from the road network and are designated exclusively for cyclists or shared with pedestrians. On-road cycle paths dominate the city centre, with road shoulders on high-traffic streets and shared road environments on lower-traffic streets.

Current plans propose dedicated cycleway facilities along George Street and Moore Street to establish key east-west and north-south connections within the CBD.

- The proposed Moore Street Cycleway connects at its western end to a shared path on the northern edge of Moore Street, crossing the Copeland Street intersection. At its eastern end, it links over Bigge Street to a shared path and the railway station.
- The proposed George Street Cycleway connects with a Western Sydney Infrastructure Grant (WSIG) cycleway project to the east, linking Scot Street to the station. It also ties into the future strategic cycleway south to Casula. The central section connects with the proposed Moore Street Cycleway. To the north, the George Street Cycleway integrates with future strategic links to Warwick Farm and northwest to Bonnyrigg.

Figure 4 illustrates the existing and proposed cycleways within Liverpool city centre.

Figure 4 Exiting and proposed cycleways in Liverpool city centre. Source: Liverpool City Council Masterplan

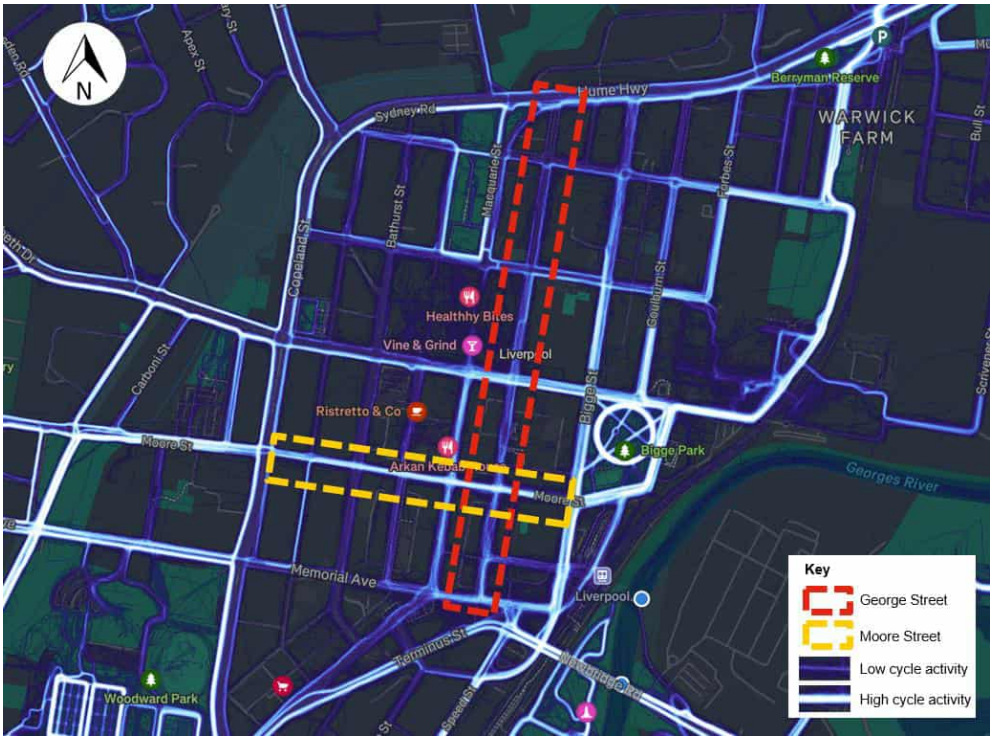


2.4 Pedestrian and cyclist movements

Strava data, presented in Figure 5, highlights key pedestrian and cycling activity patterns across Liverpool city centre, revealing several important trip attractors and movement corridors. Significant north-south activity is concentrated along Bigge Street, while east-west movements are prominent along Moore Street and Elizabeth Street.

High levels of active travel are also observed in the eastern part of the CBD, particularly along Moore Street near TAFE, as well as along Burnside Drive, Hart Street, and Remembrance Avenue. These routes provide connections to Warwick Farm, where the train station is located. Additionally, the Liverpool railway and bus station in the southeast of the city experiences substantial foot and cycle traffic in its vicinity.

Figure 5 Strava data for Liverpool city centre and the surrounding area. Source: Strava

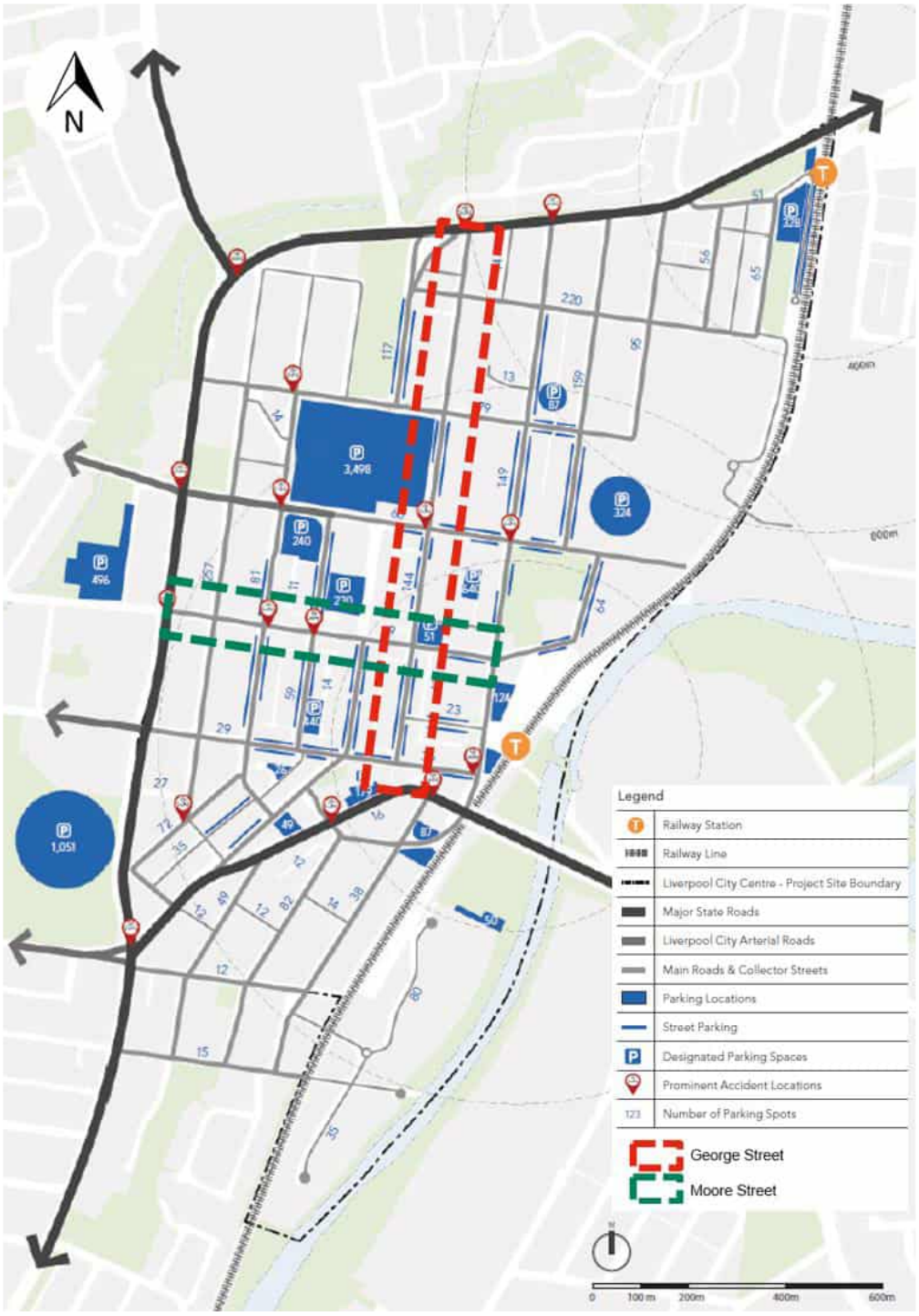


2.5 Car parking

Off-street parking in Liverpool city centre is concentrated in a few key locations, offering significant capacity for vehicle accommodation. Major facilities include Westfield Shopping Centre, which provides 3,498 spaces, making it the largest parking hub. Other notable car parks include Warren Serviceway (640 spaces), Northumberland (440 spaces), Bathurst Street (240 spaces), and Liverpool Plaza Shopping Centre (230 spaces). Additional parking is available at Liverpool and Warwick Farm Railway Stations, catering to park-and-ride commuters.

On-street parking is widely distributed across most city centre roads, providing short-term options for visitors and residents. This combination of off-street and on-street parking offers flexibility for various users, though demand may exceed supply during peak periods, particularly in commercial and retail areas. Figure 6 provides an overview of parking in Liverpool CBD.

Figure 6 Liverpool city centre parking locations. Source: Liverpool City Council Masterplan



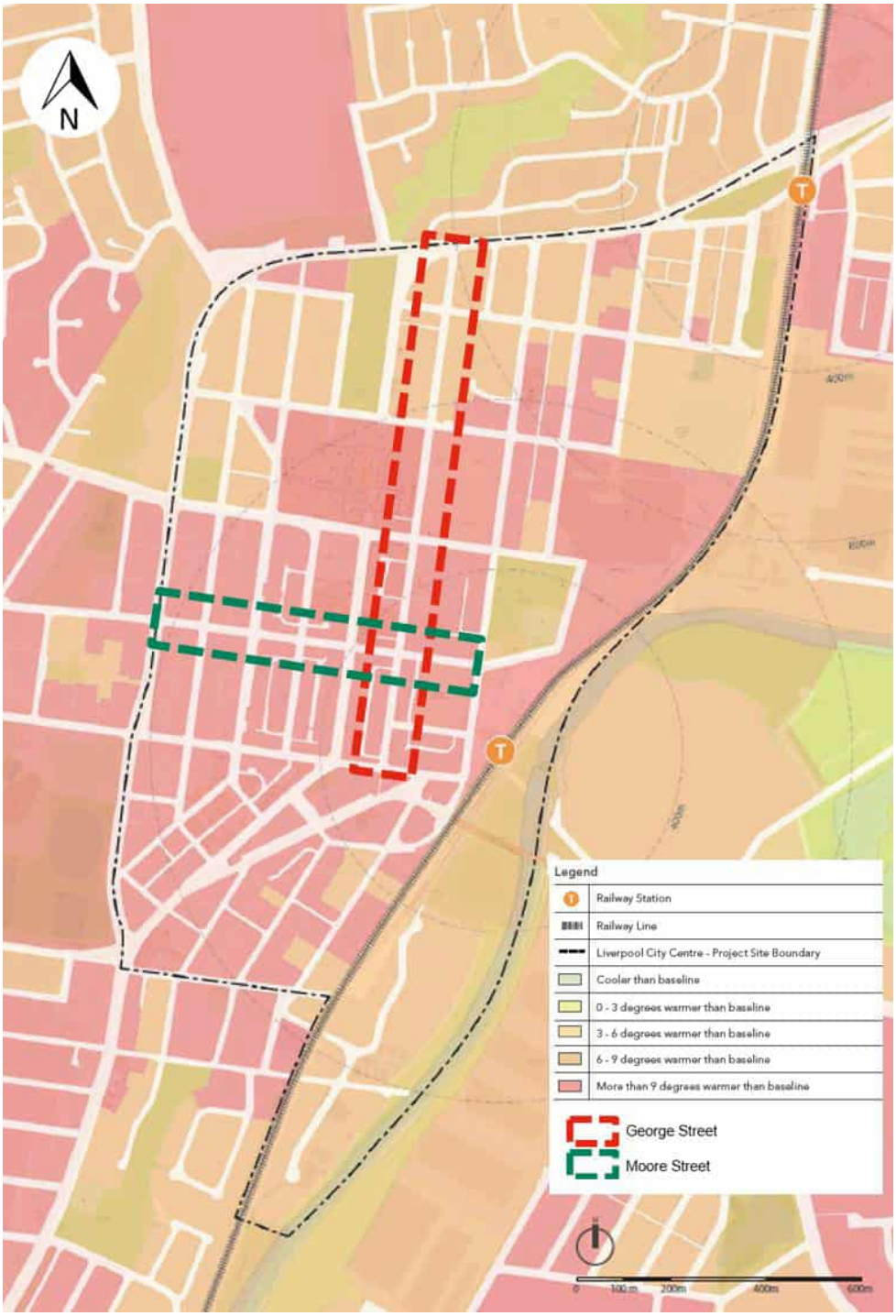
2.6 Temperature

Liverpool has a warm temperate climate characterised by hot summers, cool winters, high sunshine hours, and consistent rainfall. The city centre receives an average of 865mm of annual rainfall, with the wettest months occurring from January to March, and the driest period from July to September.

Liverpool's inland location results in significant temperature variations. Summer highs average 28°C, with lows around 17°C, while winter highs average 17°C, with lows of 5°C. Heatwaves are common during summer, and frost can occur in winter. An overview of Liverpool's temperatures can be seen in Figure 7.

Both George Street and Moore Street experience the highest temperatures, with temperatures more than 9°C above baseline. The northern section of George Street, located in the residential area, sees temperatures 3-6°C above baseline.

Figure 7 Temperatures of Liverpool city centre. Source: Liverpool City Council Masterplan



2.7 Air and noise pollution

2.7.1 Air Quality

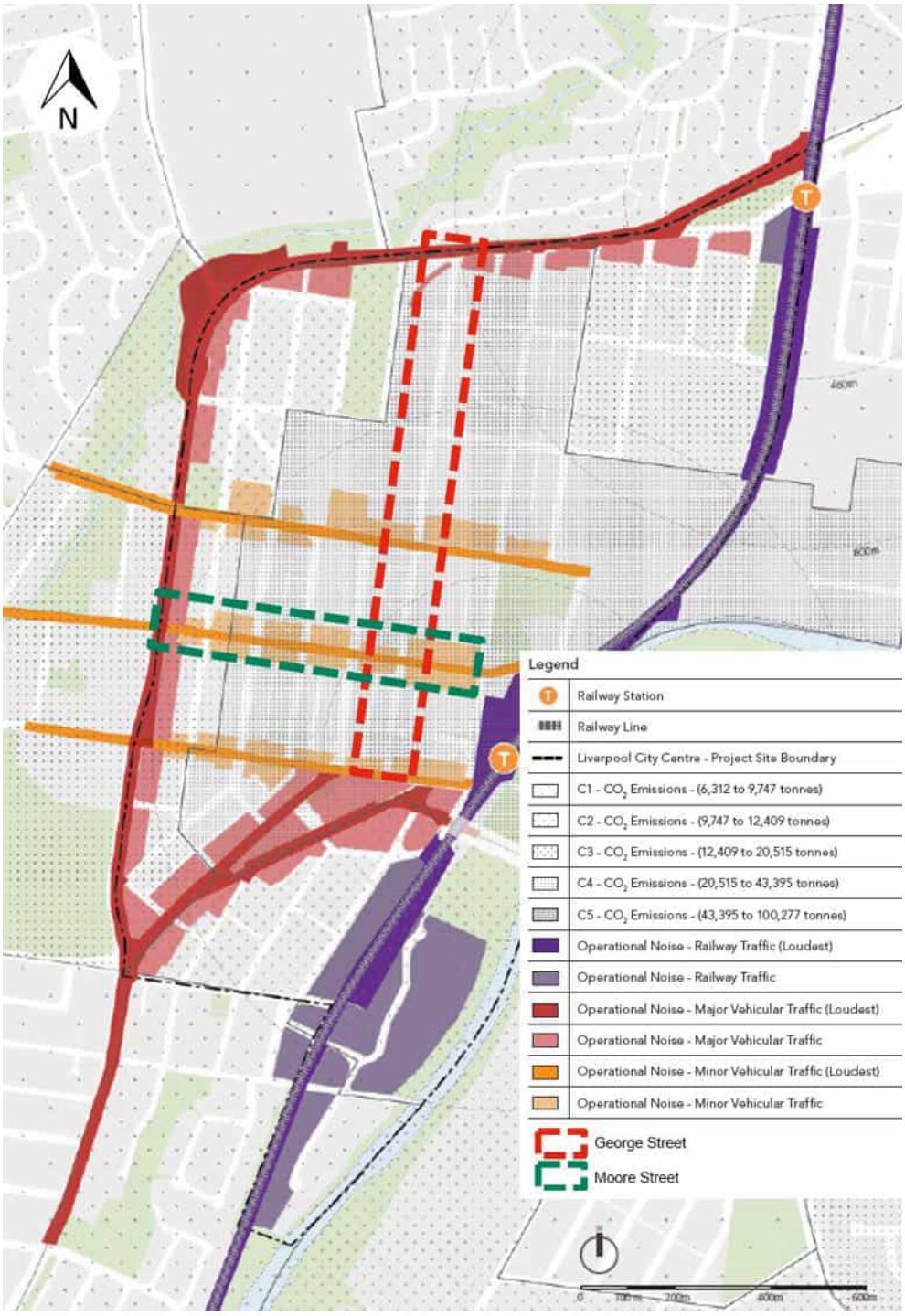
Air quality in Liverpool city centre is adversely affected by vehicle emissions, with traffic volume and vehicle types (cars, trucks, buses) being key contributors. CO_2 emissions in the area range from 9,747 tonnes near Lighthorse Park to 43,395 tonnes across larger sections of the centre, highlighting the significant impact of heavy road usage on air quality. In comparison, CO_2 emissions in Sydney CBD were recorded at 40,204 tonnes between 2014-15.

2.7.2 Noise

Environmental noise in the city centre primarily arises from trains and vehicular traffic. Passenger trains pass frequently, creating brief noise bursts of 10–15 seconds, while less frequent freight trains produce louder and longer-lasting noise due to their size and weight. Vehicular traffic is a major contributor to noise pollution, particularly along key roads such as the Hume Highway, Macquarie Street, and Terminus Street, where high speeds, heavy traffic volumes, and truck activity degrade the public domain and reduce comfort for pedestrians and residents.

Both George Street and Moore Street fall within the highest CO_2 emissions category (43,395–100,277 tonnes). Moore Street experiences moderate levels of vehicular traffic noise. An overview of air and noise pollution in Liverpool CBD is presented in Figure 8..

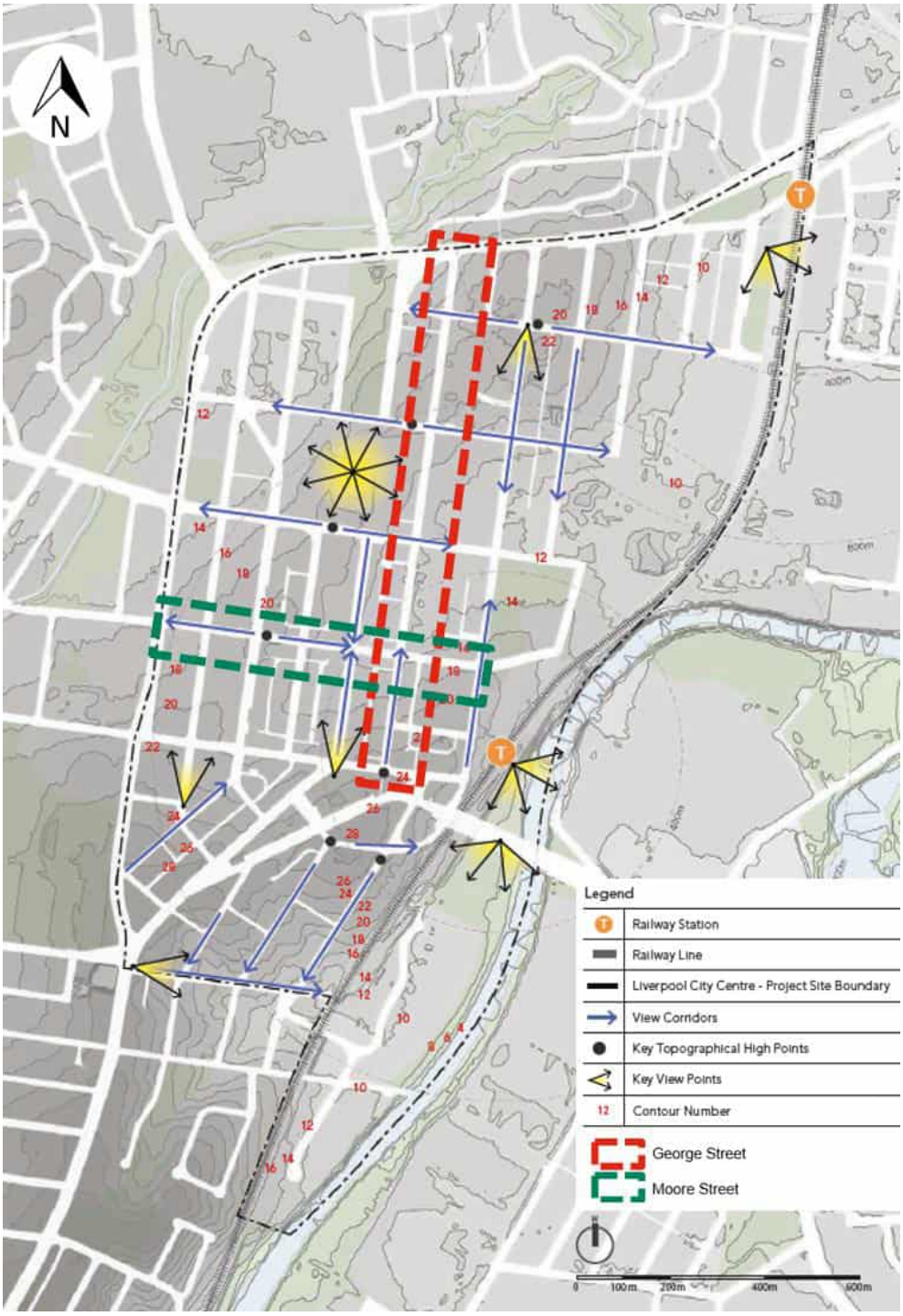
Figure 8 Air and noise pollution in Liverpool city centre. Source: Liverpool City Council Masterplan



2.8 Topography

The city centre is characterised by a diagonal ridge running from the northeast to the southwest. This ridge slopes downward towards the Georges River on its eastern side and towards Brickmakers Creek on its western side. In the southeastern part of the city centre, the ridge extends further towards the Georges River, forming a steep escarpment along the eastern edge of the railway line. At the highest points, there is a 24m difference in level between the top of the ridge and the Georges River. An overview of the topography is shown in Figure 9.

Figure 9 Topography of Liverpool city centre. Source: Liverpool City Council Masterplan

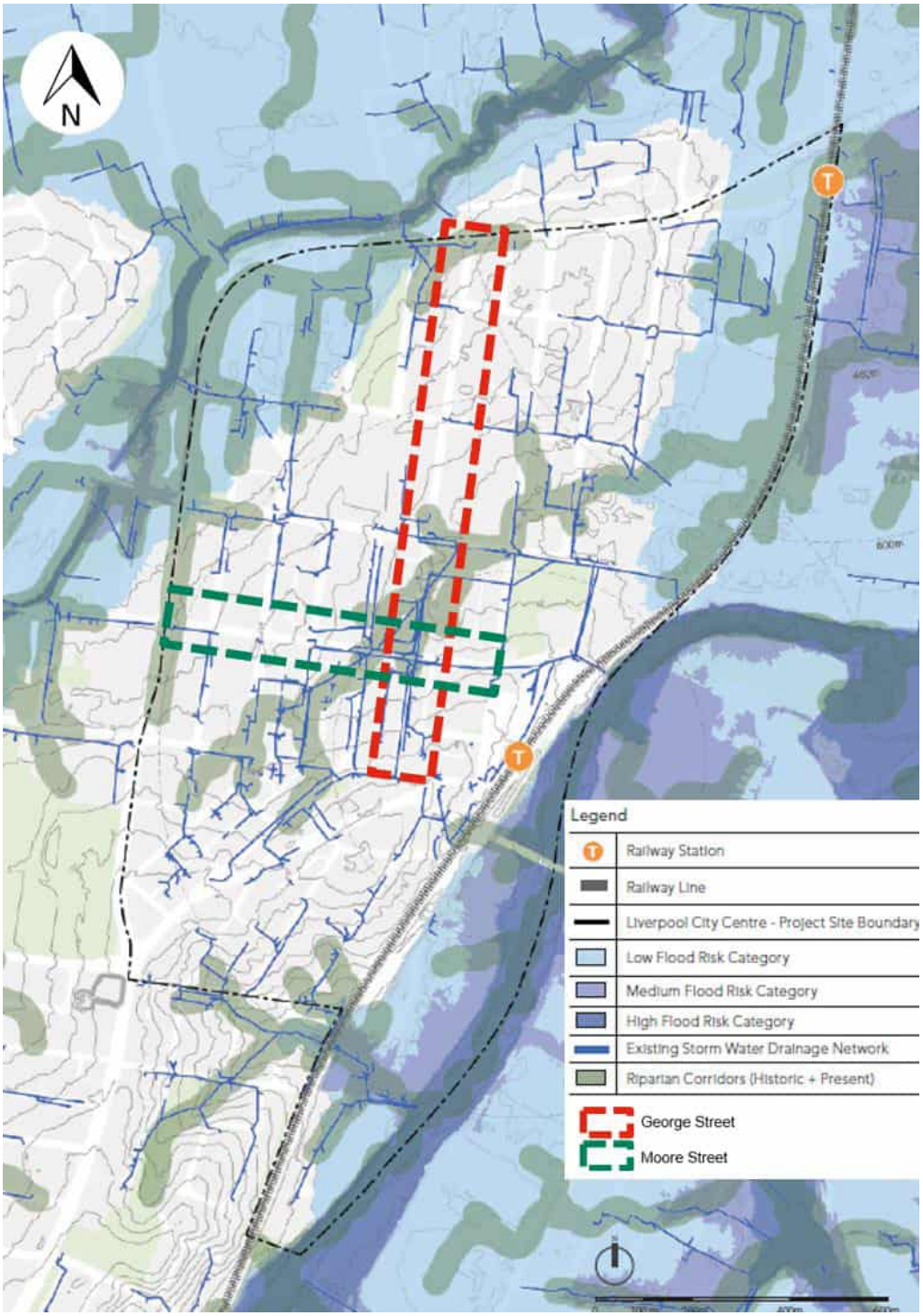


2.9 Hydrology

Liverpool city centre is bordered by the Georges River to the east and Brickmakers Creek to the north and west, with flood-prone areas surrounding these waterways. A diagonal ridge running from northeast to southwest across the city centre forms a natural watershed that drains into both water bodies. The area is supported by an extensive stormwater network, which generally follows the street layout and former creek lines, directing runoff into the Georges River and Brickmakers Creek.

The Georges River, which stretches from Appin to Botany Bay, runs along the eastern edge of the city centre for approximately 2km. While George Street and Moore Street do not have a high flood risk, George Street intersects the historic riparian corridor at the junction with Moore Street, and the area is known to flood on occasion. An overview of the hydrology of Liverpool is shown in Figure 10.

Figure 10 Hydrology of Liverpool city centre. Source: Liverpool City Council Masterplan



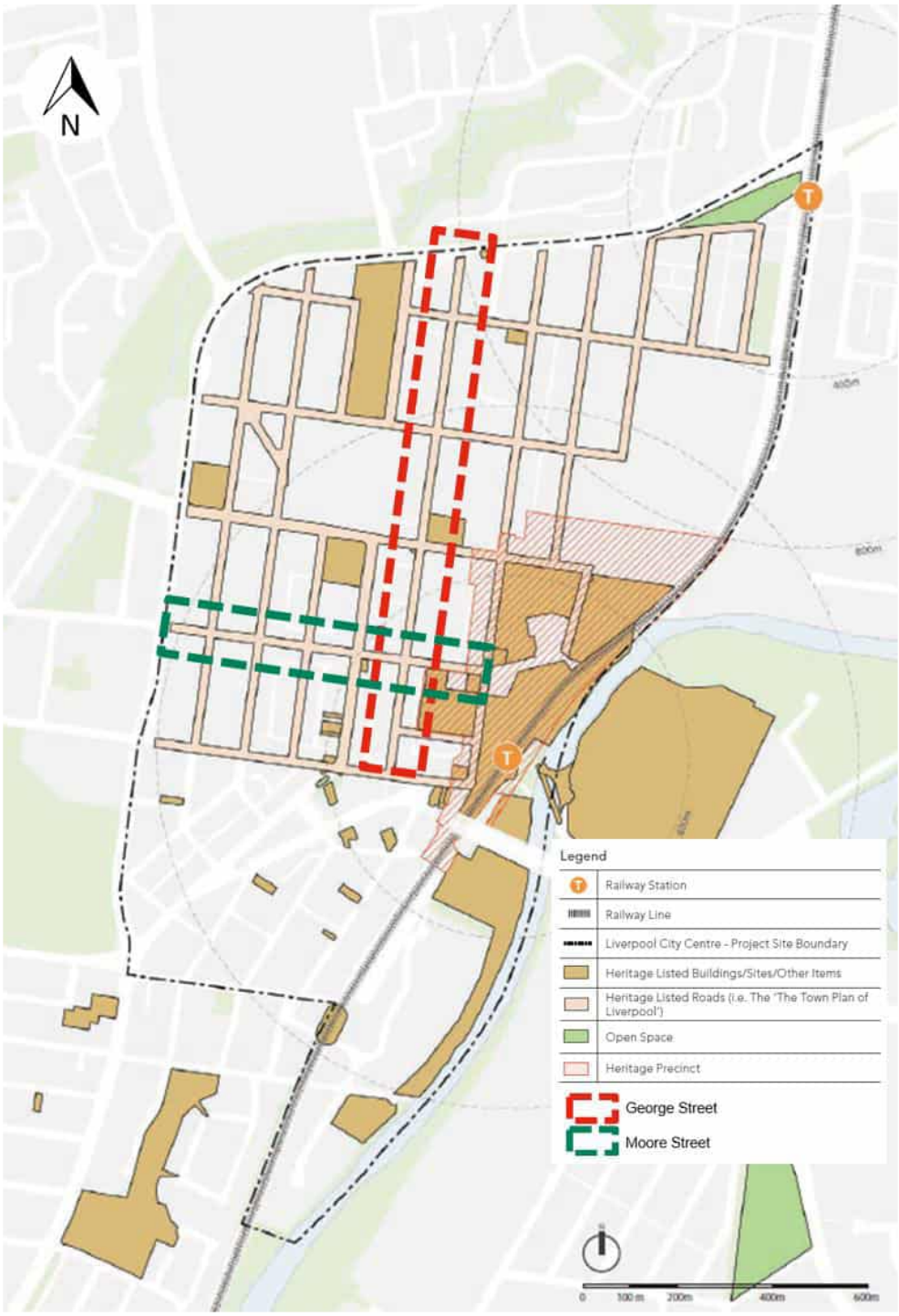
2.10 Heritage

Liverpool city centre has a rich multicultural heritage, with the traditional custodians of the land being the Cabrogal Clan of the Darug Nation. It is also acknowledged that the land was accessed by the peoples of the Tharawal and Gandangara Nations, who were the original inhabitants. The area features heritage-listed parks, streets, buildings, and other landmarks that reflect its Indigenous and colonial history. Additionally, Indigenous stories connected to the broader region contribute to its cultural narrative.

A designated Heritage Precinct in the central-eastern part of the city includes notable sites such as Bigge Park, Lighthorse Park, the Dr. Pirie Centre, the Old Courthouse, Liverpool Railway Station, Liverpool Public School, and the TAFE campus. A map of Liverpool city centre's heritage is shown in Figure 11.

The project corridor includes the heritage-listed All Saints Catholic Church, located at the intersection of George Street and Elizabeth Street, as well as several listed buildings at the Moore Street/Bigge Street intersection. As discussed in the project initiation meeting, the project will be located within the road corridor, and LCC does not anticipate any issues related to heritage. The facades of the heritage buildings will remain unaffected by the project.

Figure 11 Heritage of Liverpool city centre. Source: Liverpool City Council Masterplan



2.11 Services

Liverpool city centre contains a network of both above-ground and underground utility services, primarily located within road reserves along city streets. These utilities include electricity, gas, telecommunications, and water assets. As the project involves changes to the roads and verges, it may impact existing utility assets. If any existing utility assets are affected, they may need to be relocated or protected, and the works will require approval from the relevant utility authority. The utility authorities with assets in and around the project area are detailed in Table 4. Figure 12, Figure 13 and Figure 14 provide an overview of the water supply, sewage network, stormwater network and existing overhead power lines.

Table 4 utility authorities with assets in and around the project area

Utility Authority	Assets in and around the project area
AARNet	Underground fibre optic cable (telecommunications)
Aussie Broadband	Underground fibre optic cable (telecommunications)
Endeavour Energy	Underground and overhead HV and LV (electricity)
Jemena	Low Pressure (7kPa) and High Pressure (1050kPa) mains (gas)
NBN	Underground cables inside Telstra conduits (telecommunications)
Nextgen	Underground fibre optic cable (telecommunications)
Optus	Underground cables inside Telstra conduits (telecommunications) Underground fibre optic cable (telecommunications) Underground cable (telecommunications)
Uecomm	Underground fibre optic cable (telecommunications)
Superloop	Underground cable (telecommunications)
Sydney Water	Underground water main (water) Underground sewer, including rising sewer (sewer)
Telstra	Underground conduits and cables (telecommunications)
TPG Telecom	Underground fibre optic cable (telecommunications)

Figure 12 Water supply and sewage network for Liverpool city centre. Source: Liverpool City Council Masterplan

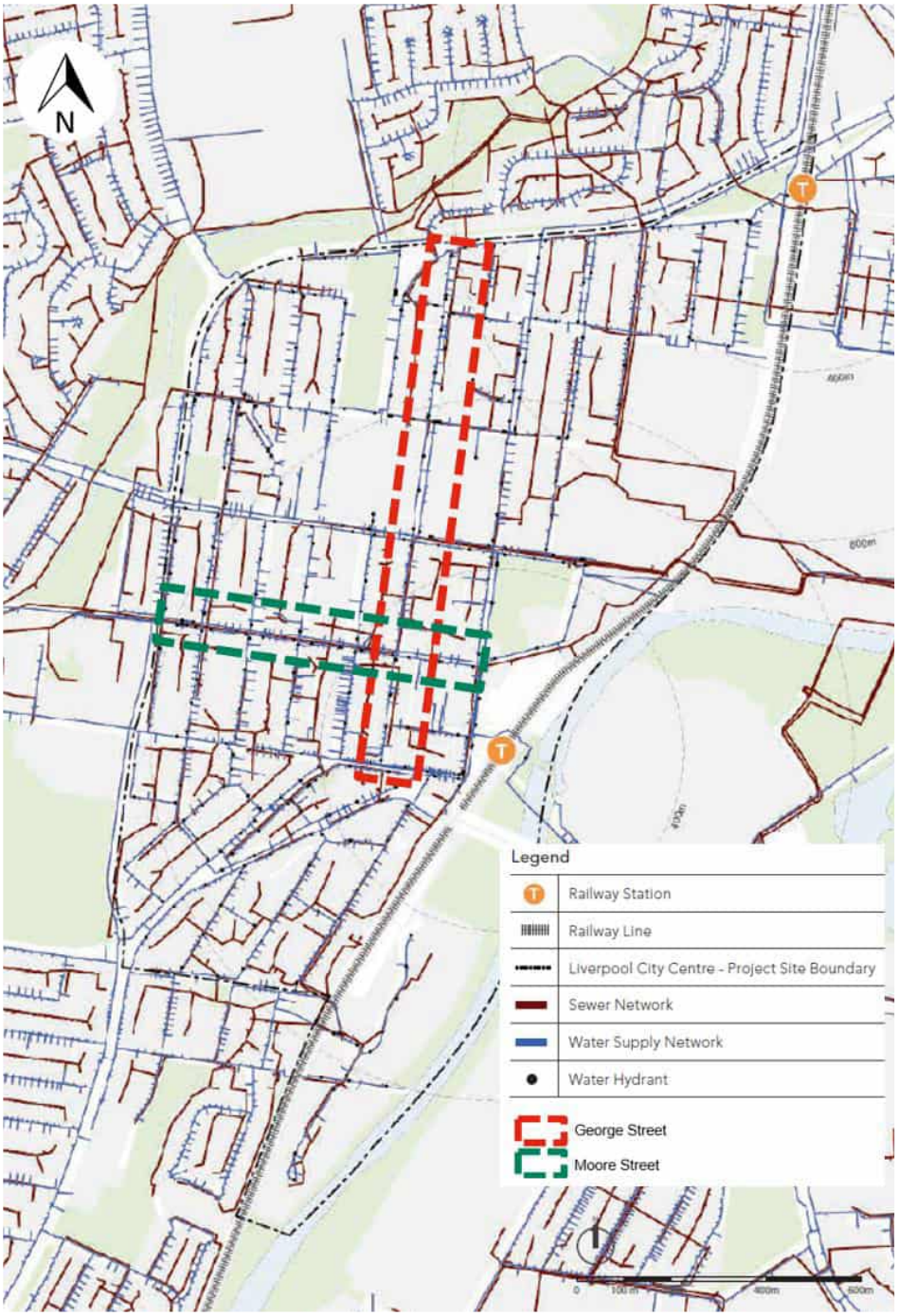


Figure 13 Stormwater network for Liverpool city centre. Source: Liverpool City Council Masterplan

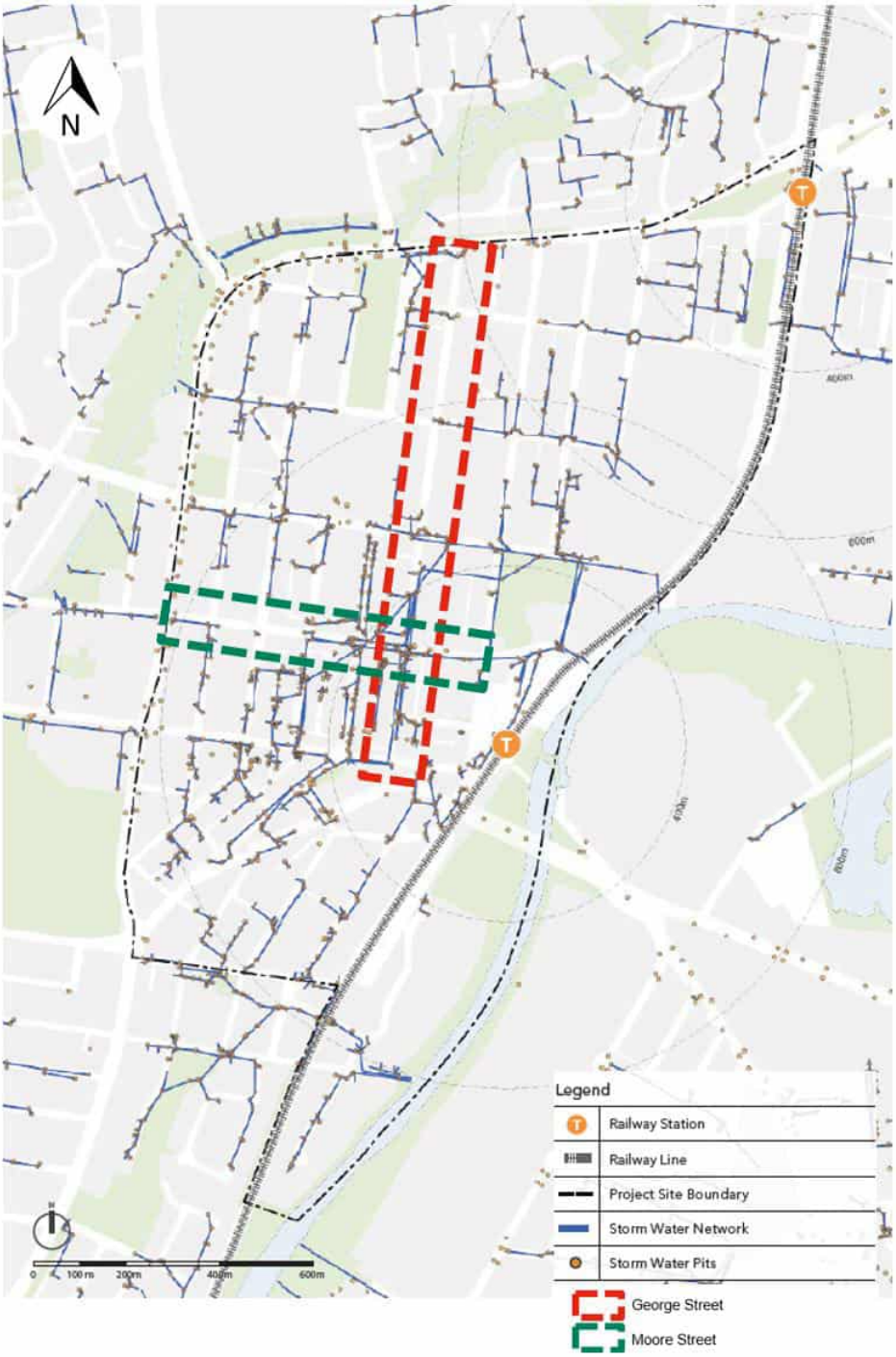
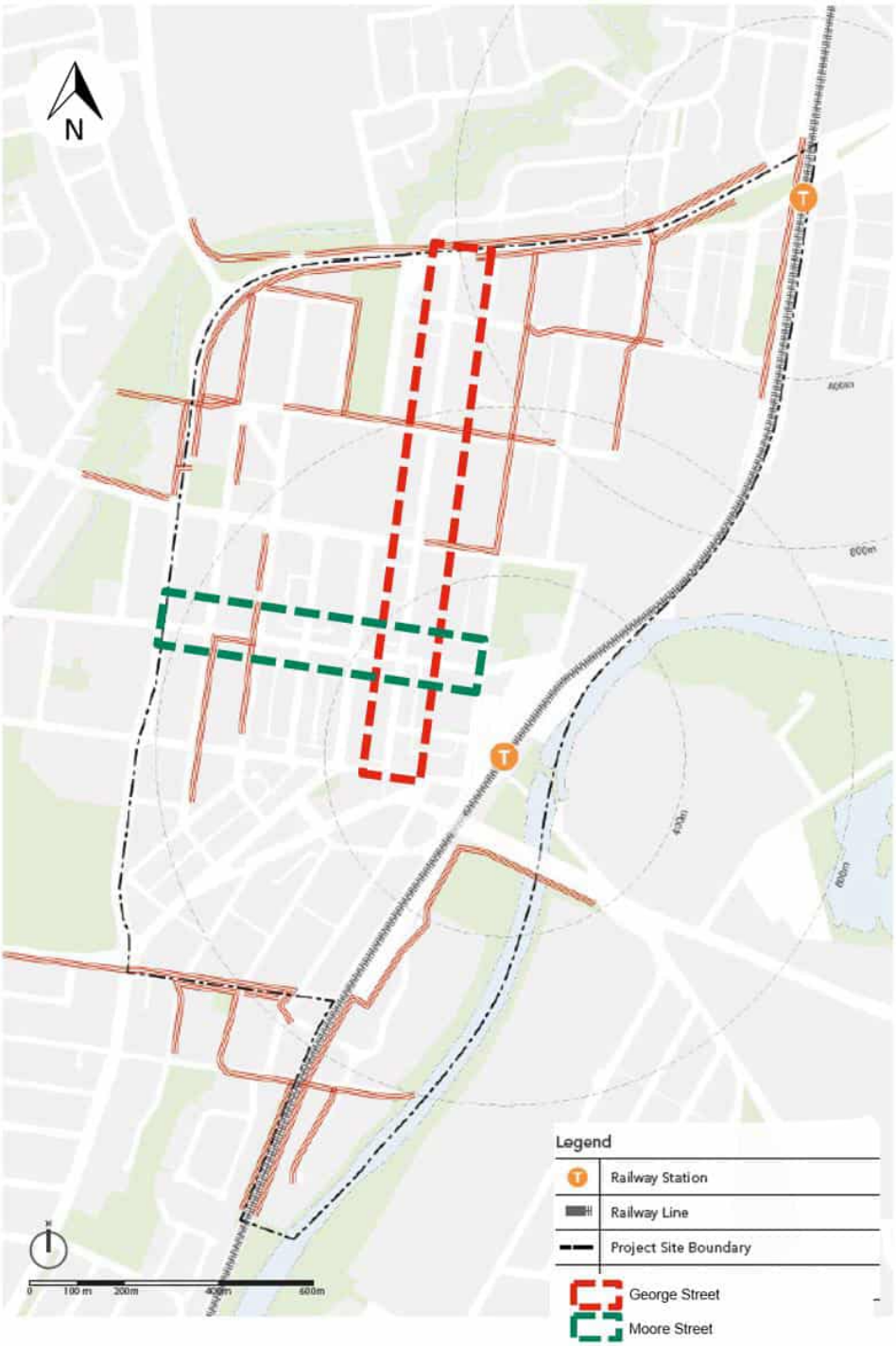


Figure 14 Existing overhead power lines for Liverpool city centre. Source: Liverpool City Council Masterplan



2.12 Land use

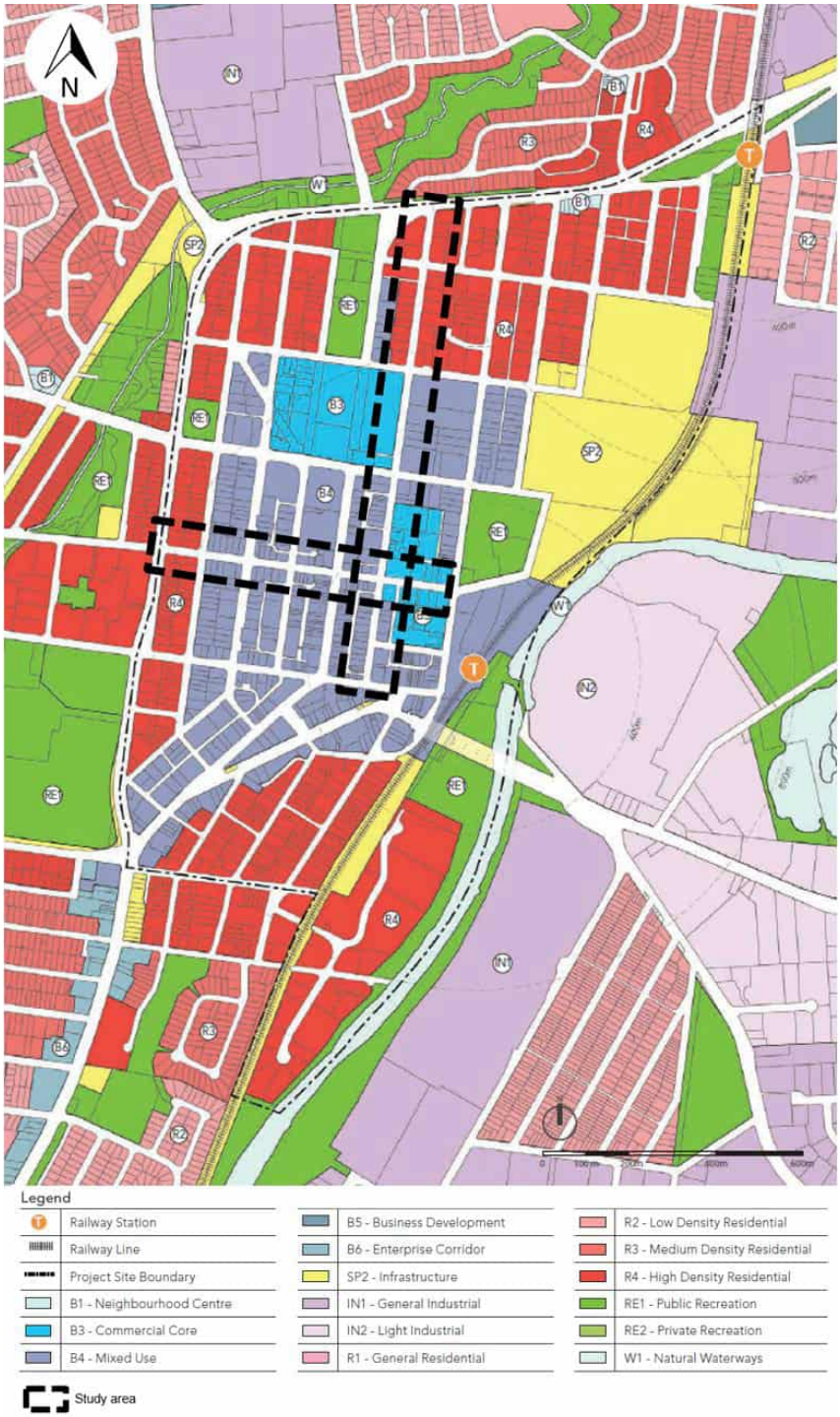
The Liverpool Local Environmental Plan (LLEP) and the Liverpool city centre Development Control Plan (DCP) are the key planning frameworks guiding development in the city centre. The LLEP is currently under review by the Council, with proposed updates aimed at fostering a vibrant, walkable, and active river city, featuring attractive open spaces and enhanced connectivity. The revised plan is expected to support greater commercial and residential activity while emphasising the importance of the health and innovation precinct in shaping the city's future.

The LLEP outlines various zones within the city centre, including:

- **B4 Mixed Use and B3 Commercial**: These zones predominantly cover the city core, facilitating a mix of commercial and residential developments.
- **R4 High-Density Residential**: Located in peripheral areas, such as the northern end of George Street and the western boundary of Moore Street, adjacent to the Hume Highway and Copeland Street.
- **SP2 Infrastructure**: Focused on the Health and Innovation Precinct and sections of the railway line.
- **RE1 Public Recreation**: Encompasses existing parks and reserves within the city centre, contributing to recreational space.

These zones work together to guide land use, ensuring a balanced mix of residential, commercial, and recreational spaces, while supporting the city's vision for growth and connectivity. An overview of the city's zoning can be seen in Figure 15.

Figure 15 LLEP Zoning for Liverpool city centre. Source: Liverpool City Council Masterplan



2.13 Character areas

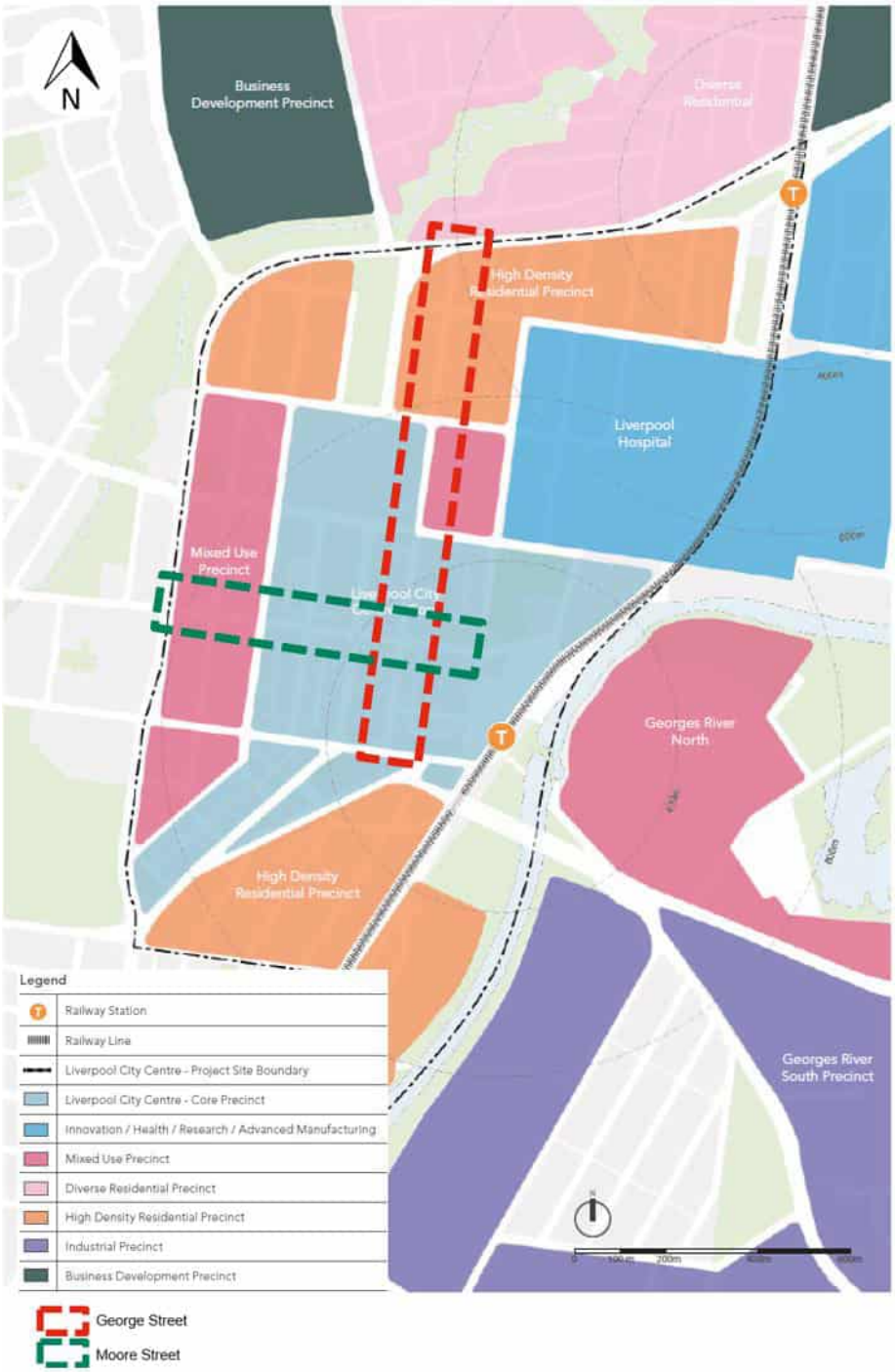
The Liverpool Collaboration Area Place Strategy, developed by the Greater Sydney Commission, outlines a vision for Liverpool that encompasses activities within the project boundary. The strategy defines several character areas within the city centre, each associated with specific functions and land uses. These areas are critical for guiding future development and enhancing the urban landscape. The key areas identified in the strategy are presented in Table 5:

The project directly interfaces with these precincts, ensuring that the proposed design supports and aligns with the vision for Liverpool's continued urban and socio-economic development. The locations of these precincts can be seen in Figure 16.

Table 5 Character areas within Liverpool

Character Area	Description
Liverpool City Centre Core	The primary commercial hub, featuring a mixed-use central business district with retail, commercial offices, university campuses, government services, residential apartments, and activated ground-floor spaces.
Diverse Residential	A mix of housing types and densities, from affordable to executive housing, while maintaining or enhancing affordable housing proportions.
High Density Residential	High-density residential and mixed-use developments near public transport and the city centre core.
Eco/Utility/Recreation	Recreation spaces integrated with Sydney Water services, offering both passive and active recreation areas connected to the river.
Innovation/Research/Health/Advanced Manufacturing	A high-tech, transit-oriented business park focused on advanced manufacturing, leveraging growth in the health, education, and equine sectors, with no residential development.
Mixed Use	Areas combining commercial, retail, residential, and community uses that complement the commercial core and support sustainable employment.

Figure 16 Liverpool city centre - character areas as per LCC Masterplan and Greater Sydney Commission, Liverpool Collaboration Area Place Strategy (LCC)



2.14 Development proposals

The NSW Government is focused on enhancing streets across Western Sydney, with a particular emphasis on Liverpool. Several initiatives have been introduced to improve the city's infrastructure and create a more pedestrian-friendly, active transport-oriented environment.

Key initiatives and guidelines shaping this vision include:

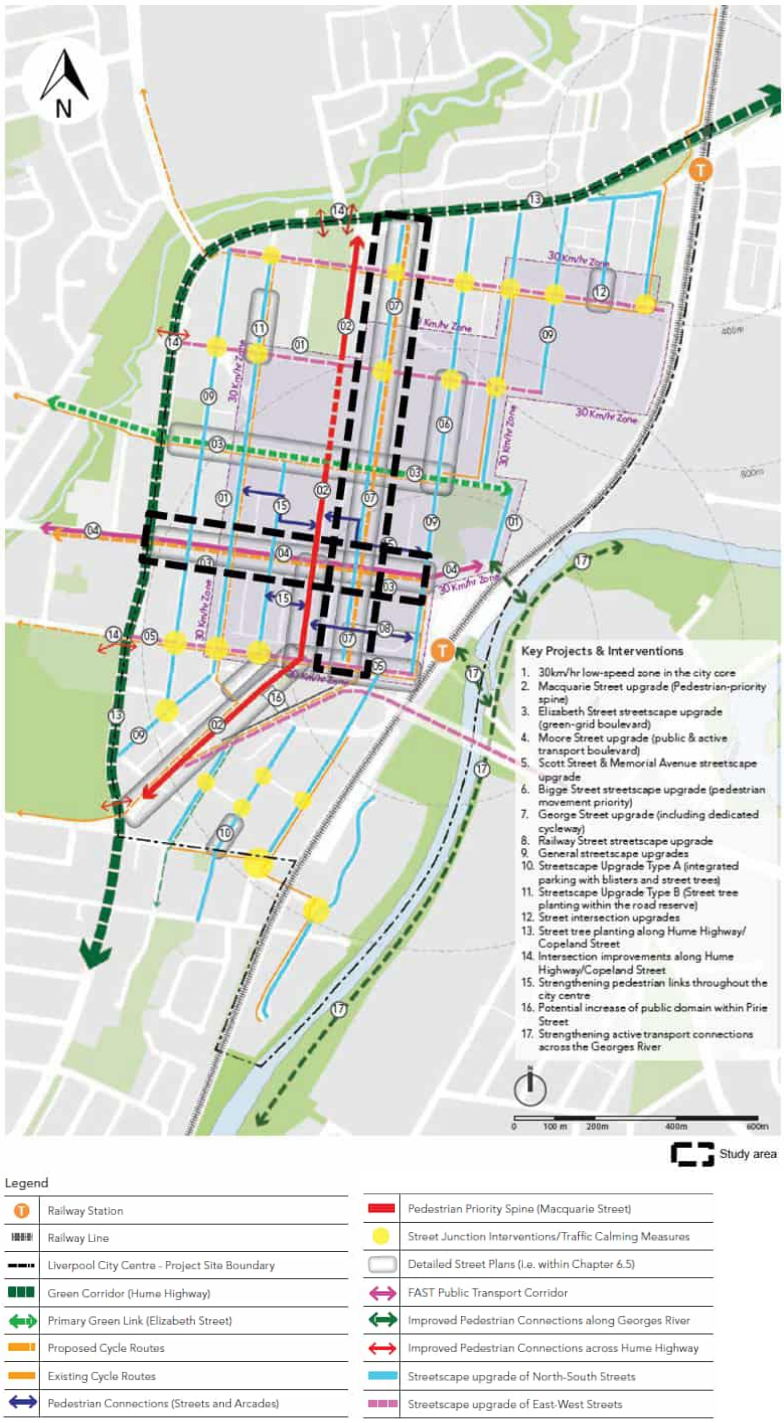
1. **Western Sydney Street Design Guidelines** (developed by the Western Sydney Planning Partnership): A resource for evaluating, planning, and designing streets to improve their functionality, accessibility, and environmental quality.
2. **Place-Based Future Transport Strategy for Liverpool** (by Transport for NSW): A strategy designed to enhance pedestrian and cycling experiences through measures like reduced speed limits, promoting sustainable travel behaviours.
3. **Movement and Place Framework** (by the Government Architect NSW): A framework aimed at achieving better outcomes for streets as public spaces, focusing on functionality and community well-being.
4. **Transport for London's Healthy Streets Approach™**: Adopted as a guiding framework for Liverpool, it prioritises the human experience and promotes healthier, more vibrant streets.

The Liverpool City Centre Master Plan integrates these efforts, aligning with the NSW Government's vision to improve the health of the Liverpool community and the city centre's environment. The plan includes the following key themes and interventions:

- **Healthy Streets**: Incorporating the 10 Healthy Street Indicators to enhance street conditions and promote well-being.
- **Active and Public Transport Priority**: Creating streets that prioritise sustainable forms of transport, including dedicated cycleways and improved footpaths.
- **Traffic Calming**: Implementing a 30km/hr speed zone within the city centre to create safer, more pedestrian-friendly streets.
- **City Centre Loop Shuttle Bus**: Connecting key points of interest and peripheral parking areas to enhance mobility.
- **Street Trees**: Introducing trees to provide shade, reduce temperatures, support native fauna, and improve air quality.
- **Intersection Improvements**: Enhancing pedestrian access along the Hume Highway, connecting key areas of the city.
- **Georges River Connections**: Developing better connections across the Georges River to link Liverpool and Moorebank.
- **Pedestrian-Priority Spine**: Creating a central pedestrian area and **public transport boulevard** within the city.
- **Open Space Network**: Streets are considered part of the public open space network, with enhancements to increase amenity and facilities.
- **Streetscape Treatments**: Reflecting the Western Sydney Parkland character through design elements that evoke the local environment.

These initiatives work together to create a city that is not only more sustainable and accessible but also more liveable and health-focused, supporting the growth and development of Liverpool as a vibrant and resilient urban space. A plan illustrating the locations of key projects and interventions for Liverpool City Centre is presented in Figure 17

Figure 17 Typology plan and key projects and interventions for Liverpool city centre. Source: Liverpool City Council masterplan



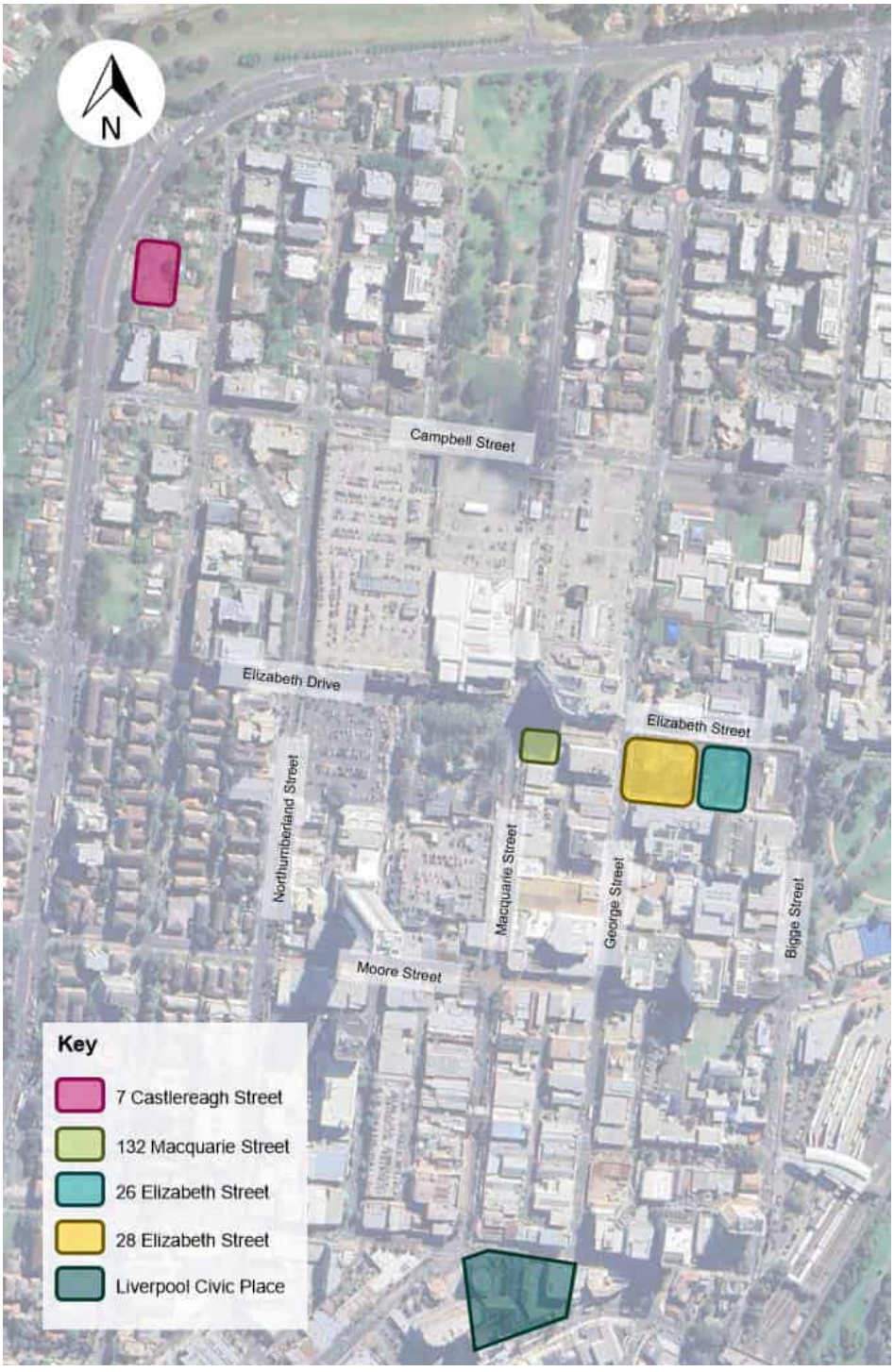
A number of development proposals have been submitted in the city to accommodate the city's growing population while enhancing its amenity and community spaces. These projects aim to create a vibrant, mixed-use environment with a focus on residential, commercial, and recreational spaces. The planned developments will improve connectivity, provide essential services, and offer public spaces that promote social interaction and well-being. With a strong emphasis on sustainability and inclusivity, these developments are designed to support the city's long-term growth, ensuring that Liverpool remains a dynamic and accessible urban hub. A map illustrating the key development areas will be provided to highlight the scope and scale of these initiatives.

An overview of the key development proposals within Liverpool CBD are presented in Table 6 and their locations illustrated in Figure 18.

Table 6 Summary of development proposals in Liverpool City Centre

Address	Description
7 Castlereagh Street	The proposed development involves demolishing existing structures, removing trees, and constructing two 11-storey residential buildings with 132 apartments: 14 one-bedroom, 99 two-bedroom, and 19 three-bedroom units. The development will feature two levels of basement parking with 194 spaces and a 90-place Centre Based Childcare Facility on the ground floor. Site works will include lot consolidation, civil works, and landscaping.
132 Macquarie Street	The proposed development involves the construction of three commercial towers, comprising 11, 17, and 21 storeys, above a four-storey podium. The project will provide 35,170 square metres of commercial floor space and 2,540 square metres of retail space. It will also feature two-and-a-half levels of basement parking, offering 200 car spaces, and a pedestrian through-site link connecting George Street and Macquarie Mall.
26 Elizabeth Street	The proposed development consists of a 34-storey mixed-use building, featuring four levels of basement car parking. The basement will provide 321 car spaces, spanning from Basement 4 to Level 1. The ground floor will house building services, a café, and separate foyers with lift lobbies for the commercial, hotel, and residential levels above.
28 Elizabeth Street	The proposed development consists of a 34-storey mixed-use building. It includes six levels of basement car parking, providing 439 car spaces and 29 motorcycle spaces. The ground floor will feature retail spaces, Levels 1 to 4 will be dedicated to commercial office spaces, and Levels 5 to 33 will comprise 312 residential apartments.
Liverpool Civic Place	The proposed seeks to modify an approved application to include the addition of Residential Flat Buildings, Co-Living Housing, and Shop Top Housing and to extend and adjust the approved building envelope for Phase B.

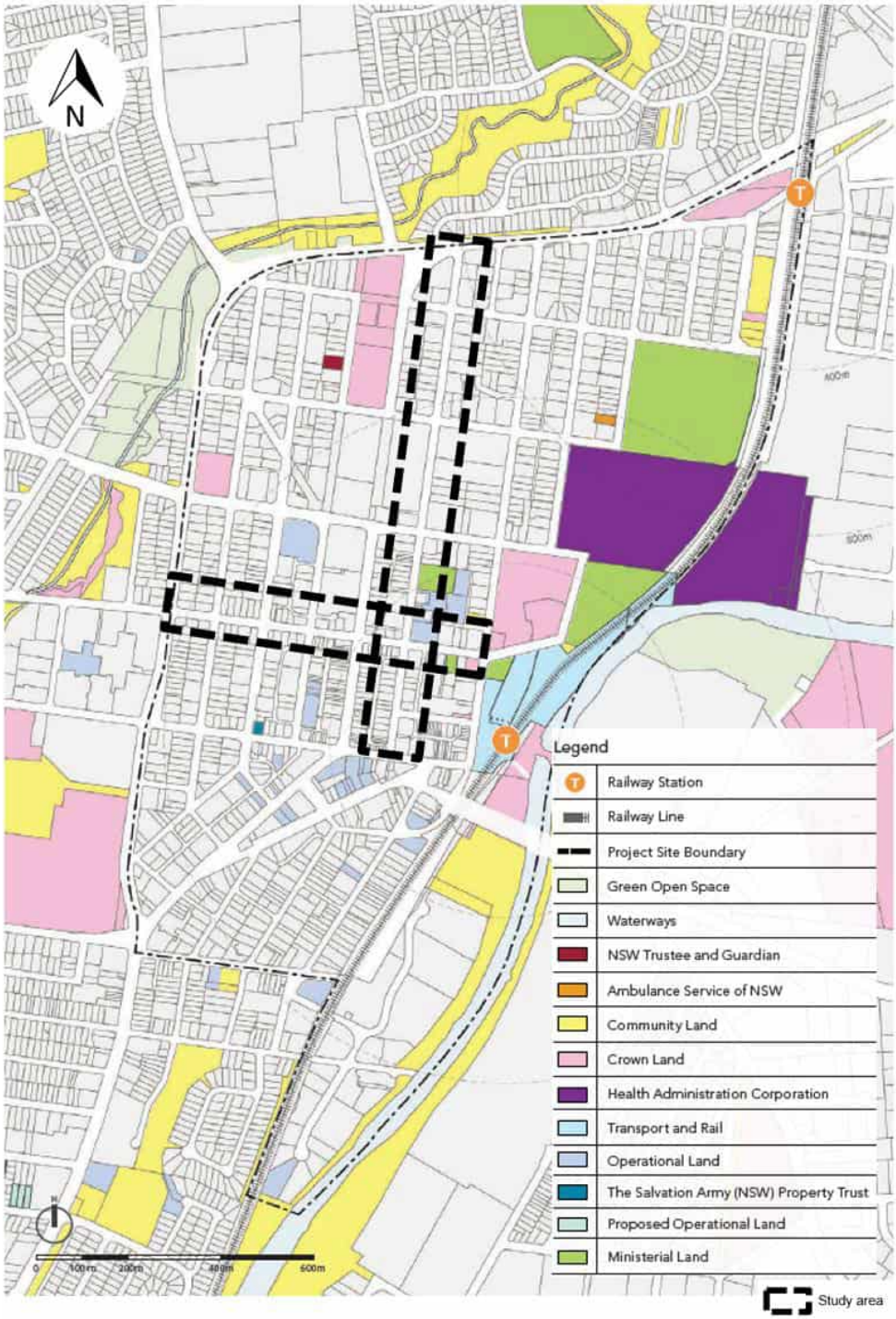
Figure 18 Key CBD development proposals



2.15 Land ownership

Most of the land within the Liverpool City Centre is privately owned, although several sites fall under different categories, including Crown Land, Community Land, Operational Land, and Leased Land. Crown Land includes areas such as Apex Park, Bigge Park, the former Liverpool Courthouse, portions of Lighthorse Park, Liverpool Memorial Pioneers Park, and land near Railway Street. Community Land includes sections of Hart Park and Lighthorse Park. Operational Land covers sites like St Luke's Anglican Church, Liverpool City Library, and the Northumberland Street carpark. Additionally, the Liverpool Hospital site is classified as Leased Land. An overview of land ownership in Liverpool CBD can be seen in Figure 19

Figure 19 Land ownership for Liverpool city centre. Source: Liverpool City Council Masterplan



3.0 Case studies

Case studies were gathered to illustrate how recent street improvements have integrated various design elements into cycleways. Key considerations included bi-directional cycleways, placemaking opportunities such as outdoor seating and dining areas, vegetation and planting, and the interaction between bus stop design and the cycleway, including bus bypass designs.

3.1 Castlereagh Street, NSW

Castlereagh Street in Sydney CBD features a newly opened bi-directional cycleway, created by reallocating space from a general traffic lane to provide a dedicated cycling facility. The street also boasts wider footpaths, offering ample space for pedestrians and outdoor seating areas. This project serves as a strong example of what could be achieved in the Little India segment of George Street, Liverpool, and in future works along the southern side of Moore Street.

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3.2 Bondi Junction / Oxford Street, NSW

The Bondi Junction cycleway features a bi-directional cycling facility on the south side of Oxford Street, designed to accommodate multiple modes of transport within the same space. Floating bus stops have been incorporated, allowing cyclists to continue safely along the street while buses can pick up passengers without risking conflicts with cyclists. This floating bus stop design could offer an effective solution to address the potential conflicts between transit stops and cyclists in Liverpool

3.3 Oxford Street, NSW

The Oxford Street Cycleway is a bi-directional cycling facility where a general traffic/parking lane has been reallocated to create a dedicated cycling space. This design enhances safety for cyclists, providing a protected area away from general traffic and public transport, ensuring a safer and more efficient route for cycling.

3.4 Pitt Street, NSW

Pitt Street in Sydney CBD is a bi-directional cycle facility functioning in a busy city environment. A general traffic lane and parking lane were reallocated to prioritise active travel including the cycle lane and space for pedestrians to walk. Space for placemaking features including outdoor seating are also included. Pitt Street highlights how reallocating road space from vehicles can enhance the functionality and liveability of a CBD, providing valuable insights for the design of Liverpool city centre's cycleways.

3.5 Bourke Street, NSW

Bourke Street Cycleway is an example of how a local streetscape can be altered to prioritise active modes while still providing access for general traffic and incorporating on-street parking for residents. The street upgrades also include wider footpaths and placemaking and vegetation. Bourke Street highlights a good example of how a cycleway, parking and vegetation can all co-exist together, which will be applicable to the Project, particularly in the residential segments.

4.0 Multi-criteria analysis

4.1 Framework

A Multi-Criteria Analysis (MCA) was utilised to evaluate and compare alternative design options for the Project by assessing them against key criteria. This structured and evidence-based tool provides a transparent approach to identifying the most balanced and effective solution.

The MCA framework considered critical factors, including functionality, safety, connectivity, placemaking potential, and cost-effectiveness. Both quantitative and qualitative data informed the assessment, ensuring each option was thoroughly evaluated against the Project's objectives.

The analysis focused on concept design options for the Moore Street and George Street cycleways. MCA scores, combined with Council's political appetite for change and stakeholder feedback, were used to determine the preferred arrangement for the Project.

4.2 Criteria

The MCA was structured around five key objectives, which reflect LCC's aspirations and align with broader strategic goals for Liverpool CBD: A summary of the MCA objectives and criteria is presented in Table 7

Table 7 MCA developed for Liverpool City Council

Objective	Criteria	Criteria Consideration
Improve Network safety for all transport users	Safety	Prioritising the safety of people walking, cycling or using vehicles through design features that minimise conflicts and enhance visibility. This may include the allowance of sufficient widths of design features to reduce potential conflicts.
Maximise livability and usability	Placemaking	Enhancing the aesthetic and functional appeal of the cycleway by integrating it with local landmarks, public art, and green spaces, creating an inviting environment. This may include the presence of landscaped areas, trees, green spaces or outdoor dining.
	Comfort	Designing a cycleway that ensures a comfortable experience for people using the facility. This may include separation from other travel modes, with sufficient clearances, and minimising the number of people crossing the cycleway.
Preserving access to business and services	Parking Impacts	Evaluating how the cycleway design effects on-street parking availability, retaining as much on-street parking as possible. This may include the retention of parking lanes.
	Special Interfaces	Managing the design where the cycleway intersects with other infrastructure, including the police station, Westfield access, school, medical centre, driveways, and key access points. This may include retaining special parking (such as disabled parking) or other access arrangements for these services.
Minimise impact on network operations	Traffic Network Impacts	Analysing how the cycleway affects vehicle flow and traffic patterns in the surrounding area, particularly at intersections and along major corridors. This may include impacts for reduction in travel lanes where there is not remaining traffic capacity within the road.

	Bus Operations	Minimising disruptions to bus services, ensuring that bus routes, stops, and schedules remain efficient and accessible for public transport users. This may include impacts to bus lanes and conflicts between the cycleway and bus stops.
Efficient and sustainable delivery and operations	Environment	Assessing the environmental benefits and impacts of the cycleway, including effects on air quality, noise, local ecosystems, and stormwater management. This may include the green areas retained or expanded.
	Constructability	Evaluating the ease and feasibility of construction, including cost, time, disruption to existing traffic and businesses, and site constraints. This may include the impact on utilities from impacting the existing footpaths or verges.

4.3 Scoring and weighting

Each design option was assessed against the objectives using a weighted scoring system that reflected the relative importance of each objective. The weighting was determined through discussions with LCC to ensure alignment with their priorities and the Project's goals.

The evaluation process was further refined during an Options Assessment Workshop with LCC, where aspirations for the two corridors were clarified, and the framework was tailored to address stakeholder needs effectively.

The MCA framework allowed for a balanced evaluation of options, focusing on safety, liveability, accessibility, operational efficiency, and sustainability. An overview of the MCA scoring system is presented in Table 8. Options were scored on a 1-4 scale, with 4 representing the best-performing option, and 3, 2, and 1 assigned to options with minor, medium, and major differences from the best option, respectively.

Table 8 MCA scoring system

	Major difference	Moderate difference	Minor difference	Best option (comparative)
Score	**1**	**2**	**3**	**4**

Each objective was weighted between 5% and 30%, depending on its relevance, with individual criteria also weighted within this range. Weighting varied across different sections of the cycleway to address specific requirements. For example, placemaking carried greater weight in CBD typologies, while constructability and parking were prioritised in residential typologies.

5.0 Design evolution

5.1 Design standards

Table 9 serves as a reference for the standard dimensions of road elements integrated into the recommended cycleway treatments. These standards were collaboratively developed with LCC and drawn from a range of design documents to ensure alignment with best practices and safety requirements. However, specific departures from these standards have been proposed for the project. Notable departures include:

- Minimum 2.8m-wide general traffic lanes
- Minimum 3.2m-wide lanes for bus traffic.
- Along the residential section of George Street, a 0.65m median has been proposed between the car parking spaces and the cycle lane, which, while narrower than standard practice, was necessitated by the need to retain existing kerb alignments within a confined cross-section. The median provides a buffer for cyclists travelling opposite parked cars and is deemed an acceptable risk by LCC. This assessment is based on the low turnover of parking in the area and the increased awareness of vehicle passengers facing oncoming cyclists, which reduces potential conflicts.

These standards emphasise the needs of all transport modes, with a particular focus on active transport such as cycling and walking. By prioritising user comfort and the separation of modes to minimise conflicts, the design ensures the safety, accessibility, and functionality of the road network for all users.

Table 9 Key road elements, widths, and the standards-setting for cycleway treatments

Infrastructure	Minimum width	Standard
Median Kerb width	0.4 m	TfNSW Cycleway Design Toolbox (2020) p. 32 & Sydney Streets Design Code (2021) p. 171
Two-way cycle path	2.5 m	Guide to Road Design Part 6A: Paths for Walking and Cycling Table 5.4 in Section 5.1.5 - Desirable minimum width
	2.4 m	Cycleway Design Toolbox (p. 32) states that a minimum width of 2.4m for a bicycle path may be appropriate in specific constrained locations. However, the Toolbox recommends a standard width of 3m, with a preferred width of 4m, for two-way cycle paths to accommodate commuter traffic and emerging forms of micromobility.
Separation for prevent dooring	1 m (0.8 m for door + 0.2 m clearance)	Minimum to prevent dooring. Guide to Road Design Part 6A: Paths for Walking and Cycling Figure 5.8 in Section 5.5.1
Parallel on-street parking	2.0-2.3 m	Australian Standard 2890.5:2020 Table 3.1 in section 3.2.2
	2.1 m	Sydney Streets Design Code (2021) p. 171
Perpendicular on-street parking	5.4 m (perpendicular to corridor) 2.4 m (parallel to corridor)	Australian Standard 2890.5:2020 Table A.1 in Appendix A *Note: using Class Low classification (i.e. generally all-day parking) as most parking currently unrestricted (classification in Table 3.2 and 3.3 in Section 3.3.2)*
General traffic width (one lane of traffic)	3.0 m	Guide to Road Design Part 3: Geometric Design - Table 4.3 For use on low speed roads with low truck volumes
	3.2 m	TfNSW, Design of Roads and Streets Manual (2024) - Table 8.3.7b for Destination high street
	2.9 m (for two lanes of traffic in each direction) 2.75 m (for one lane of traffic in each direction) 2.8m adopted with LCC direction	Sydney Streets Design Code (2021) p. 171 Sydney Streets Design Code (2021) p. 171 LCC directed minimum width
	2.8m	LCC directed minimum width
Bus Lanes	3.2m	LCC directed minimum width
Footpath	3.6m (2m pedestrian clear zone)	LCC Public Domain Technical Manual for Core Streets
Cycleway	2.5m + 0.4-1.0m median	LCC Public Domain Technical Manual for Core Streets
Shared path	4.0m footpath (2.5m clear path of travel)	LCC Public Domain Technical Manual for Core Streets

5.2 Design process

The following sections outline the approach taken by the design team to work through the design process.

5.2.1 Review of LCC reference design

Council's reference design was reviewed to evaluate alignment challenges and opportunities. The design team assessed the proposed road-side positioning of the cycleway and concluded that the reference design's approach was appropriate.

For George Street, the western side was determined to be preferable despite the potential conflict at the Westfield entrance. This decision was based on the greater number of conflicts present on the eastern side, including emergency vehicle movements at the police station, the school drop-off and pick-up zone for All Saints Catholic Primary School, and the location of bus stops.

For Moore Street, the north side was selected as the optimal alignment, consistent with the Council's reference design. The south side features more bus stops (four compared to two on the north), creating additional conflict points. The north-side alignment also facilitates connectivity with the university campus, the pedestrianised section of Macquarie Mall, and the existing shared path on the western side of Copeland Street.

5.2.2 Vision workshop

A vision workshop was held at LCC offices on the 7th of November 2024 to lock down the Project objectives and vision to help guide the design. The project team discussed and agreed on the objectives and vision as outlined in section 1.3 and 1.4. This was also an opportunity to discuss the key issues for LCC including parking as an issue for Councillors.

5.2.3 Street typologies

To determine the optimal street arrangements for accommodating cycleways on Moore Street and George Street, both streets were divided into smaller segments based on their typology. These typologies were established by analysing the existing and anticipated future character of the streets, as well as the functional requirements dictated by surrounding land uses. The typologies are illustrated in Figure 20 and Table 10.

Figure 20 George Street and Moore Street typology

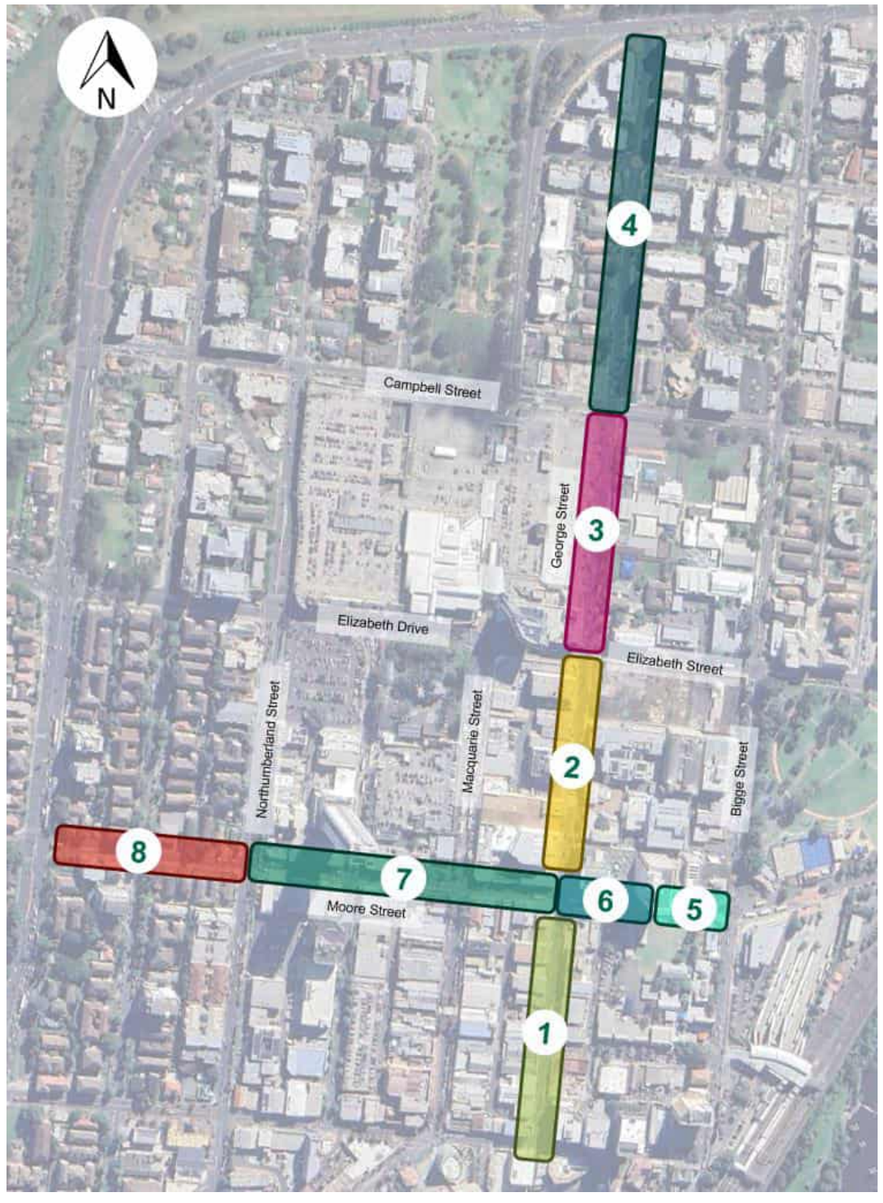


Table 10 Design typologies for the Project

No.	Segment	Description
	GEORGE STREET	
1	Little India (between Scott Street and Moore Street)	Defined by its unique cultural character, this area has the potential to be an attractor for Liverpool. This zone requires a strong placemaking focus and an approach that prioritising people, encourages pedestrian activity and social interaction, and creates a vibrant street environment that reflects this distinct identity.
2	CBD (Moore Street to Elizabeth Street)	This segment features key CBD destinations, including civic and educational centres such as the police station, courthouse, university campus, alongside a mix of commercial buildings. It intersects Moore Street, providing a connection to the wider cycle network.
3	Westfield (Elizabeth Street to Campbell Street)	This segment links to the Westfield Centre and faces unique challenges, including managing access to the shopping centre's entry/exit, taxi zones, bus stops and school pick up and drop off areas.
4	Residential (Campbell Street to Hume Highway)	The residential character requires less placemaking and more of a practical approach to consider driveway access.
	MOORE STREET	
5	Medical Centre east (Bigge Street to the medical centre)	This section requires consideration of the existing medical centre access. Priorities included maintaining the existing accessible parking and reducing potential conflicts between footpath users to maintain safe and convenient access for all users.
6	Medical Centre west (medical centre to George Street)	This section provides connection to the north – south George Street CBD cycle.
7	Moore Street CBD (George Street to Bathurst Street)	This segment is defined by the CBD characteristics of a mixed use commercial and residential buildings. This section includes the Macquarie Street pedestrianised mall. The planned T-Way will further strengthen Moore Street as a travel corridor for more sustainable modes.
8	Moore Street Residential (Bathurst Street to Copeland Street)	This section has a residential function, with the planning zone mixed use. This segment provides a safe connection for local residents into the CBD and includes driveways and overhead powerlines.

5.2.4 Optioneering

Survey data was utilised to determine accurate existing corridor widths, forming the basis for the design. The AECOM design team employed these widths in *Street Design AI (https://streetdesign.beyondcad.com/)*, an online tool, to develop cross-section options for each street typology. Each typology included at least two options: a constrained version and an aspirational version, with some more complex typologies offering additional intermediate options.

The constrained options prioritised traffic and parking lanes, reflecting Councillors' concerns, and maximised traffic and bus lane widths, often reducing space for footpaths and cycleways. In contrast, the aspirational options aligned with the Project's objectives and vision, reallocating road space to provide wider footpaths for pedestrians, trees, planting, seating opportunities, a broader separated cycle lane, and a wide median buffer.

Each design was evaluated using a Multi-Criteria Analysis (MCA), highlighting the highest-scoring option based on weighted criteria. The options and their MCA outcomes were presented to LCC during an Optioneering Workshop on 22 November 2024. These options are detailed in Section 5.3.

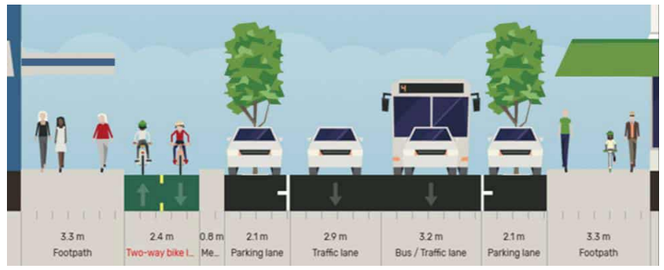
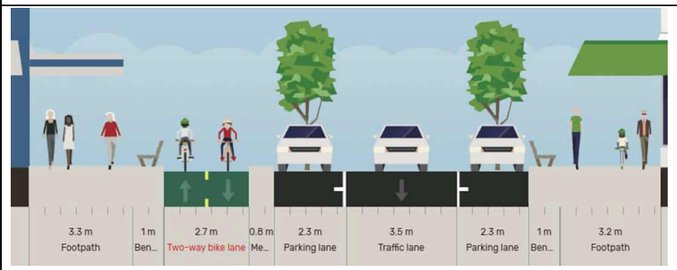
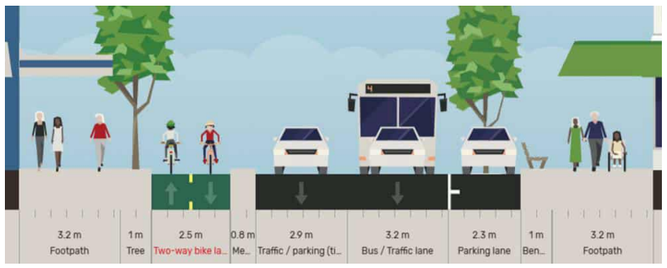
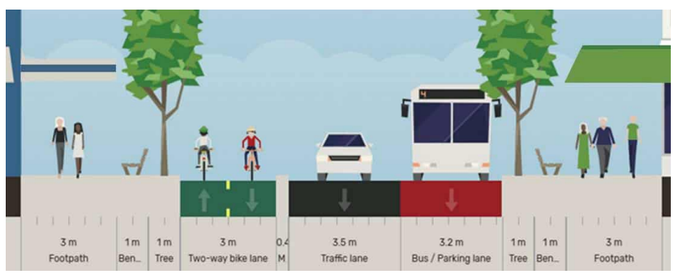
5.3 Design options – George Street

5.3.1 Segment 1 - Little India (between Scott Street and Moore Street)

The Little India segment of George Street represents a significant opportunity for placemaking, building upon its unique character and the cultural importance it holds for the local community. With thoughtful design, it has the potential to become a destination that attracts visitors from beyond Liverpool, enhancing its appeal through the integration of trees, planting, and street furniture. However, the existing on-street parking presents a notable challenge, requiring a balanced approach to maintain accessibility while accommodating new infrastructure and improvements to the streetscape.

Four options were developed for this segment which are presented in Table 11.

Table 11 Options for Segment 1 - Little India (between Scott Street and Moore Street)

Options	Cross section	Benefit	Constraint
Option 1 – Constrained		• Retains dual traffic lanes • Retains parking on lanes on both sides of the road • Potential to include new trees in between parking bays • Bus stops in lane, maximising use of parking lane	• Poor placemaking outcome. Limits foot traffic to businesses from existing. • Reduced footpath width: less attractive for shops; insufficient space for outdoor dining / seating / placemaking; limits future capacity of the CBD; potentially requires relocation of lighting poles, which could impact street lighting. • Risk of costly services relocation. • Minimal width for two-way cycleways – should only be considered in constrained areas. Poor comfort outcome • Narrow parking lanes, reduced parking for trees. • Shared bus / traffic lane • Potential conflict between car passengers from parked cars crossing the cycle path
Option 2 – Remove one traffic lane		• Width of footpath increased to 4.2m / 4.3m – more attractive for shops; more space for outdoor dining / seating / placemaking. • No loss of parking lane. • Potential to include new trees in between parking bays	• Removal of one traffic lane – will impact traffic operation, requires further investigation via traffic modelling assessment. • Wide roads can cause appearance of streetscape to be a higher speed environment. • One traffic lane with on-street parking on both sides – safety risks of weaving traffic into and out of parking bays. Will require staggered parking bays reducing number of spaces • Shared traffic and bus lane – require further confirmation from bus operator. • Bus stops in lane, which would block traffic flow
Option 3a – Aspirational (2 traffic lanes + 1 parking lane)		• Width of roadside increased to 4.3m – more attractive for shops; more space for outdoor dining / seating / placemaking. • No parking lane can result in less hazard to cyclists - avoiding pedestrian and cyclist conflicts. • Potential to include new trees in between parking bays or the footpath on the eastern edge • Bus stops in lane, maximising use of parking lane	• Loss of parking function. 23 parking spaces on George Street west amended to from all day to timed parking.
Option 3b – Aspirational (shared bus / parking lane)		• Width of roadside increased to 5m – more attractive for shops; more space for outdoor dining / seating / placemaking and trees. • No parking lane can result in less hazard to cyclists - avoiding pedestrian and cyclist conflicts.	• Removal of one traffic lane – may impact traffic operation, which requires further investigation via traffic modelling assessment. • Loss of 23 parking spaces on George Street.

5.3.1.1 MCA outcome

The MCA for Little India is weighted towards liveability and usability due to its destination character and the CBD location. Table 12 shows the highest scoring option is 3b (3.6) which is the most aspirational with a shared bus / parking lane. It scores highest for objectives 1, 2 and 5, which improves the safety for users, maximises liveability and usability of the space, and efficient and sustainable delivery and operations.

Option 1, the most constrained option is the lowest scoring a 2.45. It scores highest for objectives 3 and 4 which preserve general traffic access to business and services and minimising the impact on the network, as no traffic lanes are removed.

Table 12 MCA results for Segment 1 - Little India (between Scott Street and Moore Street) design options

Segment 1 - Little India (between Scott Street and Moore Street)					
Objective	**Weighting**	**Option 1 - Constrained**	**Option 2 - Remove 1 traffic lane**	**Option 3a: Aspirational (two traffic lanes + one parking lane)**	**Option 3b: Aspirational (Shared bus / parking lane)**
Improve Network safety for all transport users	30%	2.00	3.00	3.00	**4.00**
Maximise liveability and usability	30%	1.67	3.00	3.33	**4.00**
Preserving access to business and services	15%	**4.00**	**4.00**	2.67	2.67
Minimise impact on network operations	15%	**4.00**	1.67	**4.00**	2.67
Efficient and sustainable delivery and operations	10%	1.50	3.00	3.50	**4.00**
	TOTAL	2.45	2.95	3.25	**3.6**

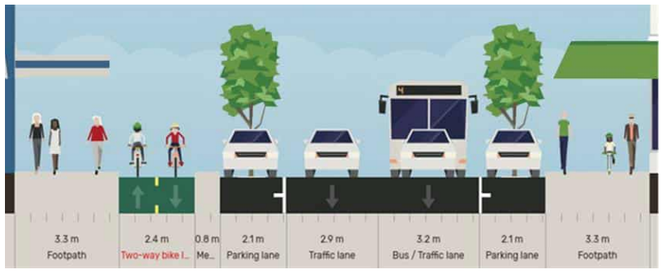
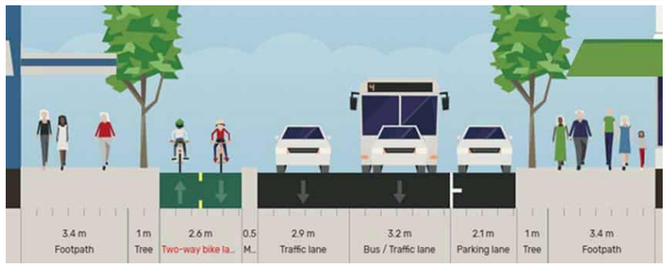
5.3.2 Segment 2 - George Street CBD (Moore Street to Elizabeth Street)

The section of George Street between Moore Street and Elizabeth Street offers significant opportunities for revitalisation. This area features the northern extent of the Little India shops and key public-facing buildings such as the courthouse and police station, which require careful consideration to address access and safety challenges, particularly for emergency vehicles.

The segment is noticeably lacking in street trees and gardens, highlighting opportunities to enhance the streetscape and improve the pedestrian experience. Additionally, the space outside the former library building, now closed, could be repurposed to establish a vibrant community hub, further activating this critical part of the corridor.

Two options were developed for this segment which are presented in Table 13.

Table 13 Design options for Segment 2 - George Street CBD (Moore Street to Elizabeth Street)

Options	Cross section	Benefit	Constraint
Option 1 – Constrained		• No loss of traffic lane or parking lane • Wider footpath width, compared to the Reference Design, however less than existing • Potential to include new trees in between parking bays • Bus stops in lane, maximising use of parking lane	• Poor placemaking outcome. Limits foot traffic to businesses from existing. • Reduced footpath width: less attractive for shops; insufficient space for outdoor dining / seating / placemaking; limits future capacity of the CBD; potentially requires relocation of lighting poles, which could impact street lighting. • Risk of costly services relocation. • Minimal width for two-way cycleways – should only be considered in constrained areas. Poor comfort outcome • Narrow parking lanes • Potential conflict between car passengers from parked cars crossing the cycle path
Option 2 – Aspirational (Consolidated Parking Lane)		• Width of footpaths increased to 4.4m – more attractive for shops and more circulation space for the police station and courthouse and space for street trees. • No parking lane can result in less hazard to cyclists - avoiding pedestrian and cyclist conflicts. • Bus stops in lane, maximising use of parking lane	• Loss of 20 parking spaces on George Street • Narrow parking lane

5.3.2.1 MCA outcome

The MCA for Moore Street to Elizabeth Street is weighted towards liveability and usability due to the presence of community buildings in this typology and the extended portion of Little India to the south. Table 14 shows the highest scoring option is Option 2 (3.8), which is the most aspirational design featuring a consolidated parking lane. It scores highest for objectives 1, 2, and 5, significantly improving safety for all users, enhancing liveability and usability, and ensuring sustainable corridor operations.

Option 1, the more constrained design, is the lowest scoring at 2.6. It scores highest for objectives 3 and 4, which focus on preserving access to businesses and services and minimising impacts on network operations, as traffic lanes remain unaffected.

Table 14 MCA results for George Street CBD (Moore Street to Elizabeth Street) segment design options

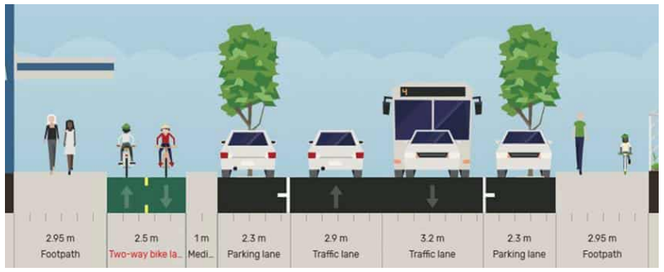
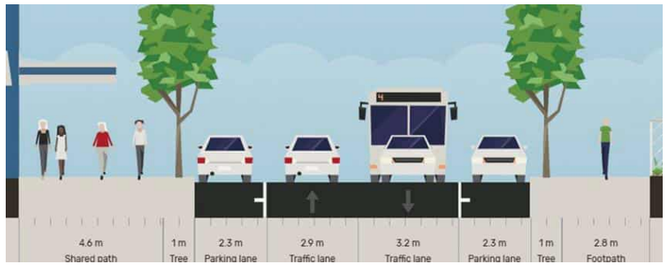
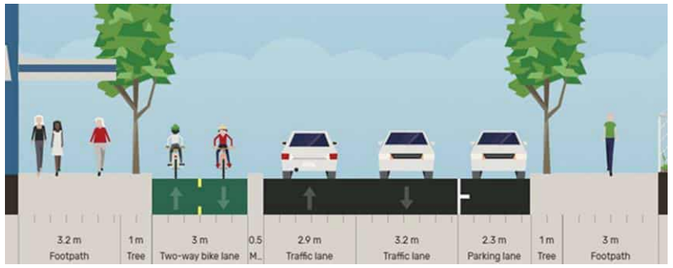
Segment 2 - George Street CBD (Moore Street to Elizabeth Street)			
Objective	**Weighting**	**Option 1 - Constrained**	**Option 2 - Aspirational (Consolidated Parking Lane)**
Improve Network safety for all transport users	30%	2.00	**4.00**
Maximise liveability and usability	30%	2.00	**4.00**
Preserving access to business and services	15%	**4.00**	2.67
Minimise impact on network operations	15%	**4.00**	**4.00**
Efficient and sustainable delivery and operations	10%	2.00	**4.00**
	TOTAL	2.6	3.8

5.3.3 Segment 3 - George Street Westfield (Elizabeth Street to Campbell Street)

This segment of George Street where the Westfield is located provides several constraints to the cycleway design. The eastern side has a large school drop off and pick up zone and an existing bus stop. The western side also has constraints including the Westfield entry/exit point, a taxi rank and a mail zone.

Three options were developed for this segment which are presented in Table 15.

Table 15 Design options for Segment 3 - George Street Westfield (Elizabeth Street to Campbell Street)

Options	Cross section	Benefit	Constraint
Option 1 – Constrained		• No loss of traffic lane or parking lane • Separated footpath and cycleway • Potential to include new trees in between parking bays	• Reduced footpath roadside width on both sides of George Street • Bus stops in lane, blocking traffic flow • Potential conflict between car passengers from parked cars crossing the cycle path
Option 2 – Shared path		• No loss of traffic lane or parking lane • Generous shared space • Space for street trees in the footpath	• Shared path introduces conflicts between pedestrians and cyclists • Bus stops in lane, blocking traffic flow
Option 3 – Aspirational (for the section to the north of pedestrian crossing)		• No parking lane would reduce conflict between pedestrians and cyclist • Separated footpath and cycleway • 3m wide cycleway allows for frequent and concurrent use in both directions.	• Loss of parking lane on the western side of George Street – mail zone (1 space) and taxi zone (5 spaces) are required to be relocated. Potential to move taxi rank to the east. • Bus stops in lane, blocking traffic flow

5.3.3.1 MCA outcome

The MCA for the Westfield typology is weighted towards preserving access to businesses and services due to the functional needs of the taxi rank, mail zone, and school drop-off areas. Table 16 shows that Option 3, the most aspirational design, achieves the highest score of 3.4. This option excels in improving network safety, enhancing liveability, minimising network impact, and enabling efficient and sustainable operations.

Option 1, the most constrained design, scores the lowest at 3.05. Its strongest performance is in minimising impacts on network operations, but it scores poorly (1.5) for efficient and sustainable operations.

Table 16 MCA results for Segment 3 - George Street Westfield (Elizabeth Street to Campbell Street) design options

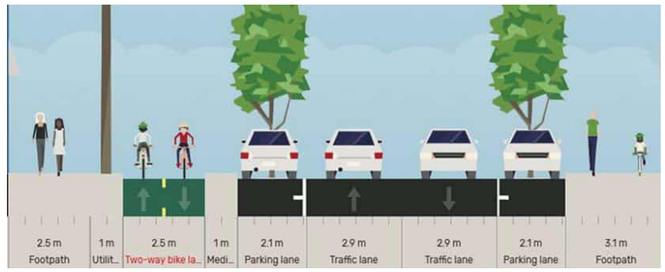
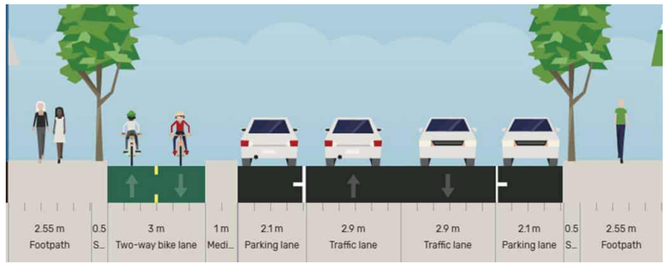
Segment 3 - George Street CBD (Moore Street to Elizabeth Street)				
Objective	**Weighting**	**Option 1 - Constrained**	**Option 2 - Shared Path**	**Option 3: Aspirational**
Improve network safety for all transport users	30%	3.00	2.00	**4.00**
Maximise livability and usability	15%	2.33	2.33	**4.00**
Preserving access to business and services	30%	3.50	**4.00**	2.00
Minimise impact on network operations	15%	**4.00**	**4.00**	**4.00**
Efficient and sustainable delivery and operations	10%	1.50	**4.00**	**4.00**
	TOTAL	3.05	3.15	**3.4**

5.3.4 Segment 4 - George Street Residential (Campbell Street to Hume Highway)

George Street north is in a residential area which doesn't pose any significant conflicts except driveways.

Two options were developed for this segment which are presented in Table 17.

Table 17 Design options for Segment 4 - George Street Residential (Campbell Street to Hume Highway)

Options	Cross section	Benefit	Constraint
Option 1 – Constrained		• No loss of traffic lane or parking lane • No changes to the existing footpath on western side of George Street - minimise road works • Potential to include new trees in between parking bays	• Reduced footpath width on eastern side of George Street • Bus stops in lane, blocking traffic flow • Potential conflict between car passengers from parked cars crossing the cycle path • Narrow parking lanes
Option 2 – Aspirational		• No loss of traffic lane or parking lane • 3m wide cycleway allows for frequent and concurrent use in both directions. • Potential to include new trees on the footpath or in between parking bays	• Reduced footpath roadside width on eastern side of George Street • Underground utility supply is required – could result in high cost • Bus stops in lane, blocking traffic flow • Potential conflict between car passengers from parked cars crossing the cycle path • Narrow parking lanes

5.3.4.1 MCA outcome

The MCA for the George Street residential typology is weighted towards efficient and sustainable delivery and operations, given the residential nature of the area and the preference for maintaining the existing kerb alignment to reduce costs. Table 18. shows that the difference between the two options is minimal. Option 1, the constrained option, scores 3.35, while Option 2, the aspirational option, scores 3. Option 2 performs slightly better in preserving access and minimising the impact on network operations. However, Option 1 excels in providing more efficient and sustainable delivery options.

Option 1, being the more constrained option, scores 2.6, with the highest scores in preserving access to businesses and services and minimising the impact on network operations.

Table 18 MCA results for Segment 4 - George Street Residential (Campbell Street to Hume Highway) design options

Segment 4 - George Street Residential (Campbell Street to Hume Highway)			
Objective	**Weighting**	**Option 1 - Constrained**	**Option 2 - Aspirational (Consolidated Parking Lane)**
Improve Network safety for all transport users	30%	**4.00**	**4.00**
Maximise livability and usability	15%	3.33	**4.00**
Preserving access to business and services	15%	3.00	**4.00**
Minimise impact on network operations	5%	**4.00**	**4.00**
Efficient and sustainable delivery and operations	25%	**4.00**	1.60
	TOTAL	**3.35**	3

5.4 Design options - Moore Street

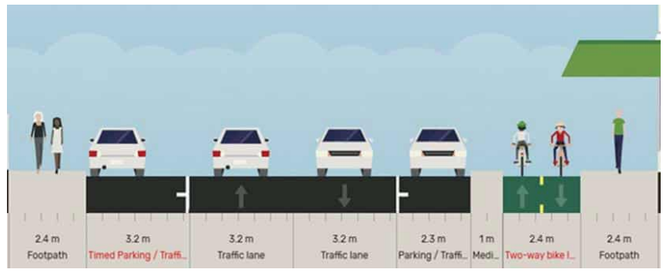
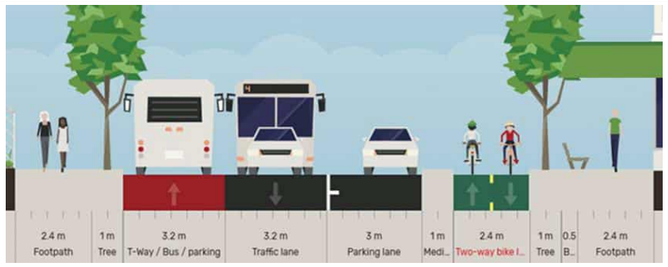
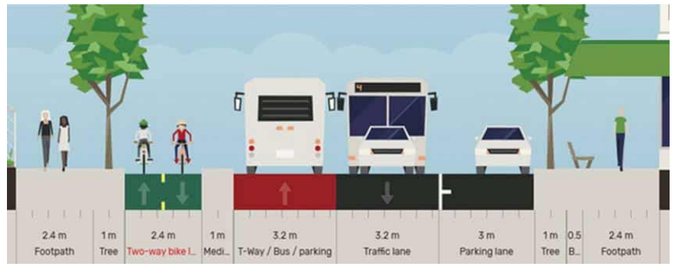
5.4.1 Segment 5 & 6 - Moore Street Medical (Bigge Street to Medical Centre)

The segment between Bigge Street and George Street presents challenges for providing the cycleway on the northern side due to the existing medical practice and the on-street parking it offers for visitors, including accessible parking. The cycleway near the medical centre must be carefully designed to minimise pedestrian/cyclist conflicts while ensuring wheelchair and ambulance access.

An option was considered to provide this section of the cycleway on the southern side, which avoids the medical centre. However, this option introduces a conflict with the existing bus stop and a new conflict with the driveway to Liverpool Public School. Despite this, placing the cycleway on the southern side offers a more convenient connection for users heading towards Bigge Street and the train station to the south. This option is a departure from the reference design and is explored in Option 2b below.

Three options were developed for this segment which are presented in Table 19.

Table 19 Design options for Segment 5 & 6 - Moore Street Medical (Bigge Street to Medical Centre)

Options	Cross section	Benefit	Constraint
Option 1 – Constrained		• No loss of traffic lane or parking lane (11 existing spaces Bigge Street – George Street)	• Minimal width for two-way cycleway – should only be considered in constrained areas • Reduced footpaths, removing option of street trees or seating • Cycleway near the medical centre needs to be carefully designed to minimise pedestrian/cyclist conflicts and allow for wheelchair / ambulance access. Minimal space to provide set down area.
Option 2a – Aspirational (cycleway on northern side)		• Wider footpath on the northern side of Moore Street, providing better urban outcome for UOW and the medical centre • No conflict between the south side bus stop and the cycleway	• Minimal width for two-way cycleway – should only be considered in constrained areas • Removal of westbound general traffic lane – requires further investigation and traffic impact assessment. • Conflict between the cycleway and medical centre to be further considered. Potential section of shared zone.
Option 2b – Aspirational (cycleway on southern side)		• Wider footpath on the northern side of Moore Street, providing better urban outcome for UOW and the medical centre • No conflicts between the cycleway and the medical centre	• Minimal width for two-way cycleways – should only be considered in constrained areas • Conflict between bus stop and cycleway on the south and the driveway to the school

5.4.1.1 MCA outcome

The MCA for this typology is weighted towards liveability and usability due to its location in the CBD and its proximity to the medical centre and university. Table 20.shows that the highest scoring option is 2a (3.7), the aspirational option with the cycleway on the north side. It scores highest for objectives 1, 2, and 5, improving safety, liveability, and usability, and providing efficient and sustainable delivery.

Option 1, the most constrained option, is the lowest scoring at 2.55. It scores highest for objectives 3 and 4, which preserve general traffic access to businesses and services and minimise the impact on network operations.

Table 20 MCA results for Segment 5 & 6- Moore Street Medical (Bigge Street to Medical Centre) design options

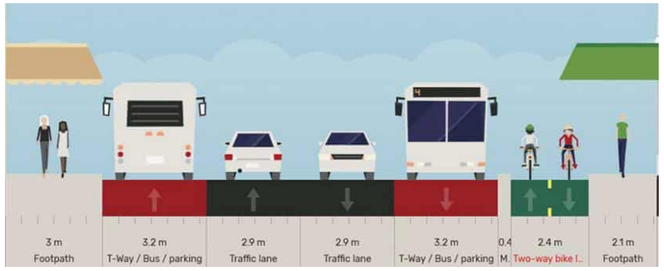
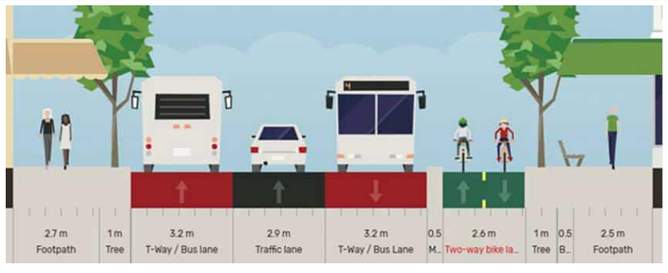
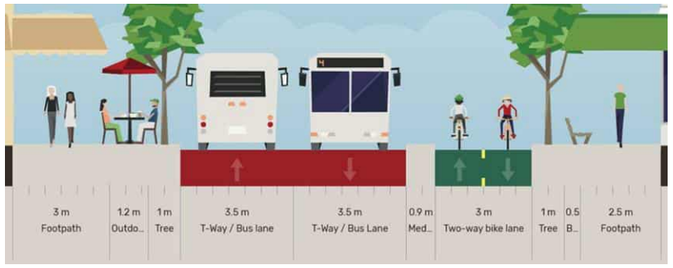
Segment 5 & 6 - Moore Street Medical (Bigge Street to Medical Centre)				
Objective	**Weighting**	**Option 1 - Constrained**	**Option 2a - Aspirational (cycleway on northern side)**	**Option 2b: Aspirational (cycleway on southern side)**
Improve Network safety for all transport users	30%	3.00	**4.00**	**4.00**
Maximise liveability and usability	30%	2.00	**4.00**	3.33
Preserving access to business and services	15%	3.00	2.67	3.33
Minimise impact on network operations	15%	3.00	3.33	3.33
Efficient and sustainable delivery and operations	10%	1.50	**4.00**	**4.00**
	TOTAL	2.55	**3.7**	3.6

5.4.2 Segment 7 - Moore Street CBD (George Street to Bathurst Street)

The Moore Street CBD segment between George Street and Bathurst Street presents challenges providing the cycleway on the southern side due to the existing bus stops and the existing utilities which would need to be relocated. The cycleway will need to be carefully designed to integrate with the bus stops and the future T-Way that will operate along Moore Street.

Three options were developed for this segment which are presented in Table 21

Table 21 Design options for Segment 7 - Moore Street CBD (George Street to Bathurst Street)

Options	Cross section	Benefit	Constraint
Option 1 – Constrained		• No loss of traffic lane or parking lane (5 existing spaces Macquarie Street – Northumberland Street)	• Reduced footpath width: less attractive for shops; insufficient space for outdoor dining / seating / placemaking / street trees; limits future capacity of the CBD; requires relocation of lighting poles, which could impact street lighting. • Minimal width for two-way cycleways – should only be considered in constrained areas
Option 2a – Aspirational (cycleway on northern side)		• No changes to the existing footpath on southern side of Moore Street - minimise road works • Wider footpath width on northern side of Moore Street allows for potential street trees and seating opportunities	• Removal of one general traffic lane - requires further investigation and traffic impact assessment.
Option 2b – Aspirational (cycleway on southern side)		• Widened footpaths on both sides of Moore St allows for potential street trees and seating opportunities and allows pedestrians to comfortably pass one another. • Wider median gives cyclists more protection. • Removal of traffic lane reduces air pollution and improves the environment for pedestrians and cyclists.	• Removal of all general traffic lanes - requires further investigation and traffic impact assessment.

5.4.2.1 MCA outcome

The MCA for George Street to Bathurst Street is weighted towards liveability and usability due to the CBD location and its connection to Little India and the Macquarie Street pedestrianised zone. Table 22.shows that the highest scoring option is 2 (3.75), the more aspirational option, which performs best in improving network safety, maximising liveability, and providing efficient and sustainable delivery and operations.

Option 1, the more constrained option, scores 2.75 and performs better in preserving access to businesses and services and minimising the impact on network operations.

Table 22 MCA results for Segment 7 - Moore Street CBD (George Street to Bathurst Street) design options

Segment 7 - Moore Street CBD (George Street to Bathurst Street)			
Objective	**Weighting**	**Option 1 - Constrained**	**Option 2 - Aspirational**
Improve Network safety for all transport users	30%	3.00	**4.00**
Maximise liveability and usability	30%	1.67	**4.00**
Preserving access to business and services	15%	**4.00**	3.33
Minimise impact on network operations	15%	**4.00**	3.00
Efficient and sustainable delivery and operations	10%	1.50	**4.00**
	TOTAL	2.75	**3.75**

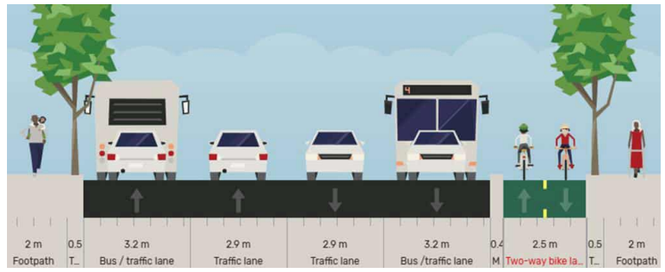
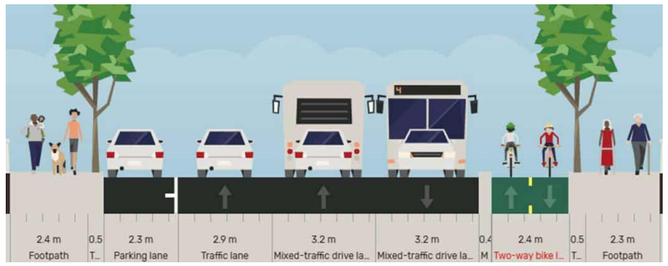
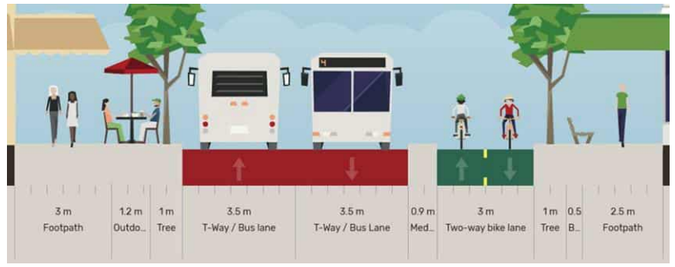
5.4.3 Segment 8 - Moore Street Residential (Bathurst Street to Copeland Street)

The segment between Bathurst Street and Copeland Street contains more residential buildings compared to other segments in the CBD. There are opportunities to enhance cycle connectivity for residents along Moore Street, into the city centre and surrounding areas.

Key challenges for the segment include overhead powerlines, frequent residential driveways and a left turn lane onto Copeland Street, all of which makes providing a cycleway on the southern side more complex.

Three options were developed for this segment which are presented in Table 23

Table 23 Design options for Segment 8 - Moore Street Residential (Bathurst Street to Copeland Street)

Options	Cross section	Benefit	Constraint
Option 1 – Constrained		• No loss of traffic lane or bus lane	• Reduced footpath roadside width on both sides of Moore Street, however acceptable for a residential typology
Option 2a – Aspirational (cycleway on northern side)		• Potential on-street parking opportunities (6 existing spaces between Macquarie Street and Northumberland Street)	• Minimal width for two-way cycleway – should only be considered in constrained areas • Removal of eastbound general traffic lane - requires further investigation and traffic impact assessment • Would impact power poles to the south
Option 2b – Aspirational (cycleway on southern side)		• 3.0m wide cycleway allows for frequent and concurrent use in both directions. • No changes to the existing footpath on southern side of Moore Street - minimise road works and utility works	• Removal of eastbound general traffic lane - requires further investigation and traffic impact assessment

5.4.3.1 MCA outcome

The MCA for Moore Street west is weighted towards minimising the impact on network operations and ensuring efficient and sustainable delivery. Due to the residential typology, placemaking is less of a focus, with the movement of vehicles, buses, and construction costs being more significant factors in this segment. Table 24.shows that the highest scoring option is Option 3 (3.7), which performs best for improving network safety, maximising liveability and usability, and ensuring efficient and sustainable delivery and operations.

Option 2, with a score of 2.85, scored highest for preserving access to local businesses and services, while Option 1 performed best for minimising the impact on network operations.

Table 24 MCA results for Segment 8 - Moore Street Residential (Bathurst Street to Copeland Street) design options

Segment 8 - Moore Street Residential (Bathurst Street to Copeland Street)				
Objective	**Weighting**	**Option 1 - Constrained**	**Option 2 - 1 traffic lanes with potential on-street parking opportunities**	**Option 3: Aspirational**
Improve Network safety for all transport users	30%	3.00	3.00	**4.00**
Maximise liveability and usability	10%	2.00	2.00	**4.00**
Preserving access to business and services	10%	3.00	**4.00**	3.00
Minimise impact on network operations	25%	**4.00**	3.20	3.20
Efficient and sustainable delivery and operations	20%	2.20	2.20	**4.00**
	TOTAL	2.95	2.85	**3.7**

6.0 Preferred cross sections and alignment summary

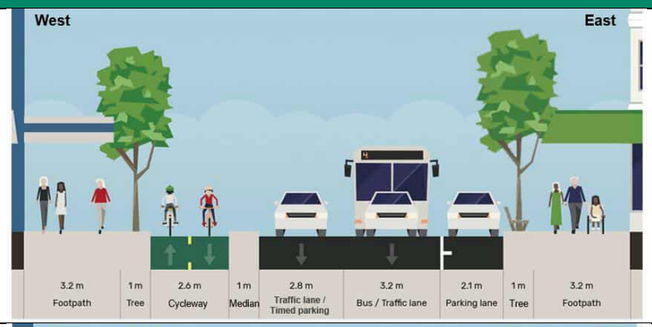
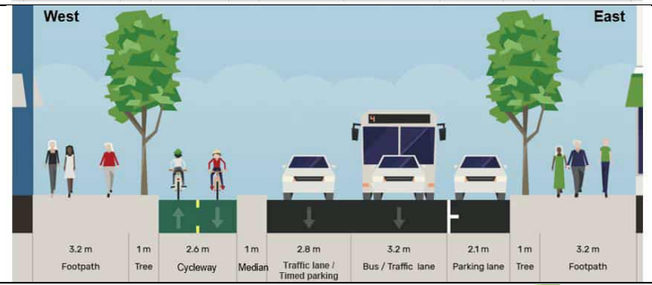
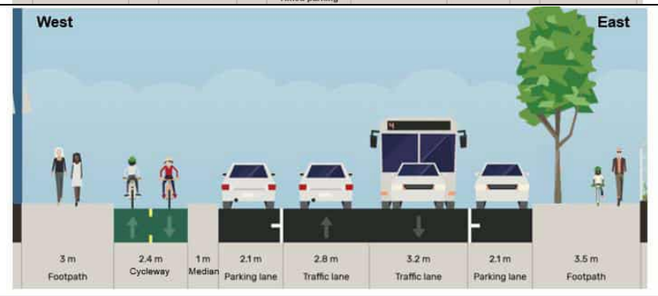
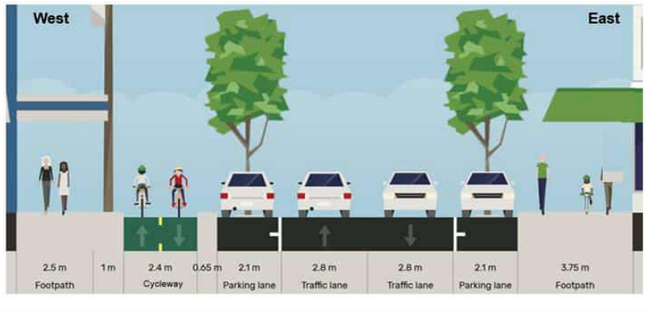
The various cycleway design options and their respective MCA ratings were presented to LCC during an Optioneering Workshop held on the 22nd of November 2024. The purpose of this workshop was to engage LCC in a collaborative review of the options, ensuring that the chosen design best aligned with Council's objectives and priorities.

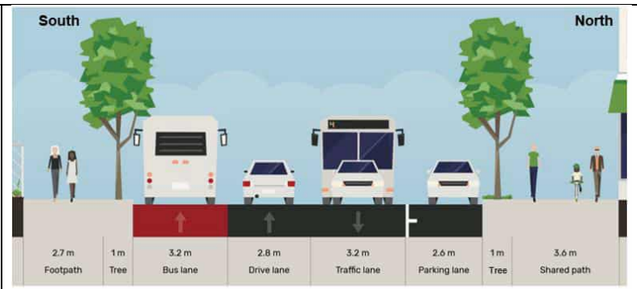
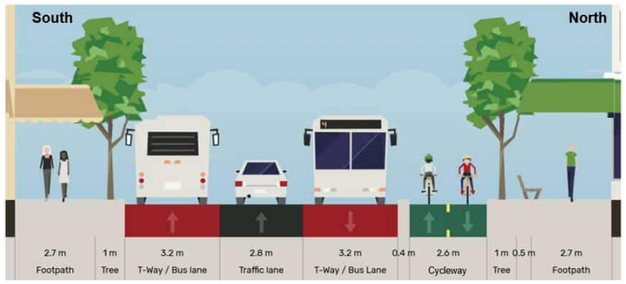
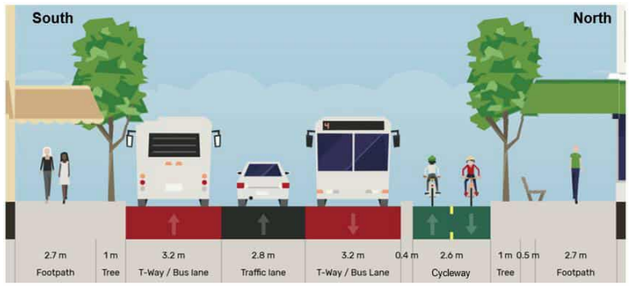
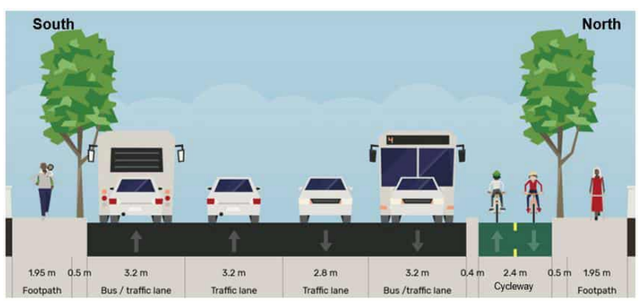
Following the workshop, LCC provided feedback on the options, selecting their preferred designs based on the MCA results and their internal drivers, including their appetite for change and feedback from internal stakeholders. The feedback also considered various factors such as constructability, functionality, and safety.

AECOM reviewed the feedback and refined the selected options to ensure they met LCC's requirements while maintaining a focus on the key project goals and vision. The refinement process was iterative, balancing the desired outcomes with the practical considerations of the project, such as ensuring the designs would be deliverable within the allocated timeframes and budget.

The final preferred cross sections, along with a summary of the reasoning behind the decisions are presented in Table 25. This table outlines the specific cross-section options that were chosen, providing clarity on how the preferences of LCC were incorporated into the design process, ensuring that both the technical and community needs were addressed effectively. These cross sections will form the basis for the concept design.

Table 25 Preferred cross sections and reasoning

Preferred Option	Option	Cross section	Reasoning
Segment 1 - Little India(between Scott Street and Moore Street)	Option 3a		Council has selected Option 3a, the highest-scoring base option in the MCA, with an adjustment to the west traffic lane to allow for a clearway during peak hours and parking during off-peak hours. This option retains the placemaking elements of the highest-scoring option while addressing the key issue of timed parking in the western travel lane, as requested by Councillors. To accommodate this, AECOM has made additional adjustments, including reducing the travel lane to 2.8m and footpath widths to 4.2m, as advised by LCC. Consideration will be given to buses turning left from George Street, which currently utilise a portion of the right turn lane, to complete their left turn onto Scott Street. Council note that WSIG do not intend to modify the George Street / Scott Street intersection to preserve the functionality of the existing traffic control signals (TCS).
Segment 2 - George Street CBD (Moore Street to Elizabeth Street)	Option 2		Council has selected Option 2, the highest-scoring base option in the MCA, with a modification to the west traffic lane to allow for a clearway during peak hours and parking during off-peak hours. This option retains the placemaking elements of the highest-scoring option while addressing the key issue of timed parking in the western travel lane, as requested by Councillors. To accommodate this, AECOM has made additional adjustments, including reducing the travel lane to 2.8m and footpath widths to 4.2m, as advised by LCC. Existing driveway access locations, such as outside Max Perrams Funerals will be retained.
Segment 3 - George Street Westfield (Elizabeth Street to Campbell Street)	Option 1		Council has selected Option 1, the lowest-scoring constrained base option in the MCA, due to the requirement to retain the taxi rank. To accommodate this, AECOM has made additional adjustments, including reducing the travel lane to 2.8m, the cycleway to 2.4m, and the parking lane to 2.1m, as advised by LCC. The western footpath has been reduced to 3m, while the eastern footpath has been increased, bringing it to just 100mm less than the existing width, in order to minimise the impact on utilities and maintain the school drop-off and pick-up space for All Saints Catholic Primary School. Street trees will be integrated with the parking lane on the eastern side to enhance the streetscape and provide shade.
Segment 4 - George Street Residential (Campbell Street to Hume Highway)	Option 1		Council has selected Option 1, the highest-scoring MCA option, due to its minimal impact on the existing kerbs, utilities, and construction costs. To accommodate this, AECOM has made additional adjustments, including reducing the travel lanes to 2.8m, the cycleway to 2.4m, and the median to 0.65m, as advised by LCC. Although the median is adjacent to parking, its reduction is feasible in this location because the parked cars face oncoming cyclists, allowing them to be seen before stepping out of their vehicles. These changes have allowed the kerb lines to remain unchanged from the existing alignment. Increase the amount of street trees by integrating with the parking lanes on the each side, and along footpaths to enhance the streetscape and provide shade. The cycleway will transition into a shared path at the northern end of George Street which connects to the shared path on the Hume Highway.

Segment 5 and 6 - Moore Street Medical (Bigge Street to Medical Centre), Moore Street (Medical Centre to George Street)	Combination	 	Council has opted to divide this typology into two sections: the eastern section, from Bigge Street up to and including the medical centre, and the western section, from the medical centre to George Street. The eastern section adopts an alternative approach, creating a shared path that extends from the existing shared path on Bigge Street. This approach provides more space outside the medical centre, where pedestrians would have priority to accommodate patient pick-up and drop-off requirements. The traffic lanes would consist of one lane eastbound and two lanes westbound, with off-peak parking included in the southern bus lane. Additional edits by AECOM include reducing the car travel lane to 2.8m, increasing the parking lane width to 2.6m to accommodate ambulance parking, and reducing the shared zone to 4.6m to preserve the existing southern footpath kerb, thereby reducing costs and maintaining the existing trees. Further discussions will be had with Council and bus companies on where the existing bus zone will be relocated. The western section would return the cycleway to road level, creating a 2.6m separated cycleway with a 0.4m median, as no parking is present in this section. The additional width is allocated to the footpath.
Segment 7- Moore Street CBD (George Street to Bathurst Street)	Option 2		Council has selected Option 2, the highest-scoring MCA option, due to its beneficial placemaking elements and its sustainable, cost-effective approach, which impacts only one kerb of the existing alignment. To accommodate this, AECOM has made additional adjustments, including reducing the car travel lane to 2.8m, as advised by LCC, and the median to 0.4m. The additional width has been allocated to the footpath. Further investigation to the types of planting on the south side of Moore Street needed, to ensure they do not conflict with the existing awning. Council support the removal of the eastbound travel lane and the restriction of private vehicles. The existing turnaround area on Macquarie Street will be retained, allowing vehicles travelling northbound on Macquarie Street to turn left into Moore Street, and vehicles travelling westbound on Moore Street to turn left into Macquarie Street.
Segment 8 - Moore Street Residential (Bathurst Street to Copeland Street)	Option 1		Council has selected Option 1, the lowest-ranking MCA option, due to its ability to meet the network operational requirement of two lanes in each direction. This typology, with its residential nature, can accommodate the change in the footpath, though further consideration is needed regarding the impact on services beneath the footpath on both sides. To accommodate this, AECOM has made additional adjustments, including reducing the car travel lane to 2.8m, as advised by LCC, and the cycleway to 2.4m. Additional width has been allocated to the second westbound travel lane to accommodate the bus switch to the centre lane on the approach to Copeland Street. Council supports the removal of the right turn lane (eastbound) to Bathurst Street.

7.0 Next steps

This chapter outlines the forthcoming actions and deliverables required to progress the project from its current stage through to completion. These steps have been structured to ensure a comprehensive and coordinated approach, addressing all critical aspects of the design and its integration with stakeholder requirements.

7.1 Schedule of Services

The following services will be undertaken as part of the next phase of the project:

7.1.1 Services Assessment and Review

Conduct a detailed review of existing services to identify potential conflicts or constraints. This assessment will inform the design process and minimise disruptions during implementation.

7.1.2 Site Inventory

Undertake a comprehensive site inventory, including the preparation of detailed plans, schedules, and photographic records to document current conditions and inform design decisions.

7.1.3 Issues Analysis

Develop an issues analysis, including annotated plans and photographs, to identify existing challenges and opportunities. This step will ensure that the design effectively addresses key site-specific concerns.

7.1.4 Concept Layout and Arrangement

Create a concept layout and arrangement for the proposed cycling facilities. This will include detailed drawings and plans to illustrate the intended design and layout.

7.1.5 Traffic Impact Study

Undertake a traffic impact study, including SIDRA modelling, to evaluate the effects of the proposed changes on traffic operations. This analysis will support the decision-making process and compliance with relevant guidelines.

7.1.6 Transport for NSW Engagement

Engage with Transport for New South Wales to review and submit drawings and associated documentation. This engagement will ensure alignment with regulatory requirements and stakeholder expectations.

7.1.7 Light Level Simulations

Prepare light level simulations and analyses for both existing and proposed pole locations. This task will assess compliance with illumination standards and identify potential improvements.

7.1.8 Traffic Committee Meeting Documentation

Prepare the necessary documentation for presentation at the Traffic Committee Meeting, facilitating stakeholder review and approval of the proposed designs.

7.2 Key Deliverables

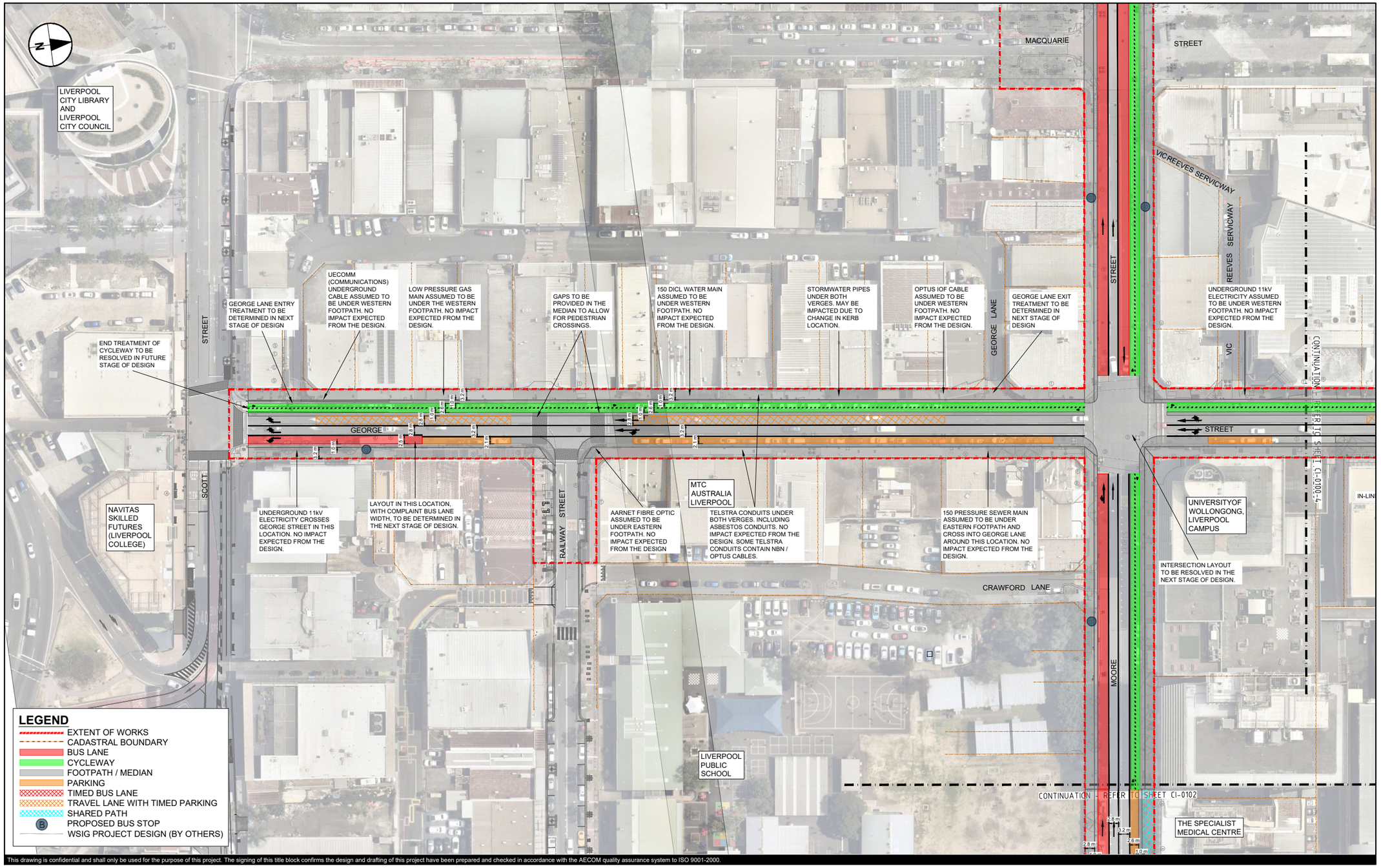
To ensure progress and transparency, Table 26 presents the deliverables that will be provided by the respective AECOM team members during Stage 2.

Table 26 Stage 2 deliverables

Key Deliverable	AECOM Owner
Services / stormwater audit drawings and brief report	Glenn Donahoo
Community Consultation Materials	Belinda Dods
Parking number survey	Martin Mallia
Access report.	Martin Mallia
Preliminary safety in design report	Belinda Dods
Safety in Design Workshop	Belinda Dods
50% Design Report	Belinda Dods
Monthly reports	Martin Mallia

Appendix A – Design drawings

ISO A1 594mm x 841mm



This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the AECOM quality assurance system to ISO 9001-2000.

CONSULTANT

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PROJECT

MOORE STREET AND GEORGE STREET CYCLEWAY

CLIENT

CHECK PRINT — BACKDRAFT REQUIRED ☐ READY TO ISSUE ☐

	INITIAL	DATE
SELF CHECK		
DRAFTING		
DESIGN ENGINEER		
LEAD DESIGN		
VERIFIER		
BACKDRAFTED/CORRECTED		
CONFIRMED		

SCALE BAR

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1:500

KEY PLAN

PROJECT MANAGEMENT INITIALS

P.DAWADI	G. DONAHOO	M. MALIA
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
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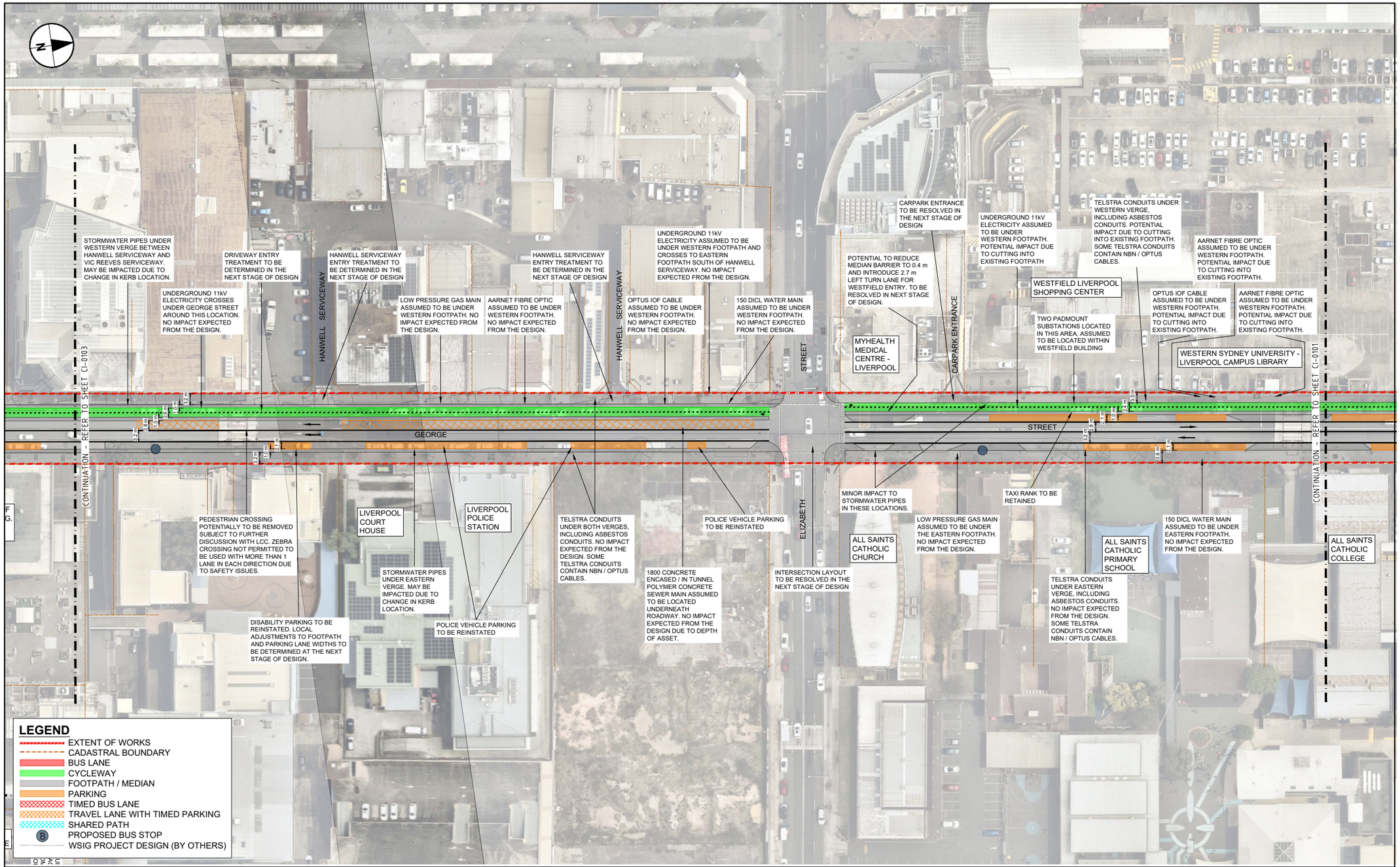

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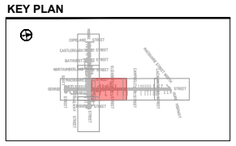

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UNDERGROUND AND OVERHEAD ELECTRICITY ABOVE / UNDER WESTERN FOOTPATH. 11kV PRESENT, ASSUMED TO BE UNDERGROUND BUT REQUIRES CONFIRMATION. NO IMPACT EXPECTED FROM THE DESIGN.

UNDERGROUND 11kV ELECTRICITY ASSUMED TO BE UNDER WESTERN FOOTPATH. POTENTIAL IMPACT DUE TO CUTTING INTO EXISTING FOOTPATH.

WESTFIELD LIVERPOOL SHOPPING CENTER

POTENTIAL TO ADD ADDITIONAL PARKING IN THIS AREA OR REDUCE MEDIAN BUFFER TO 0.4 m AND CREATE 2.7 m LEFT TURN LANE

TELSTRA CONDUITS UNDER WESTERN VERGE, INCLUDING ASBESTOS CONDUITS. POTENTIAL IMPACT DUE TO CUTTING INTO EXISTING FOOTPATH. SOME TELSTRA CONDUITS CONTAIN NBN / OPTUS CABLES.

NEXTGEN 3rd PARTY DUCT CROSS GEORGE STREET ON NORTHERN SIDE OF CAMPBELL STREET. NO IMPACT EXPECTED FROM THE DESIGN.

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DRIVEWAY TREATMENT TO BE RESOLVED IN NEXT STAGE OF DESIGN

100 CICL WATER MAIN ASSUMED TO BE UNDER WESTERN FOOTPATH. NO IMPACT EXPECTED FROM THE DESIGN.

DRIVEWAY TREATMENT TO BE RESOLVED IN NEXT STAGE OF DESIGN

ENTRY TREATMENT TO PENNY LANE TO BE RESOLVED IN THE NEXT STAGE OF DESIGN

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CONTINUATION - REFER TO SHEET CI-0102

GEORGE STREET

CAMPBELL STREET

PENNY LANE

CONTINUATION - REFER TO SHEET CI-0104

LACHLAN STREET

ALL SAINTS CATHOLIC COLLEGE

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TPG DUCT ASSUMED TO BE UNDER EASTERN FOOTPATH. NO IMPACT EXPECTED FROM THE DESIGN.

LOW PRESSURE GAS MAIN ASSUMED TO BE UNDER THE EASTERN FOOTPATH. NO IMPACT EXPECTED FROM THE DESIGN.

TELSTRA CONDUITS UNDER EASTERN VERGE, INCLUDING ASBESTOS CONDUITS. NO IMPACT EXPECTED FROM THE DESIGN SOME TELSTRA CONDUITS CONTAIN NBN / OPTUS CABLES.

POTENTIAL TO ADD ADDITIONAL PARKING IN THIS AREA.

INTERSECTION LAYOUT TO BE RESOLVED IN THE NEXT STAGE OF DESIGN.

STORMWATER PIPES AND PITS AT INTERSECTION, MINOR IMPACTS POSSIBLE.

200 m PVC WATER MAIN ASSUMED TO BE UNDER EASTERN FOOTPATH. NO IMPACT EXPECTED FROM THE DESIGN.

TELSTRA CONDUITS UNDER BOTH VERGES, INCLUDING ASBESTOS CONDUITS. NO IMPACT EXPECTED FROM THE DESIGN. SOME TELSTRA CONDUITS CONTAIN NBN/OPTUS CABLES.

LEGEND

- EXTENT OF WORKS
- CADASTRAL BOUNDARY
- BUS LANE
- CYCLEWAY
- FOOTPATH / MEDIAN
- PARKING
- TIMED BUS LANE
- TRAVEL LANE WITH TIMED PARKING
- SHARED PATH
- PROPOSED BUS STOP
- WSIG PROJECT DESIGN (BY OTHERS)

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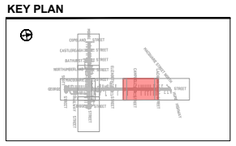

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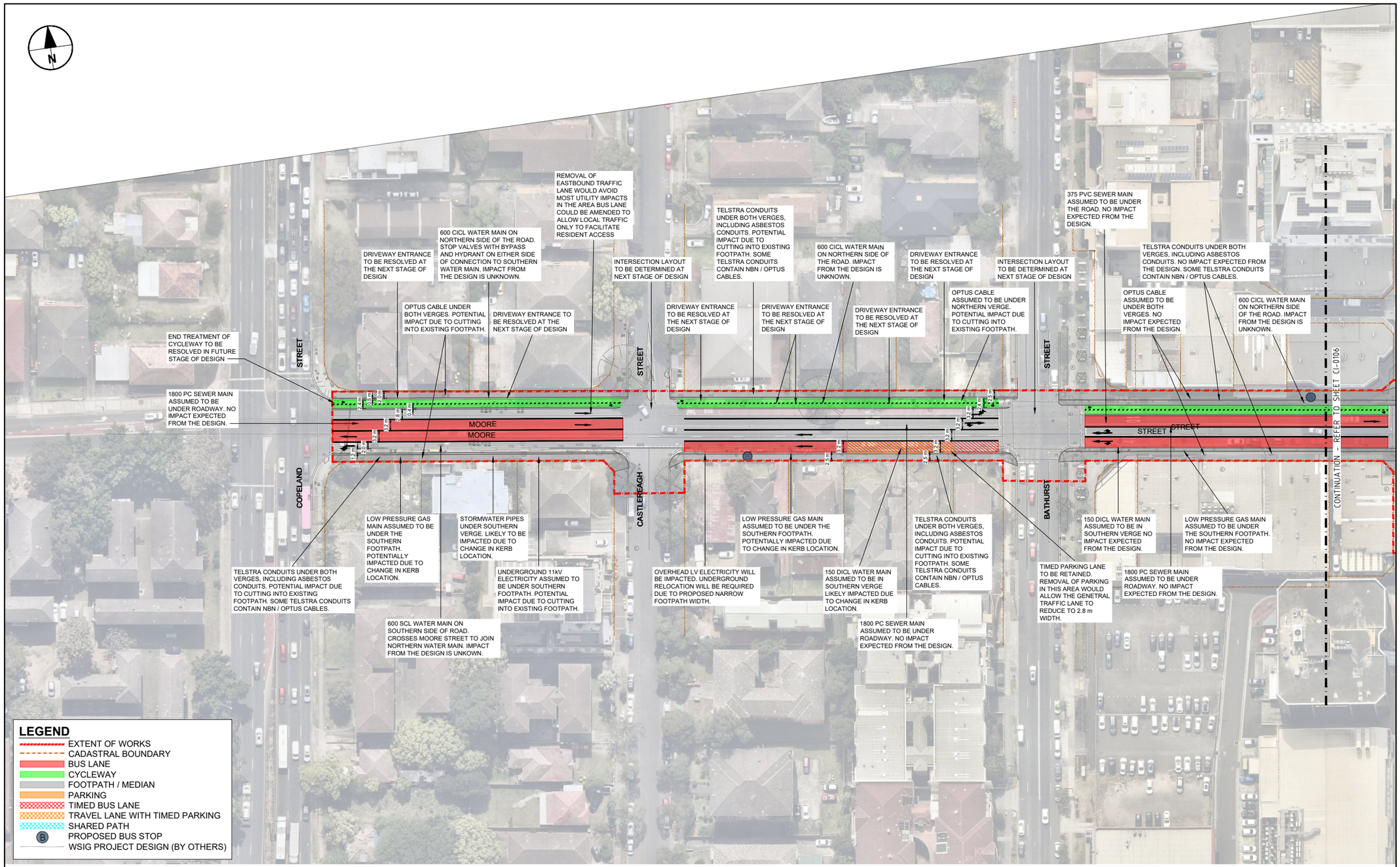

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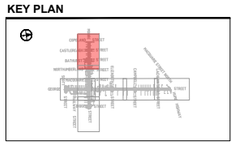

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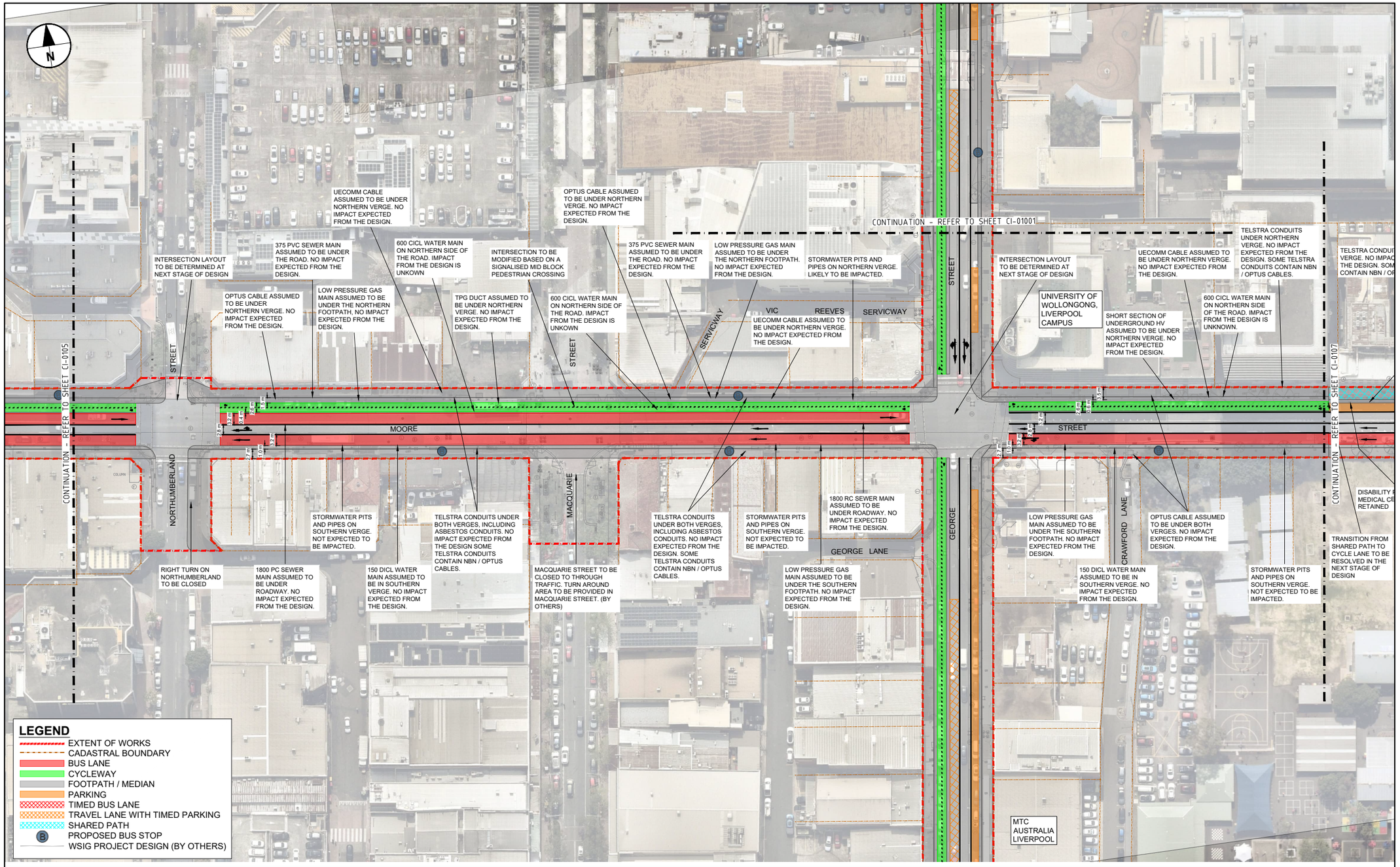

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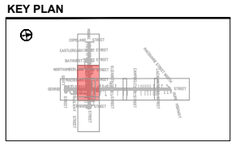

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Prepared for
Liverpool City Council
ABN: 84 181 182 471

AECOM

50% Design Report

George Street and Moore Street Cycleways

07-Apr-2025
Liverpool City Council Cycleways
Doc No. 1

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Delivering a better world

50% Design Report

George Street and Moore Street Cycleways

Client: Liverpool City Council

ABN: 84 181 182 471

Prepared by

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1.0 Introduction

Liverpool City Council (LCC) engaged AECOM to develop a concept design for cycleways along Moore Street and George Street in the Liverpool CBD (the Project). This 50% Design Report outlines the process undertaken to develop the preferred option. This report carries on from the Design Evolution Report, which outlines previous optioneering and contextual analysis. This report presents the design development and rationale for the Project.

1.1 Context and background

Liverpool is located in Sydney's southwest and is emerging as the city's third CBD, positioned at the heart of major regional infrastructure investment. As a key metropolitan centre, Liverpool is undergoing significant urban transformation, with increasing population growth, development, and economic activity driving demand for enhanced transport and public domain infrastructure.

The Liverpool City Centre Public Domain Master Plan (2020) provides a strategic framework for improving the city's streetscape, supporting a walkable, people-friendly environment through wider footpaths, dedicated cycling infrastructure, and upgraded public spaces. Additionally, Liverpool City Council's cycling strategy, as outlined in the Liverpool Bike Plan 2018-2023, reaffirms cycling as a valid and equal mode of transport, promoting it for both recreation and commuting to enhance connectivity, health, and sustainability. The plan identifies key cycling corridors and infrastructure priorities, ensuring Liverpool's network evolves to meet the needs of its growing population.

The George Street and Moore Street Cycleway Project aligns with these strategies, contributing to a safe, connected, and accessible active transport network within the city centre. LCC secured funding through the Get NSW Active program from Transport for NSW to develop a concept design for dedicated cycle facilities along these key corridors, reinforcing the NSW Government's commitment to promoting walking and cycling as preferred transport modes.

The Moore Street section of the cycleway serves as a key east-west link between Bigge Street and Copeland Street, connecting major destinations such as the University of Wollongong Liverpool campus, Macquarie Street pedestrian zone, and Liverpool's shopping precinct. It also integrates with Liverpool train station, local bus services, and the T-Way corridor, ensuring seamless multimodal access.

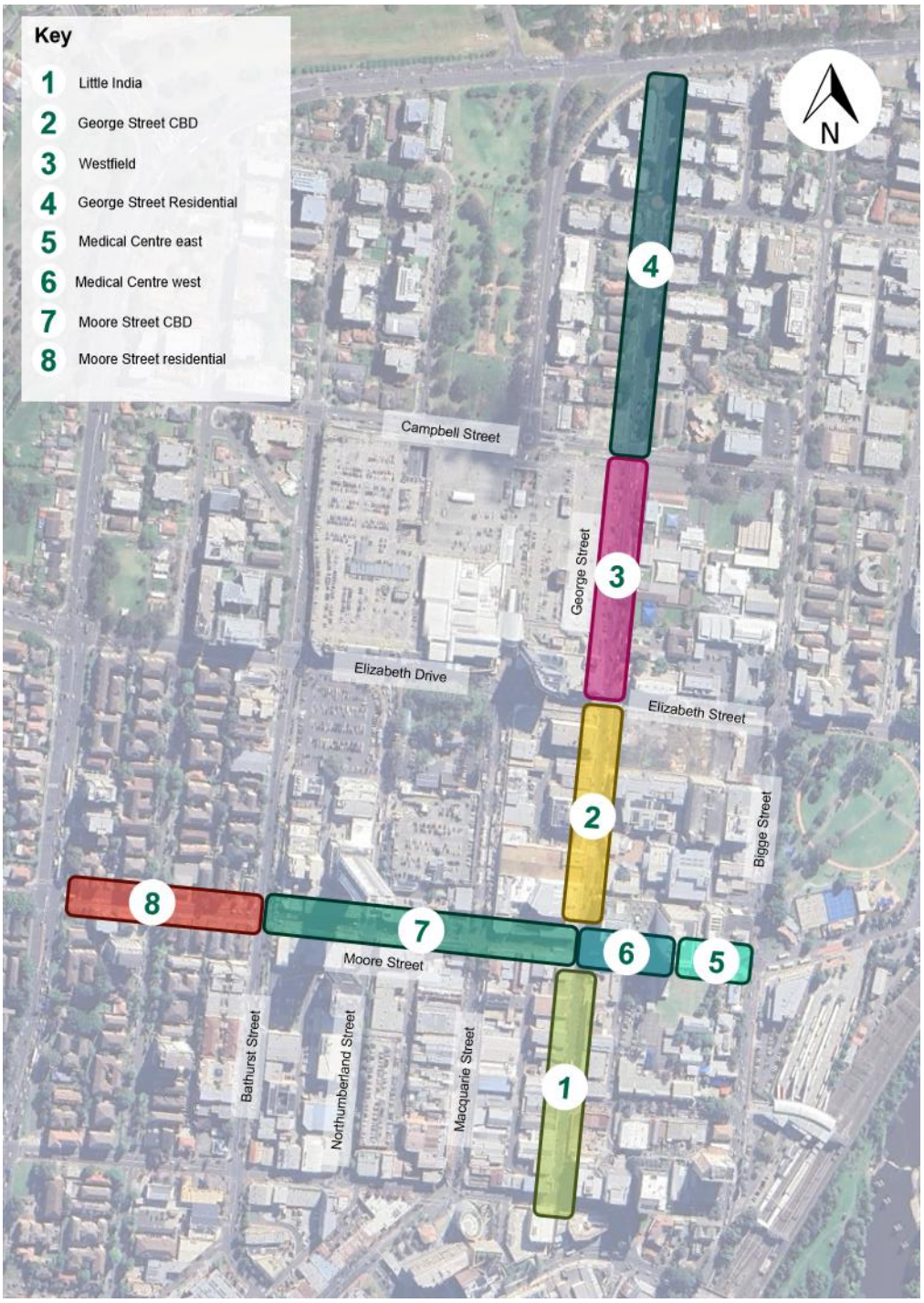
The George Street section forms a critical north-south connection between Scott Street and Copeland Street, linking significant civic, commercial, and cultural landmarks, including the Liverpool police station, courthouse, Westfield shopping centre, and the vibrant Little India precinct.

The study area consists of distinct zones, each serving specific functions, demands, and street characteristics. To ensure an optimal and functional design for each use, the streets were classified into smaller segments based on their typology. A detailed description of these street typologies is provided in Section 5.2

By delivering high-quality cycle infrastructure along two of Liverpool's most important corridors, this project plays a key role in realising Liverpool's long-term vision for an integrated, sustainable, and people-focused transport network.

An overview of the Project site can be found in Figure 1

Figure 1 The Project study area



1.2 Project vision

A Vision Workshop, conducted in partnership with LCC, was key to defining the project objectives and aligning the design approach with LCC's aspirations. The resulting vision for Liverpool city cycleway is as follows:

"The vision for this project is to transform Liverpool's city centre into a more inclusive, accessible, and vibrant urban space. By delivering separated cycleways along George Street and Moore Street, the aim is to enable the safe movement of people, while building a stronger sense of community and connectivity.

This project will enable people to be prioritised by creating opportunities for increased tree canopy, greenery and seating to provide cool, comfortable spaces. These improvements aim to attract visitors and encourage longer stays in the CBD, supporting local businesses and community spaces.

The design will also accommodate private vehicle parking while promoting micromobility options to encourage more people to access the city. This approach supports a safe, attractive and vibrant CBD that is prepared for the planned future population of Liverpool."

1.3 Objectives

The project objectives were developed collaboratively between AECOM and LCC in line with the design brief for the cycleways, while incorporating the broader placemaking ambitions for Liverpool CBD:

- **Develop a separated two-way cycleway** along George and Moore Streets within Liverpool CBD to enhance connectivity and accessibility for residents, workers, and visitors.
- **Improve safety** by creating a secure environment for micromobility users, encouraging greater uptake of active travel.
- **Integrate with the wider strategic cycleway network**, ensuring seamless connections and bolstering the region's active transport infrastructure.
- **Deliver a future-ready design** that accommodates Liverpool's anticipated population growth and evolving mobility demands.
- **Enhance the sense of place** by introducing improved amenities and fostering a welcoming, vibrant atmosphere for all users.

1.4 Strategic context: NSW Government

1.4.1 Get NSW Active

Liverpool City Council secured funding through the Get NSW Active program from Transport for NSW to develop a concept design for dedicated cycle facilities along Moore Street and George Street within the CBD. This funding highlights the NSW Government's commitment to making walking and cycling safe, convenient, and attractive for everyday travel.

The George Street and Moore Street Cycleway Project directly aligns with the program's objectives by creating a connected and continuous active transport network, improving access to key local destinations, and encouraging more people—especially children and young people—to walk and cycle safely. By supporting multimodal travel, vibrant public spaces, and inclusive transport options, this project contributes to a more liveable and accessible Liverpool, reinforcing cycling as a practical and preferred mode of transport for short trips.

1.4.2 Liverpool City Centre Public Domain Master Plan, 2020

The Liverpool City Centre Public Domain Master Plan (2020) outlines Council's vision to transform public spaces in the city centre into greener, more vibrant, and active environments. The Master Plan recommends

enhancements such as wider footpaths, dedicated cycleways, additional street trees and vegetation, public art installations, improved street furniture, pedestrian lighting, and upgraded paving materials. These improvements aim to enhance accessibility and amenity throughout the city centre. Liverpool Council's Master Plan key principles are found in Table 1.

Table 1 Liverpool City Centre Public Domain Master Plan key principles

LCC Masterplan Principles	How they respond to Get active and the Project principles
Improve Connectivity	Creating a Liverpool CBD that will be well-connected, accessible, and inclusive. By increasing cycle facilities in the CBD, there will be improvements in cycle connectivity between key destinations, supporting east–west and north–south movements, and connecting to Transport for NSW's future strategic cycleway network.
Enhance Liveability	Liverpool CBD and the public domain will be designed to better meet the needs of the community and reflect the unique character of the city. Providing cycle infrastructure through the CBD will also result in streetscape improvements, including widening footpaths, increasing planting and vegetation, and reducing car parking. These changes will contribute to creating vibrant places and liveable neighbourhoods for locals and visitors.
Increase Productivity	The public domain within the CBD will be designed to meet the needs of everyone, encouraging them to spend more time there and support local businesses. The cycleway will reallocate space to active modes, prioritising it in some areas and encouraging people to travel to the CBD by walking and cycling.
Achieve Sustainability	Sustainability will be achieved within the CBD through social, environmental, economic, and leadership initiatives that will increase the resilience of the city centre. By providing facilities for cycling and making improvements for walking, it is expected there will be a mode shift to more sustainable modes of transport in the CBD, having positive impacts on air quality, temperature, noise, and native flora and fauna.
Deliver Governance	LCC will have a clear vision for the city centre and will provide information to deliver the masterplan. There will be proposals to deliver cycle infrastructure along George Street and Moore Street, and the Get Active funding will help LCC deliver their vision.

1.4.3 The Greater Sydney Commission's Liverpool Collaboration Area Place Strategy, as part of the A Metropolis of Three Cities Greater Sydney Region Plan

The Greater Sydney Commission's Liverpool Collaboration Area Place Strategy, developed as part of the A Metropolis of Three Cities – Greater Sydney Region Plan, positions Liverpool as a key metropolitan centre with a focus on connectivity, sustainability, and economic growth. The Project directly supports this vision by enhancing active transport links, improving local accessibility, and reducing car dependency.

The Project aligns with the strategy's commitment to improving walking and cycling connections within the city centre and to surrounding areas, fostering a people-focused urban environment. By prioritising active transport infrastructure, the project contributes to Liverpool's transformation into a well-connected, vibrant, and sustainable city, ensuring it remains a thriving hub for residents, workers, and visitors.

1.4.4 Liverpool City Council's Local Strategic Planning Statement, *Connected Liverpool 2040*

Liverpool City Council's Local Strategic Planning Statement, Connected Liverpool 2040, outlines a vision for a well-connected, productive, liveable, and sustainable city over the next 20 years. The George Street and Moore Street Cycleway Project directly supports Local Planning Priority 1 – Active and Public Transport, reinforcing Liverpool's role as a thriving, accessible urban centre.

This project contributes to Council's commitment to increasing sustainable work-related travel to over 50% by delivering high-quality cycling infrastructure. It also aligns with the goal of establishing a fully connected cycle network by 2040, supporting active transport's health, environmental, and amenity benefits. By providing safe, accessible cycling infrastructure, the project helps facilitate emerging micro-mobility options, such as e-bikes and e-scooters, further enhancing Liverpool's sustainable transport network.

1.4.5 Liverpool Bike Plan, 2018-2023

While the Liverpool Bike Plan 2018-2023 has become outdated, many of its objectives remain relevant to the George Street and Moore Street cycleway project. Liverpool City Council remains committed to improving cycle infrastructure to promote healthy lifestyles, enhance access to the natural environment, and reduce congestion by encouraging a shift from cars to cycling.

This project directly supports the Bike Plan's vision by addressing connectivity gaps within the Liverpool City Centre, improving access to key destinations, and creating a safe, well-connected cycling environment. By delivering separated cycleways, shared paths, and pedestrian-priority treatments, the project aligns with Council's long-term goal of making cycling a valid and attractive transport choice.

1.5 Project stakeholders and engagement

The success of the George Street and Moore Street Cycleway Project depends on collaborative engagement with key stakeholders, ensuring the design meets the needs of Council, government agencies, local businesses, and the wider community. Key stakeholders include:

- Liverpool City Council: Urban Design, Traffic and Transport, and Design & Infrastructure Planning teams
- Council Directors
- Mayor & Councillors
- WSIG (Western Sydney Infrastructure Grant) Project Team
- Transport for NSW: Network Operations, Active Transport, Sydney Buses and Operations
- Local Community, Residents, and Business Owners

AECOM is actively engaging with internal Council teams while also supporting Council-led interactions with external stakeholders. Key internal stakeholders include the Urban Design, Transport, and Western Sydney Infrastructure Grants (WSIG) teams, who have helped shape the project. These teams have participated in vision and optioneering workshops, and preferred alignment presentations, ensuring the cycleway aligns with Liverpool's broader strategic planning and infrastructure priorities.

External Government stakeholders, including local bus operators, Transport for NSW (Network Operations, Bus/T-Way Operations, and Active Transport teams) have been engaged through the design process. Stakeholder comments have been incorporated into the design where possible, however a full review of the design will be undertaken by Government upon submission of the 50% design and report and comments will be provided to incorporate into the 100% design. Furthermore, Council Directors have been engaged through Council-led discussions, with AECOM providing technical input and consultation materials. On 16 December 2024, LCC's internal teams presented the preferred option to the Executive Leadership Team, ensuring alignment with broader strategic objectives and community expectations. On 18 March 2025, the project team presented the project to the Governance Committee Meeting, receiving support for Council, and was endorsed at the Council meeting on 26 March 2025.

Community engagement is a critical component of the project, ensuring the final design reflects the needs of residents, business owners, and local organisations. Initial Council stakeholder feedback has informed early design decisions, with additional consultation materials to be prepared by AECOM for Council's future engagement activities. A formal Community Engagement Period will take place once the 50% design has been agreed, which will be coordinated by LCC, with AECOM supporting through materials, visuals, and technical insights.

To maintain ongoing collaboration and project oversight, AECOM conducts fortnightly Project Working Group meetings via Teams, as well as monthly progress reports to track key tasks and address risks. Internal LCC teams, including the WSIG team, will continue to be engaged throughout Stages 1–3, ensuring seamless coordination and alignment with Liverpool's broader transport and urban planning goals.

2.0 Purpose and scope of the report

2.1 Current project status

Liverpool Cycleways Concept Design is currently in progress, with the project advancing through the early design stages to 50% Design. A key milestone has been reached with the general agreement of the alignment and approach, allowing the transition to the next phase of design development. This report supports the 50% Design submission.

2.2 Purpose of this report

The purpose of this report is to describe the process of concept design development. The report aims to identify key design constraints and present the outcomes of assessments completed as part of the Project.

This report should be read in conjunction with the Design Evolution Report dated 27th January 2025. This report provides analysis of local topography, land use, existing infrastructure and destinations to understand the opportunities and constraints influencing the concept design. It examines the existing transport network including cycle, pedestrian, public transport services and current vehicle and parking provision.

The report includes a Multi-Criteria Assessment (MCA) and an optioneering process, which evaluated multiple design alternatives against the following key criteria:

- Improve network safety for all transport users
- Maximise liability and usability
- Preserving access to business and services
- Minimise impact on network operations
- Efficient and sustainable delivery and operations

These assessments provided a structured approach to comparing options, ensuring the most suitable design was selected based on both quantitative and qualitative considerations. Following this analysis, the preferred option, as endorsed by Council, was identified as the most viable solution. The selection was guided by the need to balance infrastructure feasibility with the long-term goals of promoting active travel and enhancing the local streetscape.

3.0 Project data

Table 2 outlines the data received from Liverpool City Council at inception

Table 2 Data received from Liverpool City Council

Title	Information Details	Date Provided	Purpose
Crash data	Safe System Analytics Crash Data	14/11/24	To inform the design and highlight accident hot spots
Topographic and Stormwater survey		14/10/24	To allow for an accurate design considering all existing utilities, street furniture and road features
Land ownership	CBD zoning	14/10/24	To establish the area permitted for design without requiring land acquisition.
DA information	Information provided from 2002	14/10/24	To consider any future development works in the proposed design
MUSIC Modelling data and report	Existing Proposed primary Proposed primary and secondary, SWH Water demand LCC WQD masterplan	14/10/24	To understand the areas of localised flooding that may impact the design
Parking inventory	Moore Street and George Street	14/10/24	To have a baseline of existing parking conditions to compare with any future parking gain/loss
Healthy streets assessment	Moore Street place audit reports Moore Street Healthy Street Assessment Report Community responses Community survey graph	14/10/24	To allow the design team to understand the healthy streets requirement and Council intent for specific streets
Strategic Cycleways inputs	LCC letter SCC program WPC submission SCC MCA for Liverpool City Council	14/10/24	To consider the work done by the Strategic Cycleways team in the design of the cycleway.
Streetlight assessment	Streetlight Index map, December 2024 Streetlight assets	17/12/24	To enable streetlighting changes to be made based on the proposed design
Traffic counts	Liverpool CBD intersection counts 2014-2016 Mid-block counts Traffic report – TIA redacted	14/10/24	To allow base traffic simulation models to be built to test the network impacts of the design for future scenarios
Trees	Adopted LCC TMS Adopted LCC TMTG Adopted LCC TP	03/03/25	To allow for the arborist report to be undertaken and for a consistent tree strategy to be implemented

4.0 Design standards and criteria

4.1 Design standards

Table 3 serves as a reference for the standard dimensions of road elements integrated into the recommended cycleway treatments. These standards were collaboratively developed with Liverpool City Council (LCC) and drawn from a range of design documents to align with best practices and safety requirements. However, specific departures from these standards have been proposed for the project. Notable departures include:

- Minimum 2.8m-wide general traffic lanes
- Minimum 3.2m-wide lanes for bus traffic.
- Along the residential section of George Street, a 0.65m median has been proposed between the car parking spaces and the cycle lane, which, while narrower than standard practice, was necessitated by the need to retain existing kerb alignments within a confined cross-section. The median provides a buffer for cyclists travelling opposite parked cars and is deemed an acceptable risk by LCC. This assessment is based on the low turnover of parking in the area and the increased awareness of vehicle passengers facing oncoming cyclists, which reduces potential conflicts.

These standards emphasise the needs of all transport modes, with a particular focus on active transport such as cycling and walking. By prioritising user comfort and the separation of modes to minimise conflicts, the design promotes the safety, accessibility, and functionality of the road network for all users.

The geometric design criteria adopted for development of the concept design complies with relevant standards and guidelines. The standards and guidelines are listed below in priority order:

1. Professional Services Contract Concept Design Brief (Brief)
2. Transport publications
3. Austroads Guide to Road Design (AGRD) with Transport supplements
4. Australian standards
5. Standards Australia handbooks
6. Other sources as agreed with the Transport representative

Key design criteria for the geometric design are summarised in Table 3.

4.2 Design elements

Table 3 Key Road elements, widths, and the standards-setting for cycleway treatments

Infrastructure	Minimum width	Standard
Median Kerb width	0.4 m	Transport for NSW Cycleway Design Toolbox (2020) p. 32 & Sydney Streets Design Code (2021) p. 171
Two-way cycle path	2.5 m	Guide to Road Design Part 6A: Paths for Walking and Cycling Table 5.4 in Section 5.1.5 - Desirable minimum width
	2.4 m	Cycleway Design Toolbox (p. 32) states that a minimum width of 2.4m for a bicycle path may be appropriate in specific constrained locations. However, the Toolbox recommends a standard width of 3m, with a preferred width of 4m, for two-way cycle paths to accommodate commuter traffic and emerging forms of micromobility.
Separation for prevent dooring	1 m (0.8 m for door + 0.2 m clearance)	Minimum to prevent dooring. Guide to Road Design Part 6A: Paths for Walking and Cycling Figure 5.8 in Section 5.5.1
Parallel on-street parking	2.0-2.3 m	Australian Standard 2890.5:2020 Table 3.1 in section 3.2.2
	2.1 m	Sydney Streets Design Code (2021) p. 171
Perpendicular on-street parking	5.4 m (perpendicular to corridor) 2.4 m (parallel to corridor)	Australian Standard 2890.5:2020 Table A.1 in Appendix A *Note: using Class Low classification (i.e. generally all-day parking) as most parking currently unrestricted (classification in Table 3.2 and 3.3 in Section 3.3.2)*
General traffic width (one lane of traffic)	3.0 m	Guide to Road Design Part 3: Geometric Design - Table 4.3 For use on low speed roads with low truck volumes
	3.2 m	Transport for NSW, Design of Roads and Streets Manual (2024) - Table 8.3.7b for Destination high street
	2.9 m (for two lanes of traffic in each direction) 2.75 m (for one lane of traffic in each direction) 2.8m adopted with LCC direction	Sydney Streets Design Code (2021) p. 171 Sydney Streets Design Code (2021) p. 171 LCC directed minimum width
	2.8m	LCC directed minimum width
Bus Lanes	3.2m	As agreed with Liverpool City Council
Footpath	3.6m (2m pedestrian clear zone)	LCC Public Domain Technical Manual for Core Streets
Cycleway	2.5m + 0.4-1.0m median	LCC Public Domain Technical Manual for Core Streets
Shared path	4.0m footpath (2.5m clear path of travel)	LCC Public Domain Technical Manual for Core Streets

4.3 Design vehicles

The typical design vehicles are summarised in Table 4. Design vehicles have been selected to suit the typical vehicle movements along each road. Design and check vehicles for each intersection differ as agreed with Council to suit the intersecting road types. Further discussion will be required between Council and Transport for NSW to confirm the design vehicle.

Table 4 Through Movement Design vehicles

Description	Design vehicle	Check vehicle	Reference
Moore Street	Single Unit Truck/Bus 12.5 m	Single Articulated 19.0 m	AGRD04-23 Table 5.1
George Street	Single Unit Truck/Bus 12.5 m	Single Articulated 19.0 m	AGRD04-23 Table 5.1

In the selection of design vehicles on bus routes, it was observed that the Single Unit Bus 12.5 m could not be accommodated under some of the existing intersection arrangements. In these cases, the existing kerb lines have been retained, and smaller design vehicles have been used. The Single Unit Bus 12.5 m has been designated as the check vehicle in these cases. The selected design and check vehicles for each intersection are presented in Table 5.

Table 5 Intersection Design Vehicles

Intersection	Design vehicle	Check vehicle
George Street / Scott Street	Single Unit Truck/Bus 12.5 m	Single Articulated 19.0 m
George Street / Railway Street	Service Vehicle 8.8 m	Single Unit Truck/Bus 12.5 m
George Street / Moore Street	Single Unit Truck/Bus 12.5 m	Single Articulated 19.0 m
George Street / Elizabeth Street	Single Unit Truck/Bus 12.5 m	Single Articulated 19.0 m
George Street / Campbell Street	Single Unit Truck/Bus 12.5 m	Single Articulated 19.0 m
George Street / Lachlan Street	Service Vehicle 8.8 m	Single Unit Truck/Bus 12.5 m
George Street / Hume Highway	Single Unit Truck/Bus 12.5 m	Single Articulated 19.0 m
Moore Street / Castlereagh Street	Service Vehicle 8.8 m	Single Unit Truck/Bus 12.5 m
Moore Street / Bathurst Street	Single Unit Truck/Bus 12.5 m	Single Articulated 19.0 m
Moore Street / Northumberland Street	Service Vehicle 8.8 m	Single Unit Truck/Bus 12.5 m
Moore Street / Macquarie Street	Service Vehicle 8.8 m	Single Unit Truck/Bus 12.5 m

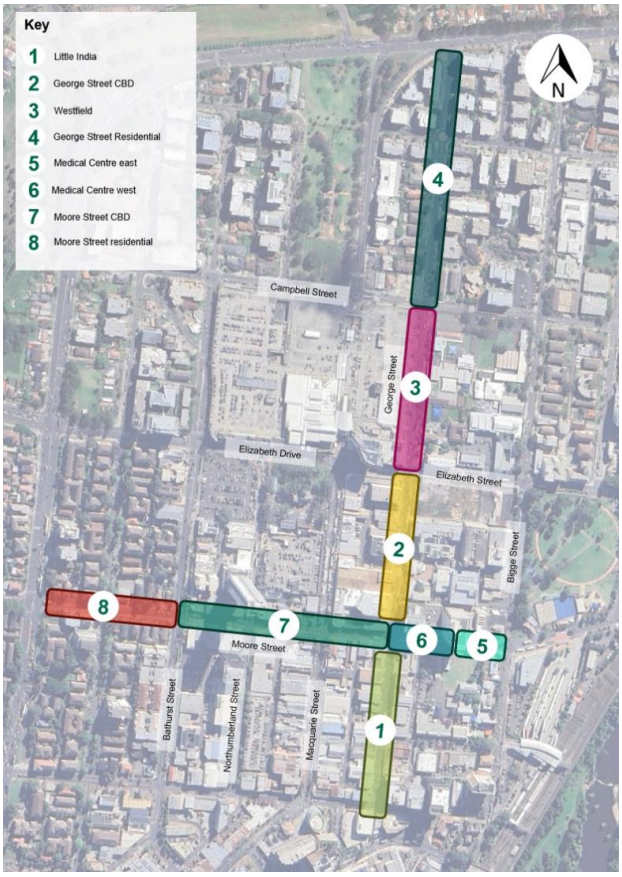
4.4 Drainage design

A high-level drainage review has been undertaken over the alignment of the cycleway to determine where drainage infrastructure is impacted. The kerb and intersection treatments proposed for the cycleway will result in changes to the existing drainage network. A detailed assessment of the network will be undertaken to maintain the existing performance of the network. The next stage of the design will document the proposed location of new pits.

4.5 Street lighting

An assessment of the existing lighting infrastructure along both Moore Street and George Street has been undertaken. Below is the assumed road user volume for the lighting assessment:

Figure 2 Road User Volumes for Street lighting Assessment



(1) Little India – Commercial Area, heavy traffic volume

(2) George Street CBD – heavy traffic volume

(3) Westfield – heavy traffic volume

(4) George Street Residential – low traffic volume

(5) Medical Centre East – heavy traffic volume

(6) Medical Centre West – heavy traffic volume

(7) Moore Street CBD – heavy traffic volume

(8) Moore Street Residentail – low traffic volume

Based on the above assumptions, Table 6 below lists the lighting design category targets that the existing installation should be compliant with:

Table 6 Street lighting requirements

Location	AS/NZS 1158 Lighting Subcategory
Little India	V1 / V2
George Street CBD	V1
Westfield	V1
George Street Residential	V3
Medical Centre East	V1 / V2
Medical Centre West	V1 / V2
Moore Street CBD	V1
Moore Street Residential	V3
Pedestrian Zebra Crossing (Outside Westfield)	PX1

5.0 Design development

The following is a continuation of the design process and optioneering outlined in the Design Evolution Report, dated 27.01.2025.

5.1 Meetings and workshops

The following key stakeholder meetings and workshops were held with the following stakeholders for consultation and design direction.

5.1.1 Transit systems

A meeting was held on 21st January 2025 to discuss the design and engage with Transit Systems on the size of bus and functionality for drivers. Transit Systems operate bus services on behalf of Transport for NSW in the Liverpool area and have a comprehensive knowledge base of the local area. The outcome of that meeting was general acceptance of inline bus stops, and a request to cater for two 12.5 buses on Moore Street between Bathurst Street and Northumberland Street (20m door to door); one 12.5m and one 19m articulated (30m door to door); on 12.5m on George Street.

5.1.2 Transport for NSW

A discussion was held on 6th March 2025 to discuss the following:

- Banning the right hand turn from George Street southbound onto Moore Street to simplify the cycleway connection and intersection phasing. This was discounted due to the additional congestion impact on George Street.
- A consensus was reached that design vehicles are to be 14.5m, where feasible. Where there is not sufficient space, this will revert to an 18m arctic. Where buses are not turning, service vehicles are to be used as design vehicle (8.8m). The check vehicles should be 12.5m.
- Discussion about the George Street / Moore Street intersection and the issue of the bus swept path impacting the proposed cycleway. The proposal for the buses to share a lane with general traffic and the bus stop to be moved back to allow for queuing was advised by Transport for NSW to be unlikely to be approved. Council was not supportive of removal of the general traffic lane.

5.1.3 Liverpool City Council

Various meetings have been held with Council to discuss design direction throughout the course of design process. An important outcome was achieved in a meeting held between Council and AECOM on the 12th March 2025 where the George Street / Moore Street intersection was discussed again, and three proposals were put to Council to ensure the cycle way connection east on Moore Street could be retained. Of the three proposals Council chose to progress with the delivery of a dedicated cycleway with departure for 12.5m bus swept path. Council would need to discuss further with Transport for NSW. With swept paths shown as a conservative radius that in reality bus drivers may be able to achieve.

5.2 Street typologies

To determine the preferred street arrangements for accommodating cycleways on Moore Street and George Street, both streets were divided into smaller segments based on their typology. These typologies were established by analysing the existing and anticipated future character of the streets, as well as the functional requirements dictated by surrounding land uses. The typologies are illustrated in Figure 3 and

Table 7.

No.	Segment	Description
	GEORGE STREET	
1	Little India (between Scott Street and Moore Street)	Defined by its unique cultural character, this area has the potential to be an attractor for Liverpool. This zone requires a strong placemaking focus and an approach that prioritises people, encourages pedestrian activity and social interaction, and creates a vibrant street environment that reflects this distinct identity.
2	CBD (Moore Street to Elizabeth Street)	This segment features key CBD destinations, including civic and educational centres such as the police station, courthouse, university campus, alongside a mix of commercial buildings. It intersects Moore Street, providing a connection to the wider cycle network.
3	Westfield (Elizabeth Street to Campbell Street)	This segment links to the Westfield Centre and faces unique challenges, including managing access to the shopping centre's entry/exit, taxi zones, bus stops, and school pick up and drop off areas.
4	Residential (Campbell Street to Hume Highway)	The existing residential character of this area contributes to the placemaking of this segment, however, a practical approach is required to consider driveway access.
	MOORE STREET	
5	Medical Centre east (Bigge Street to the medical centre)	This section requires consideration of the existing medical centre access. Priorities included maintaining the existing accessible parking and minimising potential conflicts between footpath users to maintain safe and convenient access for all users. Additionally, there is an emphasis on enhancing the placemaking within this segment through bolstering street tree planting and furniture.
6	Medical Centre west (medical centre to George Street)	This section provides connection to the north – south George Street CBD cycle.
7	Moore Street CBD (George Street to Bathurst Street)	This segment is defined by the CBD characteristics of a mixed use commercial and residential buildings. This section includes the Macquarie Street pedestrianised mall. The planned T-Way will further strengthen Moore Street as a travel corridor for more sustainable modes.
8	Moore Street Residential (Bathurst Street to Copeland Street)	This section has a residential function, with the planning zone mixed use. This segment provides a safe connection for local residents into the CBD and includes driveways and overhead powerlines.

Figure 3 George Street and Moore Street typology segments

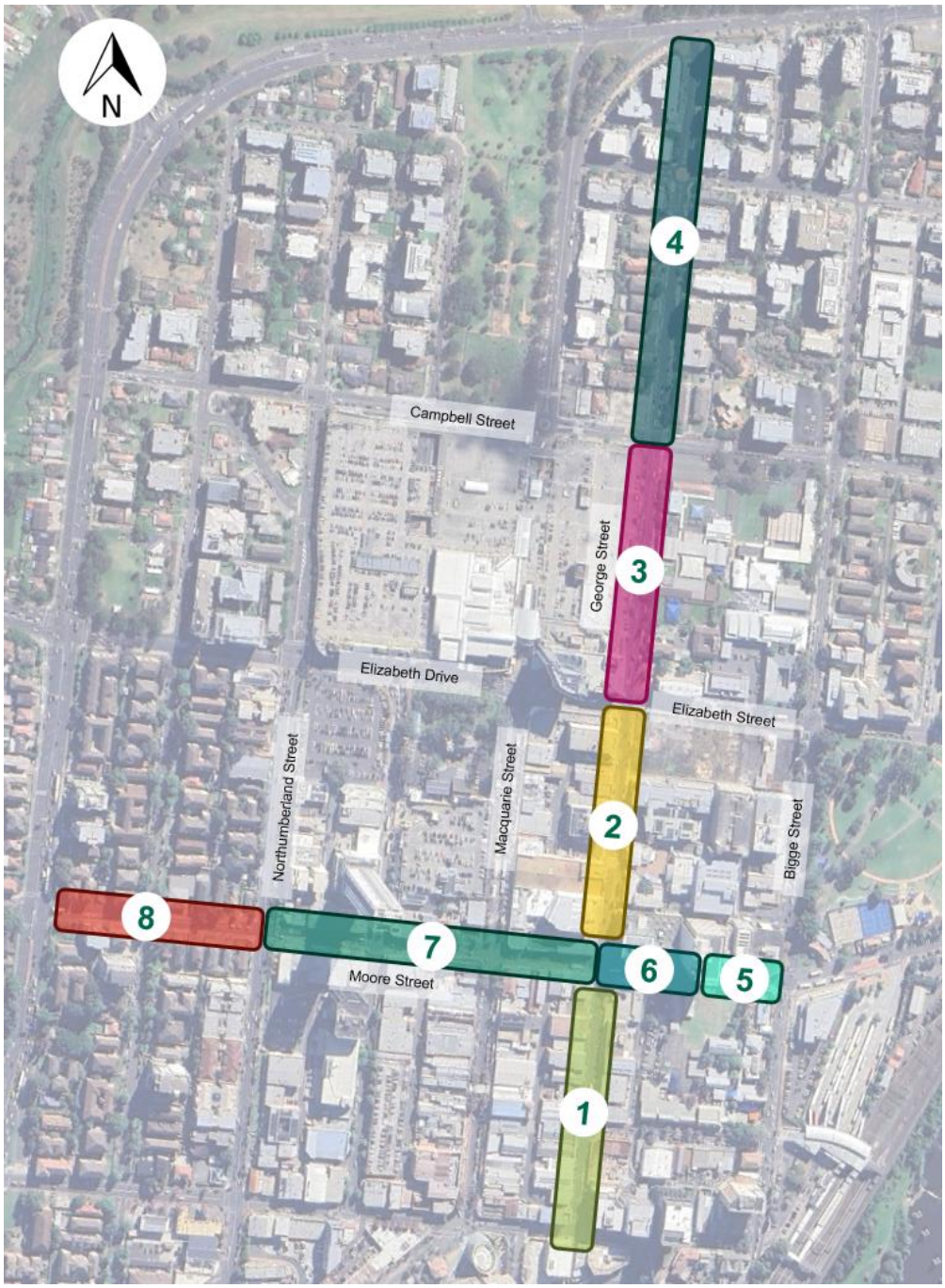

N
4
Campbell Street
George Street
3
Elizabeth Drive
Elizabeth Street
Northumberland Street
Macquarie Street
2
Bigge Street
8
7
6
5
Moore Street
1

Table 7 Design typologies for the Project

No.	Segment	Description
	GEORGE STREET	
1	Little India (between Scott Street and Moore Street)	Defined by its unique cultural character, this area has the potential to be an attractor for Liverpool. This zone requires a strong placemaking focus and an approach that prioritises people, encourages pedestrian activity and social interaction, and creates a vibrant street environment that reflects this distinct identity.
2	CBD (Moore Street to Elizabeth Street)	This segment features key CBD destinations, including civic and educational centres such as the police station, courthouse, university campus, alongside a mix of commercial buildings. It intersects Moore Street, providing a connection to the wider cycle network.
3	Westfield (Elizabeth Street to Campbell Street)	This segment links to the Westfield Centre and faces unique challenges, including managing access to the shopping centre's entry/exit, taxi zones, bus stops, and school pick up and drop off areas.
4	Residential (Campbell Street to Hume Highway)	The existing residential character of this area contributes to the placemaking of this segment, however, a practical approach is required to consider driveway access.
	MOORE STREET	
5	Medical Centre east (Bigge Street to the medical centre)	This section requires consideration of the existing medical centre access. Priorities included maintaining the existing accessible parking and minimising potential conflicts between footpath users to maintain safe and convenient access for all users. Additionally, there is an emphasis on enhancing the placemaking within this segment through bolstering street tree planting and furniture.
6	Medical Centre west (medical centre to George Street)	This section provides connection to the north – south George Street CBD cycle.
7	Moore Street CBD (George Street to Bathurst Street)	This segment is defined by the CBD characteristics of a mixed use commercial and residential buildings. This section includes the Macquarie Street pedestrianised mall. The planned T-Way will further strengthen Moore Street as a travel corridor for more sustainable modes.
8	Moore Street Residential (Bathurst Street to Copeland Street)	This section has a residential function, with the planning zone mixed use. This segment provides a safe connection for local residents into the CBD and includes driveways and overhead powerlines.

5.3 Current design approach – George Street

The following provides a break-down of the design approach for George Street. Refer to Appendix A for the concept design drawings.

5.3.1 General

5.3.1.1 Urban Design

Increasing tree canopy along George Street is a key priority for the Project. While shop front awnings present a limiting factor for tree growth within the Little India segment, creating shade along the cycleway is a key comfort outcome for users and would provide cooling within the street to encourage users to stay longer. The approach has been to propose smaller trees that are suitable directly adjacent to awnings.

In line with the Liverpool City Centre Public Domain Technical Manual (LCC, 2024), blisters have been provided where feasible with trees and understorey planting to provide shade and traffic calming. To define Little India, *Caesalpinia ferrea* (Leopardwood) trees are proposed along the eastern side of the road to support the character of this section with their unique patterned bark and bright yellow flowers. Outside of Little India, blisters will be planted with *Zelkova serrata* (Green Vase).

The Street Tree Master Plan species for George Street is *Harpulia pendula* (Tulip Wood). However, the Project proposes a mix of *Harpulia pendula* (Tulip Wood) and *Zelkova serrata* (Green Vase) in tree grates in the verges. This mix of species and placement within the streetscape will not only establish a distinctive and cohesive character along the corridor but also enhance its resilience to challenging climatic conditions. The *Harpulia pendula* species ensures green canopy coverage in the winter months, while the *Zelkova serrata* allows for seasonal sunlight to penetrate the streetscape. Further discussion may be required about this species due to the fruit of the *Harpulia pendula* dropping on the proposed cycleway potentially causing a hazard. This has been added to the safety risk register.

The introduction of both the tree grates and blisters provide opportunities for Water Sensitive Urban Design (WSUD) and passive irrigation integration along the corridor. To promote tree growth, linked trenches and permeable paving should be considered for all trees, where feasible. Tree locations are subject to detail design and a full utility survey.

Cycle parking is considered in each block of the CBD and excluded from the residential areas. The location of furniture will be considered in the next phase of the design. A 2.5m clear path minimum has been adopted where there is a pedestrian path, and 3.8m wide minimum where there is a shared path, with the furniture and lighting zone located to the road edge.

5.3.1.2 Traffic

George Street is a key north-south corridor through Liverpool's CBD, serving a mix of transport modes, land uses, and movement priorities. Its strategic importance is reinforced by its role in the bus network, its function as a key access route for businesses and residents, and the high levels of pedestrian activity along sections of the corridor. The introduction of a cycleway along George Street presents an opportunity to enhance active transport while ensuring an appropriate balance between movement and place functions.

The proposed traffic strategy focuses on optimising the street's capacity for all users by reallocating road space to accommodate the cycleway while maintaining efficient traffic flows. South of Elizabeth Street, where George Street operates as a one-way, two-lane corridor, one lane will be reallocated to provide dedicated cycling infrastructure. This ensures safe and continuous cycling connectivity while still allowing for bus movements and general traffic operations. North of Elizabeth Street, where George Street becomes two-way in a highly active retail and school precinct, careful design interventions will be implemented to support multimodal access, including potential adjustments to intersection layouts, crossing facilities, and traffic signal phasing to prioritise pedestrian safety and minimise conflicts.

Timed parking strategies will be introduced to maximise kerbside space efficiency, ensuring that parking availability aligns with demand throughout the day. This will involve peak-period clearways to facilitate traffic flow during high-demand times, while off-peak periods will allow for loading, deliveries, and short-term parking to support businesses. These measures will be particularly critical in high-activity areas such as the Little India precinct and the northern commercial zones, where pedestrian volumes are significant.

Overall, the traffic strategy for George Street aims to facilitate safe and efficient movement while enhancing the street's role as a vibrant urban space. By integrating active transport infrastructure, optimising parking and traffic management, and prioritising pedestrian-friendly design, George Street will function as a balanced corridor that supports sustainable mobility and the evolving needs of Liverpool's CBD.

5.3.1.3 Civil

The introduction of a cycleway along George Street requires careful civil engineering planning to ensure the street's infrastructure supports its evolving multimodal function. The key considerations include road geometry, pavement design, drainage modifications, utility relocations, and integration with existing streetscape elements. A well-planned civil strategy will ensure the durability, safety, and functionality of the corridor while maintaining efficient construction staging to minimise disruptions to businesses, residents, and traffic operations.

One of the primary engineering challenges is the reallocation of road space to accommodate the cycleway while maintaining vehicle access and kerbside functionality. This may require road widening in certain sections, particularly at intersections where turning movements and pedestrian crossing facilities need to be adjusted. Additionally, resurfacing and pavement strengthening may be necessary to support changes in traffic loads, particularly in areas transitioning from vehicle lanes to cycleways or pedestrian zones.

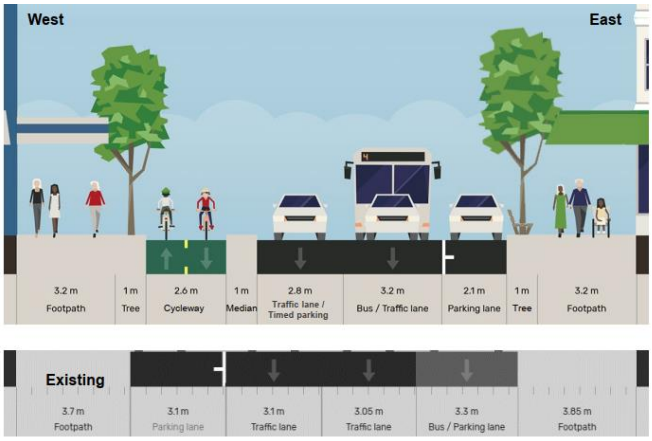
Drainage and stormwater management are critical considerations, as changes to the road layout and kerb alignments may affect surface water flow. The strategy will involve assessing existing drainage infrastructure and implementing modifications such as additional pit inlets or regrading to prevent localised flooding and ensure proper runoff management. Given George Street's mix of land uses, these adjustments must also account for existing underground utilities, requiring coordination with service providers to relocate or protect assets as needed.

The streetscape and public realm will be enhanced through high-quality finishes, durable materials, and complementary street furniture to improve the pedestrian and cyclist experience. In high-activity areas such as the Little India precinct and north of Moore Street, careful selection of kerbing materials, landscaping, and wayfinding elements will reinforce the street's place function while maintaining accessibility for all users.

A staged construction approach will be implemented to minimise disruption to traffic, businesses, and the local community. Temporary traffic management plans will ensure continuous access for essential movements, including bus operations, emergency services, and deliveries. Through effective planning, the civil engineering strategy for George Street will create a resilient and adaptable transport corridor that integrates active transport, enhances the urban environment, and supports the broader objectives of Liverpool's CBD.

5.3.2 Little India (between Scott Street and Moore Street)

Figure 4 George Street section (between Scott Street and Moore Street)



George St, facing north

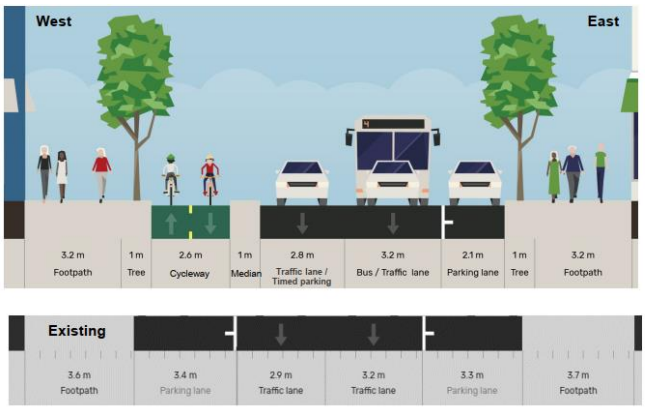
Table 8 Segment 1 – Design considerations

Urban design considerations	• Design reflects the unique cultural identity of Little India. • Widened footpaths support Liverpool's future growth and placemaking opportunities. • Provision for trees, planting, street furniture, and outdoor dining. • Placement of furniture considers street gradient. • Public Art Opportunity: Potential for small-footprint sculpture at widened kerb (subject to sightline/access considerations).
Traffic engineering considerations	• Two traffic lanes during peak periods. • Western lane transitions to timed parking during off-peak to support businesses. • Permanent parking retained on the eastern side alongside bus stop and bus lane. • Separated cycle path provided along George Street. • CFTs at laneways & service roads ensure pedestrian/cyclist priority. • Existing bus stop near Scott Street remains in left lane. • Cycleway transitions into a shared path at Scott Street. • Future dedicated cycle route along Scott Street to be considered by WSIG. • Full-width kerb ramps at Scott Street to support increased pedestrian crossing volume. • Shared crossings at signalised pedestrian crossings connecting to Railway Street. • Onward dedicated cycle route along Railway Street not included in this project (to be considered by WSIG).

Civil engineering considerations	• Cycleway integrated within existing road carriageway to reduce impact on underground utilities. • Drainage and utility assessment based on feature survey & BYDA data. • Additional quality level A & B surveys required for below-ground utilities. • Existing inlet pits retained and adjusted to match final levels and kerb changes. • Potential new inlet pits at CFT locations (subject to further review). • Railway St junction pits retained and adjusted for new levels. • Drainage pit relocations to be documented in the next design phase. • Railway St sewer manhole to be rebuilt in the new verge. • TCS poles relocated for new pedestrian crossing alignments. • Streetlighting poles repositioned to meet design lighting standards. • Significant communications pit at Railway St retained, but adjusted to suit new levels. • Further notes on utilities and drainage included in design drawings

5.3.3 George Street CBD (between Moore Street and Elizabeth Street)

Figure 5 George Street section (between Moore Street and Elizabeth Street)



George Street, facing north

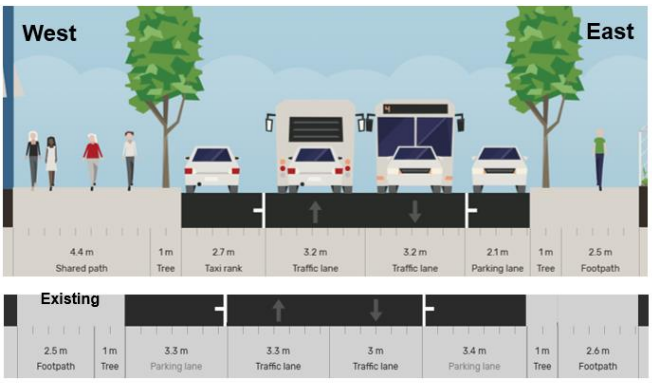
Table 9 Segment 2 – Design considerations

Urban design considerations	• Section includes the northern extent of Little India shops, courthouse, and police station. • Widened footpaths to support future growth, including residential development at the Elizabeth Street corner. • Widened verge for placemaking with trees, street furniture, and planting. • Full-width kerb ramps proposed at Elizabeth Street for increased crossing volume.
Traffic engineering considerations	• Designed to balance active and vehicular transport with emergency service and business accessibility. • Separated cycle path along George Street, continuous footway treatments at laneways/service roads to prioritise pedestrians/cyclists. • Cycleway transitions to a shared path at the Elizabeth Street intersection to connect with the existing shared path along George Street (Elizabeth Street to Campbell Street). • Two traffic lanes during peak periods, with the western lane converting to timed parking during off-peak to support businesses. • Permanent parking on the eastern side, including police bays and 1P parking, retained to support local businesses. • CFTs proposed at laneways and service roads to prioritise pedestrian movement, with raised footpath connections over service lanes. • Existing bus stop on the eastern verge converted to an in-line bus stop to maximise parking availability and enhance bus operations. • In-line bus stop to be complemented by planting beds to enhance urban amenity, promote traffic calming, and provide shade for users.
Civil engineering considerations	• Cycleway integrated within the existing road carriageway to minimise impacts on utilities and drainage infrastructure.

	• Existing midblock pedestrian crossing removed as crossing two lanes in one direction is not permitted. • Drainage and utilities assessed based on feature survey & BYDA data; further A and B surveys required to assess impact on below-ground utilities. • Existing kerb inlet pits realigned to suit new kerb alignment. • Detailed assessment required for existing inlet pits at CFTs to determine if additional pits are needed. • Stormwater junction pit at Reeves Service way CFT to be raised to match new verge levels. • Drainage pit relocations will be documented in the next design phase. • Utilities pits adjusted to match new verge levels; no relocations identified between Moore Street and Elizabeth Street. • TCS poles adjusted as part of intersection design. • Additional notes on drainage and utilities impact included in design drawings.

5.3.4 George Street Westfield (Elizabeth Street to Campbell Street)

Figure 6 George Street section (between Elizabeth Street to Campbell Street)



George Street, facing north

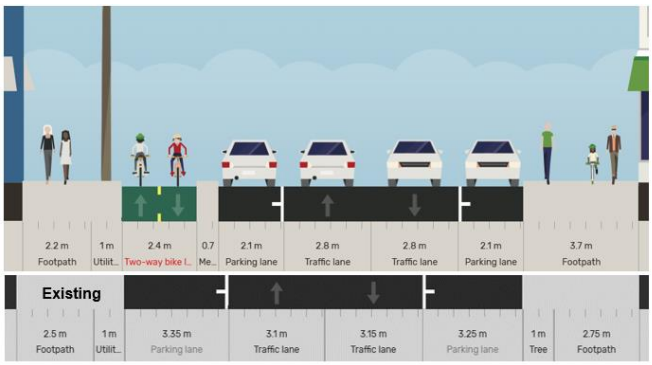
Table 10 Segment 3 – Design considerations

Urban design considerations	• The section includes key destinations such as Westfield Shopping Centre, a health centre, All Saints Catholic Church, and All Saints Catholic Primary School. • Full-width kerb ramps are proposed at shared crossings to accommodate increased crossing volume. • High-contrast surface treatments or creative ground markings should be explored to facilitate interactions between active transport users along the Westfield driveway interface, which will be further explored in subsequent design stages. • Larger planting beds are proposed at the pedestrian crossing to promote traffic calming and increase WSUD opportunities and planting within the streetscape. • Existing bus stops will be converted to in-line bus stops, with planting beds proposed to enhance urban amenity and offer shade for users.
Traffic engineering considerations	• The George Street Westfield section has been designed to accommodate two-way traffic while balancing various competing parking demands, including a mail zone, taxi zone, school pick-up and drop-off spaces, short-term parking, and bus zones. • The proposed lane configuration includes a single traffic lane in each direction, with a dedicated left-turn bay allowing entry into the Westfield car park from the south. • On the eastern side, a combination of school pick-up and drop-off zones, short-stay parking, and an in-lane bus stop has been provided. • The western side includes a mail zone, taxi rank, short-stay parking, and another in-lane bus stop. • The western side accommodates a wide driveway providing access to Westfield, which has been identified as a potential conflict point for pedestrians, cyclists, and vehicles. Further consultation with Westfield is required to develop and implement mitigation measures to enhance safety at this location.

	• Due to geometric constraints along this section, cycle priority has been designed as a shared path. • The shared path extends between Elizabeth Street and Campbell Street and is considered an appropriate solution given the inactive frontage at Westfield, which results in lower pedestrian gathering. Movement on the footway in this area is primarily focused on accessing the taxi rank or parked vehicles. • Existing bus stops will be converted to in-line bus stops to maximise parking and promote bus priority.
Civil engineering considerations	• Assessment of the existing drainage and utilities has been undertaken based on feature survey and BYDA information. Additional quality level A and B survey is required to determine the impact to below-ground utilities. • Due to the movement of kerb lines on the western verge of George Street, multiple kerb inlet pits will require relocation. The detailed drainage design will determine if additional inlet pits are required. • Drainage pit relocations will be documented in the next phase of design. • As verge widths are increasing in this block, no existing utilities pits are moving into the roadway and will only need to be adjusted to suit new verge levels and surface treatments. • TCS poles will be adjusted as part of the intersection design and pedestrian crossing locations.

5.3.5 George Street residential (Campbell Street to Hume Highway)

Figure 7 George Street residential section (between Campbell Street to Hume Highway)



George Street, facing north

Table 11 Segment 4 – Design considerations

Urban design considerations	• The George Street residential segment, between Campbell Street and the Hume Highway, is lined with apartment buildings and retains the current kerb profiles. • Tree planting is proposed in blisters between parking bays, providing much-needed shade, creating a more comfortable and inviting environment for pedestrians. • The design maintains a clear separation between trees and active travel infrastructure, ensuring that space for walking and cycling remains unobstructed. This balances planting with functionality, improving both the aesthetic appeal and liveability of the corridor.
Traffic engineering considerations	• The design optimises space allocation while prioritising active and sustainable transport, with a separated cycle path along this section and breaks in the median to maintain residential driveway access. • Due to geometric constraints, the cycleway has been designed at a narrower width of 2.4m, with a 0.7m median next to parking bays. This configuration is considered safe and functional for cyclists despite the reduced width. • Unrestricted on-street parking bays are provided on both sides of the road, with gaps to accommodate driveway access for residents. • At the Lachlan Street intersection, a protected cycleway design will improve safety and comfort for cyclists. • Raised pedestrian crossings will enhance accessibility, particularly for individuals with mobility impairments, while also reinforcing pedestrian priority. • The roundabout island at the Lachlan Street intersection will be reduced in size to create a more compact layout, improving visibility and shortening crossing distances for pedestrians and cyclists. • At the northern end, the cycleway will transition into a shared path at the Hume Highway, ensuring a continuous and well-connected active transport corridor. This design prioritises safety, accessibility, and user comfort.

	• The proposed lane configuration includes a single 2.8m-wide traffic lane in each direction. These lanes are not designed for buses, as this section of George Street does not form part of a regular bus route.
Civil engineering considerations	• The existing kerb line will be maintained in its existing location where possible between Campbell Street and the Hume Highway. • Assessment of the existing drainage and utilities has been undertaken based on feature survey and BYDA data. Additional quality level A and B survey is required to determine the impact on below-ground utilities. • Existing drainage inlet pits will need to be adjusted near intersections where kerb returns are increased, and to suit the new raised crossings at the intersection with Lachlan Street. Drainage pit relocations will be documented in the next design phase. • Minor adjustments to utilities will be required to suit new verge levels. • The existing TCS poles at the intersection with Campbell Street will need to be relocated to suit the new intersection design. • Additional notes on the drainage and utilities impact are included in the design drawings.

5.4 Current design approach - Moore Street

The following provides a break-down of the design approach for Moore Street. Refer to Appendix A for the concept design drawings.

5.4.1 General

Urban Design

Moore Street is a key urban connector, linking key civic spaces and providing a direct connection into Liverpool Station. The Street is a wide movement corridor, and the future dedicated public transport and active transport link lends itself to an avenue of larger street trees to provide shade of the road surfaces and fit with the scale of the cross section. Although some widening of Moore Street can be achieved, the awnings along the north side of Moore Street CBD unfortunately limit the size of the trees able to be installed in this section. There is opportunity in the future, with the public vehicle lane to be closed, to install larger shade trees to the southern verge. For this Project, the southern verge is left untouched, to limit the construction spend to one side of the road and allow for more significant planting to be considered in the future. Where feasible, larger trees have been considered where there are not conflicts with awnings.

As the design progresses into the next stage, consideration is needed to determine which of the existing trees should be retained. The Street Tree Master Plan proposes *Ginko biloba* (Maidenhair Tree), which has been installed to the eastern most end of Moore Street. Council mentioned this tree struggling in drought, which may be an issue in a warming climate. *Lophostemon confertus* (Brush Box) has been proposed as an alternative species which provides deep shade and is ever green. C*upaniopsis anacardioides* (Tuckeroo) could be considered for a smaller however further discussions are required as this species drops fruit and seed pods, which could be a hazard on the proposed cycleway. This has been added to the safety risk register.

In line with the Liverpool City Centre Public Domain Technical Manual (LCC, 2024), planting has been included in the verges where feasible. Within the residential area of Moore Street, the footpaths widths go down to 2.5m, and therefore tree pits have been proposed in lieu of small strips of planting.

Both the tree grates and planted area provide opportunities for Water Sensitive Urban Design (WSUD) and passive irrigation integration along the corridor. To promote tree growth, linked trenches and permeable paving should be considered for all trees, where feasible. Tree locations are subject to detail design and a full utility survey.

Cycle parking is considered in each block of the CBD and excluded from the residential areas. The location of furniture will be considered in the next phase of the design. A 2.5m clear path minimum has been adopted where there is a pedestrian path within the CDB, and a 2.0m wide minimum in the narrow residential areas, with the furniture and lighting zone located to the road edge.

Traffic Engineering

Moore Street is a critical east-west corridor in Liverpool's CBD, serving as a primary route for both vehicular and public transport, including dedicated bus lanes along its entire length and the T-Way bus services. Its strategic importance is further reinforced by its role as a key connector to the bus interchange at Bigge Street and the T-way at Copeland Street. The corridor intersects the Macquarie Street pedestrian mall at its midpoint, linking retail, commercial, and residential areas.

The proposed traffic strategy for Moore Street aims to enhance the corridor’s functionality as a movement route while introducing a separated cycleway to encourage active transport. Moore Street will be converted into a one-way westbound route between George Street and Bathurst Street, with a contraflow eastbound bus lane. This change will allow for a dedicated cycleway along the entire length of the street, providing a continuous and safe cycling environment.

To optimise space for movement and reduce congestion, parking will be removed along this section. This will reinforce Moore Street’s role as a movement corridor prioritising traffic flow, buses, and active transport. The one-way configuration will also include improvements to intersections, ensuring smoother transitions between Moore Street and adjacent routes while maintaining access to key destinations within the CBD.

To minimise disruption to traffic patterns, alternative east-west routes through the CBD will be promoted, alleviating congestion and maintaining Moore Street’s efficiency and accessibility, particularly

during peak periods. These measures, combined with the new cycleway, will balance the needs of all transport modes and improve overall mobility.

Overall, the traffic strategy for Moore Street is designed to enhance traffic and public transport operations while improving safety and convenience for cyclists and pedestrians. By reallocating road space, optimising traffic flows, and prioritising active transport infrastructure, Moore Street will become a more integrated and accessible corridor that meets the evolving mobility needs of Liverpool's CBD.

Civil Engineering

The introduction of a cycleway along Moore Street requires a comprehensive civil engineering strategy to ensure the infrastructure supports the transformation of the street into a multimodal corridor. Key considerations include road geometry, pavement design, drainage improvements, utility relocations, and seamless integration with existing streetscape elements. This strategy will ensure that Moore Street remains functional, durable, and safe, while minimising disruption to traffic, businesses, and residents during construction.

A significant engineering challenge will be the conversion of Moore Street into a one-way westbound route between George Street and Bathurst Street, with a contraflow eastbound bus lane. This change in road layout will require careful reallocation of road space, including the removal of parking to optimise lane usage for buses, vehicles, and cyclists. The design will need to accommodate the new cycleway, which will run along the entire route, ensuring adequate width for safe cycling movement while maintaining access for buses and general traffic.

Road widening may be required in select locations, particularly at key intersections, where turning movements and pedestrian crossing facilities must be adjusted. This will ensure smooth transitions between Moore Street and adjacent streets, while maintaining accessibility to surrounding areas. In addition, pavement strengthening and resurfacing will be necessary to support changes in traffic loads, particularly in areas transitioning from vehicle lanes to cycleways or pedestrian zones.

Drainage and stormwater management will also be critical in the civil engineering strategy for Moore Street. The reconfiguration of the street's layout, including adjustments to kerb alignments, could impact surface water flow and drainage patterns. A thorough assessment of the existing drainage infrastructure will be carried out, with modifications such as additional pit inlets and regrading where necessary to prevent localised flooding and ensure proper runoff management. As Moore Street serves a mixture of retail, commercial, and residential areas, these modifications will also need to account for the protection and relocation of underground utilities, in coordination with relevant service providers.

The streetscape and public realm will be enhanced through the use of high-quality materials, durable finishes, and integrated street furniture. The overall aim is to improve the experience for pedestrians, cyclists, and other street users. In key areas, such as the intersection with Macquarie Street and near the bus interchange at Bigge Street, the selection of materials, landscaping, and wayfinding elements will support the active transport network and reinforce the street's role as a vibrant urban space.

A phased construction approach will be adopted to minimise disruption and ensure continued access for critical movements, such as bus operations, emergency services, and deliveries. Temporary traffic management strategies will be implemented to maintain essential access and minimise impacts on businesses and local traffic flow. By coordinating these efforts and planning for a staged delivery, the civil engineering strategy for Moore Street will create a safe, resilient, and adaptable transport corridor that promotes sustainable mobility while enhancing the overall urban environment of Liverpool's CBD.

5.4.2 Moore Street Medical (Bigge Street to George Street)

Figure 8 Moore Street Medical section (Bigge Street to George Street)

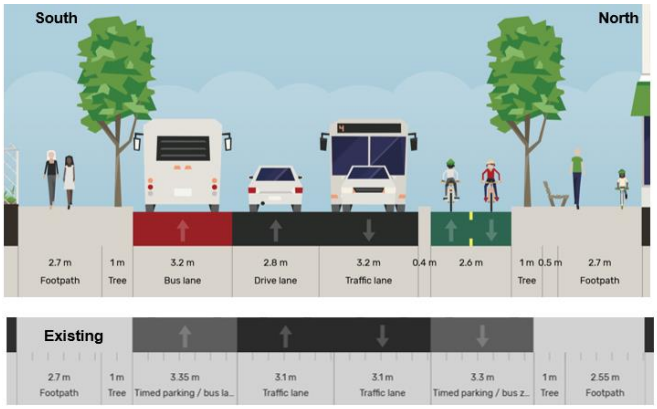


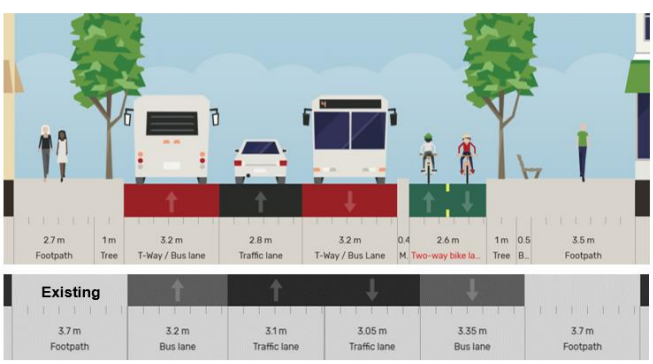
Table 12 Segment 5/6 – Design considerations

Urban design considerations	• The Moore Street Medical section connects the University of Wollongong Liverpool campus, the nearby medical centre, and surrounding commercial and hospitality establishments. • Due to spatial constraints, a shared path will be introduced on the northern side of Moore Street between Bigge Street and 23-31 Moore Street. This shared path will accommodate both pedestrians and cyclists while ensuring safe and accessible access to the medical centre. • Car parking is provided outside the medical centre, ensuring convenient access for users. • The shared path connects to the shared path on Bigge Street and transitions into a bi-directional cycleway to the west mid-block, creating a connection through to the Moore Street and George Street intersection.
Traffic engineering considerations	• The section of Moore Street between George Street and Bigge Street has been designed to balance active and vehicular transport, while ensuring accessibility for emergency services and businesses. A hybrid design approach has been used to accommodate these needs. • The cycle facility transitions between a separated cycleway and a shared path. A dedicated separated cycleway is provided between George Street and the medical centre, while a shared path is introduced between the medical centre and Bigge Street. • This adjustment is necessary to retain parking for the medical centre and accommodate the dedicated westbound bus lane. • Safe transition points between the separated cycleway and shared path have been incorporated to ensure seamless movement for cyclists. • The proposed lane configuration includes a single eastbound traffic lane and two westbound traffic lanes, one of which operates as a dedicated bus lane. • Access to Crawford Lane has been maintained to facilitate school servicing and pick-up/drop-off activities.

	• The stop lines for the westbound traffic lanes and cycle lanes must be set back to accommodate the swept path of a 12.5m bus turning left from George Street onto Moore Street. • Ongoing discussions between Liverpool Council and Transport for NSW will determine whether the bus movement is necessary. If it is deemed unnecessary, the stop line may be positioned closer to the pedestrian crossing. A similar arrangement exists at Scott Street to accommodate left-turning bus movements. • Accessible parking spaces outside the medical centre will be retained to ensure equitable access for all users. • Existing bus stops along this segment will remain unchanged, unaffected by the shared path on the northern side. • At the eastern end, the cycleway will connect to the existing shared path at Bigge Street.
Civil engineering considerations	• The existing kerb lines along the southern verge of Moore Street between George Street and Bigge Street will be retained, meaning minimal adjustments to existing utilities and drainage pits are expected along this verge. • Assessment of existing drainage and utilities has been carried out using feature survey and BYDA information. Additional quality level A and B surveys are required to assess the impact on below-ground utilities. • Along the northern verge, drainage inlet pits will need to be reconstructed to accommodate the new kerb lines. • Drainage pit relocations will be documented in the next design phase. • No utility pits have been identified that require relocation along either verge. • Existing TCS poles will be updated to suit the new intersection design.

5.4.3 Moore Street CBD (George Street to Bathurst Street)

Figure 9 Moore Street CBD section (George Street to Bathurst Street)



Moore Street, facing west

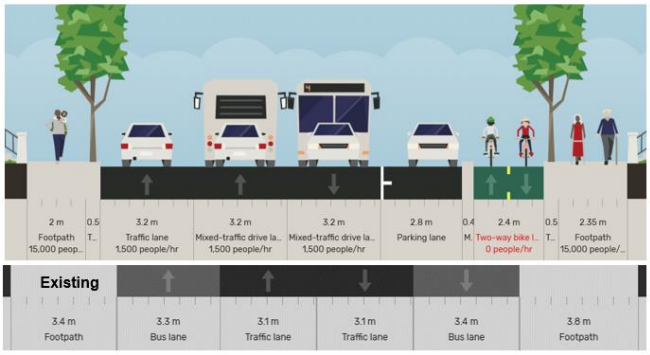
Table 13 Segment 7 – Design considerations

Urban design considerations	• The Moore Street CBD segment, extending from George Street to Bathurst Street, is lined with commercial and retail properties generating significant pedestrian activity. • This section includes Macquarie Street, a pedestrian-prioritised mall and community hub undergoing revitalisation until 2026. • The corridor generates high levels of activation and movement, enhancing the streetscape by creating a safe, accessible, and attractive environment for all users. • Trees will be planted within the footpath to improve comfort and walkability, offering shade and contributing to a greener, more inviting urban setting. • Bike parking has been suggested surrounding the mall to facilitate the transition into the pedestrian area. • There will be a break in the garden beds at the crossing point to the inline bus stop, with fencing installed at these locations to prevent bus users from crossing the cycleway at undesignated points • No amenity upgrades are proposed on the southern verge in anticipation of future kerb extension upgrades. • A large area of planting is proposed where a kerb extension is planned along Northumberland Street, with opportunities for seating integrated into the design. • The form of this design mirrors the existing garden bed forms in the Macquarie Street pedestrian mall, ensuring continuity in design language within the CBD. • Community consultation may be undertaken to explore designs that incorporate Country design opportunities or community activation. • The use of existing awnings along the street as shelter for patrons will reduce visual and physical clutter within the streetscape.

Traffic engineering considerations	• The section of Moore Street between George Street and Bathurst Street has been designed to prioritise active and public transport, acting as a key movement corridor. • A separated cycleway is provided along this section, with dedicated cycle crossings at the intersections of Macquarie Street and Northumberland Street. • The existing scramble crossing at Macquarie Street presents a unique design challenge. To accommodate all users, the intersection will be upgraded to a raised crossing while maintaining the scramble function. Cyclists will use a shared crossing and must proceed with caution to ensure safe interactions with pedestrians. • The proposed lane configuration includes a single eastbound bus-only lane and dual westbound traffic lanes, one of which is a dedicated bus lane. • Moore Street between George Street and Bathurst Street will be converted to a one-way westbound flow for general traffic, with a contraflow bus lane for eastbound movements. • As a result, right turns from Northumberland Street and Macquarie Street onto Moore Street will be prohibited for general traffic. Only through and left turns at Northumberland Street and left turns at Macquarie Street will be permitted. • The separated cycleway continues seamlessly to the Bathurst Street intersection, ensuring uninterrupted connectivity for cyclists. • All parking along this section of Moore Street will be removed to accommodate this layout. • Floating bus islands have been introduced on the northern side to reduce conflicts between cyclists on the cycleway and passengers boarding and alighting at bus stops. • Kerbside bus stops on the southern side will remain as per existing conditions. • The integration of a separated cycleway, floating bus stops, and raised crossings supports both cycling and pedestrian safety. This approach maintains safe, efficient movement for all modes of transport.
Civil engineering considerations	• Kerb lines will require reconstruction for both verges of Moore Street between George Street and Bathurst Street. This will result in kerb inlet pits needing to be reconstructed to suit the new kerb lines. • An assessment of the existing drainage and utilities has been conducted using feature survey and BYDA information. Additional quality level A and B surveys are required to assess the impact on below-ground utilities. • The drainage pits located at the Macquarie Street intersection will need to be raised to accommodate the new raised crossing. • A single junction pit at the intersection with Northumberland Street will require relocation as it currently sits on the proposed kerb line. Drainage pit relocations will be documented in the next design phase. • Two existing water stop valves and comms pits will need to be raised to sit within the new floating bus stop island between George Street and Macquarie Street. • No other utility pits have been identified that require relocation along this section of the alignment. • Existing TCS poles will be adjusted to suit the new intersection designs along this section of Moore Street.

5.4.4 Moore Street Residential (Bathurst Street to Copeland Street)

Figure 10 Moore Street residential section (between Bathurst Street to Copeland Street)



Moore Street, facing west

Table 14 Segment 8 – Design considerations

Urban design considerations	• Moore Street section accommodates multiple transport modes while prioritising safety and aesthetics. • Residential buildings dominate, with some commercial properties at the eastern end. • Footpath narrowed to 2.5m due to limited space but still considers urban amenity. • Trees planted in tree grates within the footpath for shade and a greener environment. • No garden beds due to Liverpool City Centre Public Domain Technical Manual (LCC, 2024) restrictions, but tree pits support walkability and protection from elements. • Clear, unobstructed space for active travel maintained. • Prioritises pedestrians and cyclists at Castlereagh Street intersection for safety and accessibility. • Continuous cycleway connection and raised pedestrian crossing improve movement through the intersection. • Transition from cycleway to shared path at western end of Moore Street ensures clarity and safety for cyclists at Copeland Street.
Traffic engineering considerations	• Moore Street between Bathurst Street and Copeland Street prioritises active and public transport, local access, and movement. • Separated cycleway with breaks in the median for residential driveway access. • Dedicated cycle crossing at Bathurst Street intersection and right turn facilities for cyclists onto Bathurst Street. • On-road cycleway provided across Castlereagh Street intersection with a painted carriageway to alert drivers.

	• Cycleway does not connect with pedestrian crossing due to geometric constraints. • Lane configuration includes dual lanes in each direction with dedicated bus lanes in both directions. • Eastbound bus lane in the middle of the carriageway allows left-turning vehicles. • Westbound bus lane transitions from kerbside to middle of the carriageway. • All parking along Moore Street is removed, with one kerbside bus stop remaining unchanged. • Cycleway transitions into a shared path at Copeland Street, ensuring a connected active travel corridor.
Civil engineering considerations	• Significant kerb line changes proposed to accommodate the new lane cycleway. • Existing drainage and utilities assessed using feature survey and BYDA data. • Additional A and B surveys needed to assess below-ground utilities. • New kerb inlet pits required along both verges. • Detailed drainage assessment required to determine the location of new inlet pits. • Utilities pits will require relocation or adjustments within the verge or roadway. • Consultation with relevant utility authorities required for acceptance of changes. • Two large communications pits at Castlereagh Street intersection need adjustment for raised crossings. • One large communications pit at Bathurst Street intersection needs relocation to clear new kerb. • Aerial assets that may require adjustments • Overhead power poles along both verges must be relocated underground due to reduced verge width.

5.5 Streetlighting Assessment

Assessment of the existing lighting infrastructure has been carried out, based on topology, street lighting register and equipment list provided by the client. The intersection assessment was carried out in AGI32, while the straight sections were assessed by PerfectLite. Refer to Appendix D for the preliminary assessment report.

5.5.1 Calculation Summary - Intersections

The assessment indicates that, with the exception of the George Street and Moore Street intersection, Moore Street and Bathurst Street intersection and Moore Street and Northumberland Street intersection, all the other intersections are non-compliant with the relevant design parameters listed above. The following outlines key considerations as part of the design:

- At the George Street residential zone (between Campbell Street and Lachlan Street), both intersections are poorly lit, with non-compliance to both minimum and uniformity. A full upgrade should be considered
- George Street and Elizabeth Street require additional lighting on the southern side. Otherwise, it is well-lit
- The George Street and Railway Street intersection requires clarification. As the intersection is located near a retail precinct it is assumed that the area is to comply with Category V1. This area would be close to compliance if the intended category is V2
- The centre of the Moore Street and Macquarie Street intersection is not sufficiently lit. Additional light poles are required.
- The intersection of George Street and Castlereagh Street is only illuminated by a single streetlight located at the southeastern corner. Additional lighting is required.

Calculation Summary							
Label	Units	Avg	Max	Min	Required Min	Max/Min	Required Max/Min
George-Campbell - V3	Lux	12.86	44.0	1.0	>7.5	44.00	8
George-Elizabeth - V1	Lux	40.55	69.6	5.0	>15	13.92	8
George-Lachlan - V3	Lux	9.73	46.5	1.9	>7.5	24.47	8
George-Lachlan Median E	Lux	6.83	14.6	3.6	>7.5	4.06	8
George-Lachlan Median N	Lux	26.69	46.8	8.7	>7.5	5.38	8
George-Lachlan Median S	Lux	3.53	5.7	2.1	>7.5	2.71	8
George-Lachlan Median W	Lux	11.53	23.8	5.7	>7.5	4.18	8
George-Moore - V1	Lux	36.26	49.9	18.3	>15	2.73	8
George-Railway - V1	Lux	22.50	33.1	9.7	>15	3.41	8
Moore-Bathurst - V3	Lux	57.81	120.0	16.2	>7.5	7.41	8
Moore-Castlereagh - V3	Lux	10.91	29.3	3.3	>7.5	8.88	8
Moore-Macquarie - V1	Lux	13.03	29.6	6.4	>15	4.63	8
Moore-Northumber - V1	Lux	44.38	64.2	17.1	>15	3.75	8

Figure 11 Intersection Lighting Assessment Results

5.5.2 Calculation Summary – Straight Sections

Based on the PerfectLite assessment, only the V1 section of Moore Street is compliant. Due to the width of the carriageway (generally four lanes / 12m wide), the 36-50m spacing on George Street (single-sided) and Moore Street (staggered) is not sufficient.

5.5.3 Additional Observation – Westfield Zebra Crossing

Due to the insufficient information, tilting angle and orientation, of the installed floodlights, a full analysis of this crossing has not been carried out. However, based on the specification from the Liverpool City Council lighting asset register, as well as observations from Google Maps it is expected that the floodlight installation should meet the category PX1 requirements..

6.0 Safety and risk assessment

Ensuring safety is a critical component of the project, necessitating a comprehensive evaluation of potential risks across the design, construction, operation, and decommissioning phases. This section outlines the key safety considerations and the Safety in Design framework that will be implemented to identify and address hazards early in the process. Additionally, a Road Safety Audit will be conducted at a later design stage to further assess and mitigate any remaining risks.

The Safety in Design assessment will be completed after the submission of the 50% design to identify risks or hazards. Each item in the register has been evaluated using a risk matrix, highlighted in Figure 12.

- **Buildability -** The buildability assessment focuses on risks during construction, particularly those related to site demolition, noise impacts, and potential conflicts between construction vehicles and the general public. It also considers the physical risks to workers, such as handling heavy materials that could cause injuries and interactions with utilities that may pose additional hazards.
- **Maintainability-** The maintainability assessment examines the risks associated with keeping the cycleway in good condition once completed. Key considerations include the challenges of traffic management during maintenance works, as well as safety risks arising from the accumulation of litter, leaves, and glass, which could increase the likelihood of slips, trips, and falls. Uneven surfacing and the fading of cycleway markings over time are also assessed, as they may contribute to conflicts between users.
- **Useability -** The usability assessment evaluates potential operational risks that could affect how the cycleway functions. It considers conflicts between different users, such as vehicles obstructing the cycleway, pedestrians inadvertently walking within it, and car doors opening into the path of cyclists. The assessment also acknowledges the risk of cyclists using pedestrian footpaths when the cycleway is blocked, leading to further conflicts.
- **Decommissioning -** The decommissioning assessment considers risks associated with the eventual removal or modification of the cycleway. It examines the potential for structural degradation over time, which may increase the risk of trips and falls. Additionally, poor site and traffic management during decommissioning could create conflicts between road users, cyclists, and pedestrians, posing further safety challenges.

Figure 12 Safety in design risk matrix

Safety in Design

Risk Matrix

Step 1 – Consider the Consequences		**Step 2 – Consider the Probability**		**Step 3 – Calculate the Risk**						
What are the consequences of this incident occurring?		What is the probability of the consequence identified in Step 1 happening?		**Step 1 Consequences** - select the correct line. **Step 2 Probability** - select the correct column. **Step 3 Risk Score** - the risk score is determined where the two ratings cross on the matrix below.						
Consequence		**Description**				**Consequence**				
						1	**2**	**3**	**4**	**5**
1	Insignificant – No injury or illness	A	Almost Certain - It's occurring now; or it is likely to occur within the near future; or it's a common or repeating occurrence	**Probability**	A	15	7	4	2	1
2	Minor - Injury or illness requiring first aid treatment	B	Likely - It will probably occur in the near future; it has been known to occur, or "it has happened"		B	16	11	8	5	3
3	Moderate - Injury or illness requiring medical treatment	C	Possible - Could occur in the near future, but it most likely won't; "I've heard of it happening"		C	21	17	12	9	6
4	Major - Serious or extensive injury or illness	D	Unlikely - May occur, but it would not be anticipated to happen		D	23	22	18	13	10
5	Extraordinary - Fatality or permanent disability	E	Rare - Occurrence is unlikely and requires exceptional circumstances, even in the long term future.		E	25	24	20	19	14

Calculation of Risk - 1-6 are considered very high risk , 7-14 high risk, 15-20 moderate risk and over 21 considered low risk.

Hierarchy of Controls – The hierarchy or controls is to be considered in controlling risk - Elimination, Substitution, Isolation, Engineering, Administration, Personal protective equipment

7.0 Next Steps

The next steps and key deliverables for stage 3 are presented in Table 15.

Table 15 Next steps and key deliverables for Stage 3

Next step	Description	Owner
Provide comments on 50% Design	Council to review 50% design documentation submitted in Stage 2, and provide a consolidated set of comments	Liverpool City Council
Decisions required on key items highlighted in the design issues register	Council to provide guidance and instruction on the design direction based on the key design risks highlighted in the 50% Design. The design issues register is presented in Appendix C	Liverpool City Council
Safety in Design workshop and report.	Stakeholders to meet to undertake a Safety in Design workshop to discuss safety issues. The outcomes will be documented in a Safety in Design report	Liverpool City Council / AECOM
Provide consultation materials	Prepare photomontages and all inputs into the consultation materials prepared by Council	AECOM
Prepare 80% concept design	The next design issue will be the 80% concept design and consultation drawings and collateral incorporating the outcomes of the above workshops and Council input.	AECOM
Prepare 100% design drawings and design report	Based on the feedback received at 80%, prepare a full 100% concept design drawing set, including: Paving layout, tree pits, street furniture, extent of works, existing and new kerb alignment, existing and new trees, planting, light poles, traffic signals, taxi ranks, loading zones, cycleway provision, line marking, phone booths and awnings. Service plans including existing services, conflicts, proposed amendments, relocations and new services Parking diagrams showing overall loss/gain of spaces Diagrams of existing and proposed traffic arrangements	AECOM
Tree management plan	Prepare a Tree Management Plan showing all trees existing, new and to be removed including photos and details.	AECOM
Traffic Management Plan	Prepare a Traffic Management Plan highlighting the changes to traffic operations as part of the project for endorsement by Transport for NSW	AECOM
Draft Traffic Signal Plans	Prepare draft Traffic Signal Plans for AIP approval from Transport for NSW	AECOM
Road Safety Audit	Prepare a Road Safety Audit at 80% design to incorporate safety findings into the 100% concept design.	AECOM

Appendix A

Design Drawings

ISO A1 594mm x 841mm

LIVERPOOL CITY COUNCIL CYCLEWAYS
GEORGE STREET & MOORE STREET

LOCATION PLAN
SCALE :1:5000

DRAWING LIST

DRAWING NUMBER	DRAWING TITLE
General	
60737859-SHT-00-1000-CI-0001	COVER SHEET AND DRAWING INDEX
60737859-SHT-00-1000-CI-0011	OVERALL KEY PLAN
Arrangements	
60737859-SHT-00-1000-CI-0101	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0102	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0103	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0104	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0105	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0106	GENERAL ARRANGEMENT PLAN
60737859-SHT-00-1000-CI-0107	GENERAL ARRANGEMENT PLAN

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CONSULTANT
AECOM Australia Pty Ltd
A.B.N 20 093 846 925
www.aecom.com

PROJECT
MOORE STREET AND GEORGE STREET CYCLEWAY

CLIENT
LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR
0 125 250 m
1:5000

PROJECT MANAGEMENT INITIALS

P.DAWADI	G. DONAHOO	M. MALIA
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

ISSUE/REVISION

B	21.03.25	50% CONCEPT DESIGN
A	16.12.24	PREFERRED OPTION
I/R	DATE	DESCRIPTION

PROJECT NUMBER
60737859

SHEET TITLE
COVER SHEET & DRAWING INDEX

SHEET NUMBER
60737859-SHT-00-1000-CI-0001

ISO A1 594mm x 841mm

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PROJECT
MOORE STREET AND GEORGE STREET CYCLEWAY

CLIENT
LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR
0 62.5 125 m
1:2500

PROJECT MANAGEMENT INITIALS

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DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

ISSUE/REVISION

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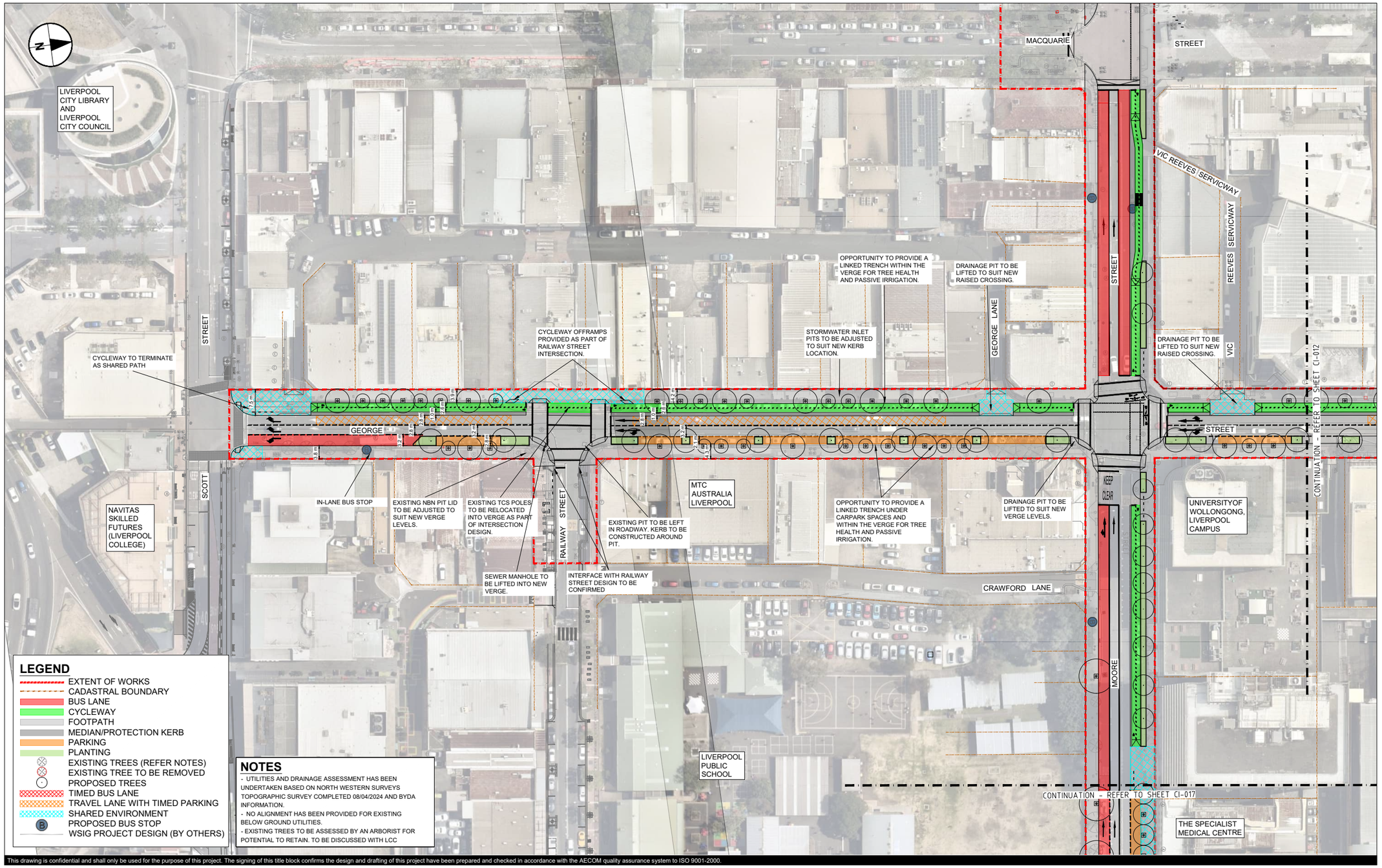
I/R	DATE	DESCRIPTION

PROJECT NUMBER
60737859

SHEET TITLE
GENERAL KEY PLAN

SHEET NUMBER
60737859-SHT-00-1000-CI-0011

ISO A1 594mm x 841mm



LEGEND

- EXTENT OF WORKS
- CADASTRAL BOUNDARY
- BUS LANE
- CYCLEWAY
- FOOTPATH
- MEDIAN/PROTECTION KERB
- PARKING
- PLANTING
- EXISTING TREES (REFER NOTES)
- EXISTING TREE TO BE REMOVED
- PROPOSED TREES
- TIMED BUS LANE
- TRAVEL LANE WITH TIMED PARKING
- SHARED ENVIRONMENT
- PROPOSED BUS STOP
- WSIG PROJECT DESIGN (BY OTHERS)

NOTES

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- EXISTING TREES TO BE ASSESSED BY AN ARBORIST FOR POTENTIAL TO RETAIN. TO BE DISCUSSED WITH LCC

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PROJECT
MOORE STREET AND GEORGE STREET CYCLEWAY

CLIENT
LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR
0 12.5 25 m
1:500

KEY PLAN

PROJECT MANAGEMENT INITIALS

P.DAWADI	G. DONAHOO	M. MALIA
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
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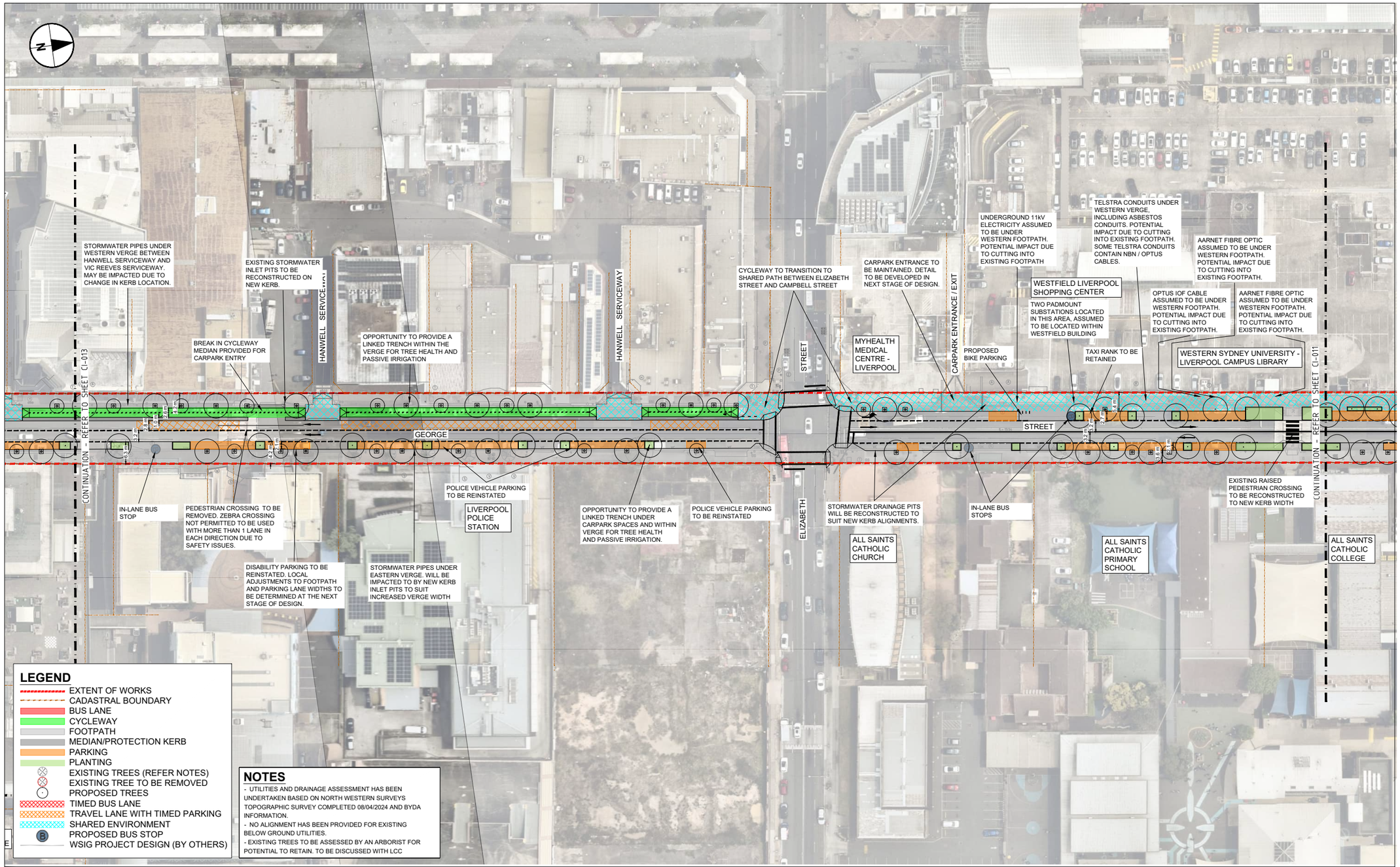
PROJECT NUMBER
60737859

SHEET TITLE
GENERAL ARRANGMENT
SHEET 1
PREFERRED OPTION

SHEET NUMBER
60737859-SHT-00-1000-CI-0101

ISO A1 594mm x 841mm



LEGEND

- EXTENT OF WORKS
- CADASTRAL BOUNDARY
- BUS LANE
- CYCLEWAY
- FOOTPATH
- MEDIAN/PROTECTION KERB
- PARKING
- PLANTING
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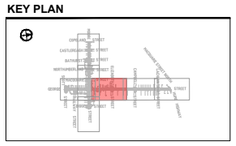
CLIENT
LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR
0 12.5 25 m
1:500

KEY PLAN



PROJECT MANAGEMENT INITIALS

P.DAWADI	G. DONAHOO	M. MALIA
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

ISSUE/REVISION

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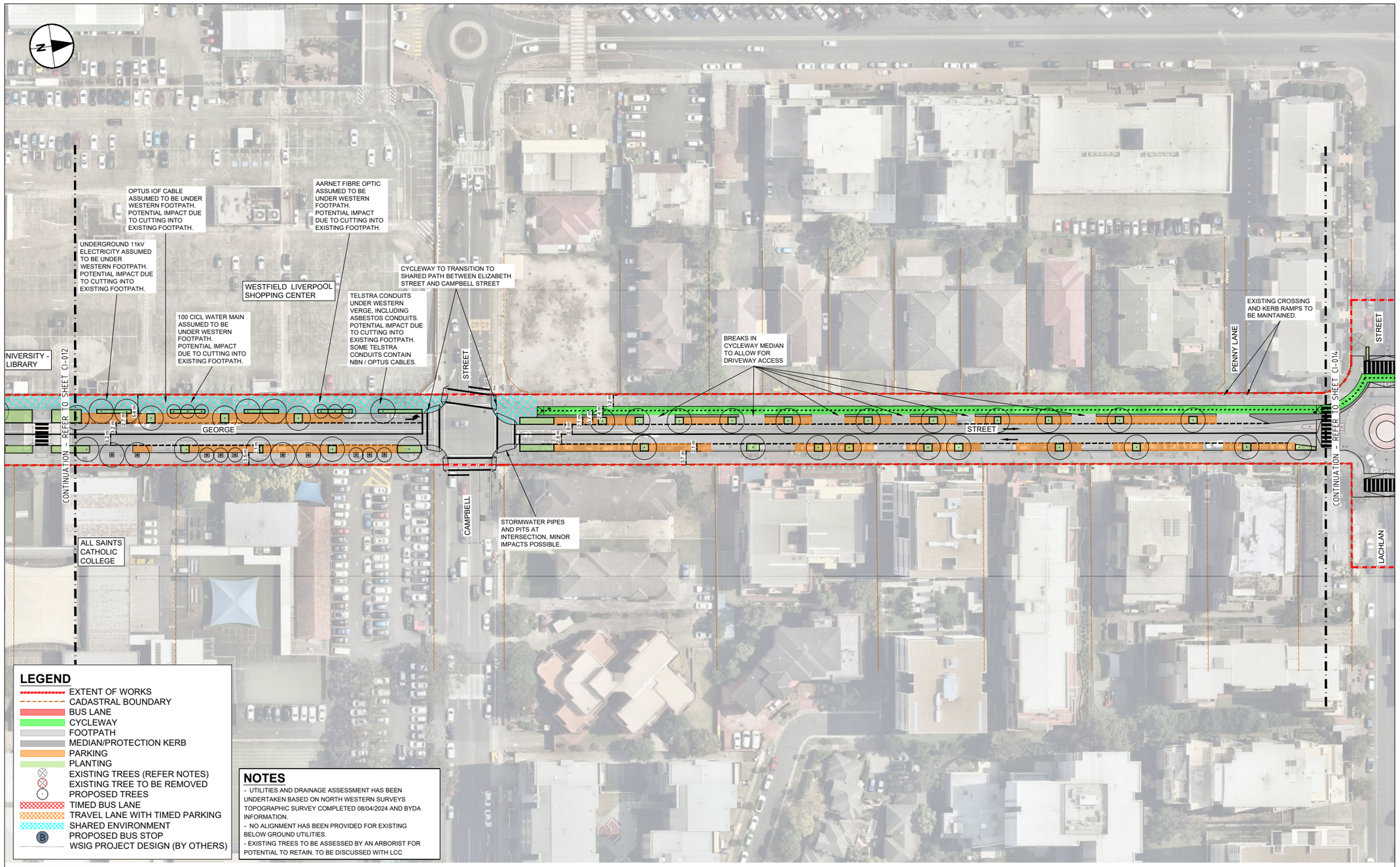
PROJECT NUMBER
60737859

SHEET TITLE
GENERAL ARRANGMENT
SHEET 2
PREFERRED OPTION

SHEET NUMBER
60737859-SHT-00-1000-CI-0102

ISO A1 594mm x 841mm



LEGEND

- EXTENT OF WORKS
- CADASTRAL BOUNDARY
- BUS LANE
- CYCLEWAY
- FOOTPATH
- MEDIAN/PROTECTION KERB
- PARKING
- PLANTING
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PROJECT
MOORE STREET AND GEORGE STREET CYCLEWAY

CLIENT
LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR
0 12.5 25 m
1:500

KEY PLAN

PROJECT MANAGEMENT INITIALS

P.DAWADI	G. DONAHOO	M. MALIA
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

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I/R	DATE	DESCRIPTION
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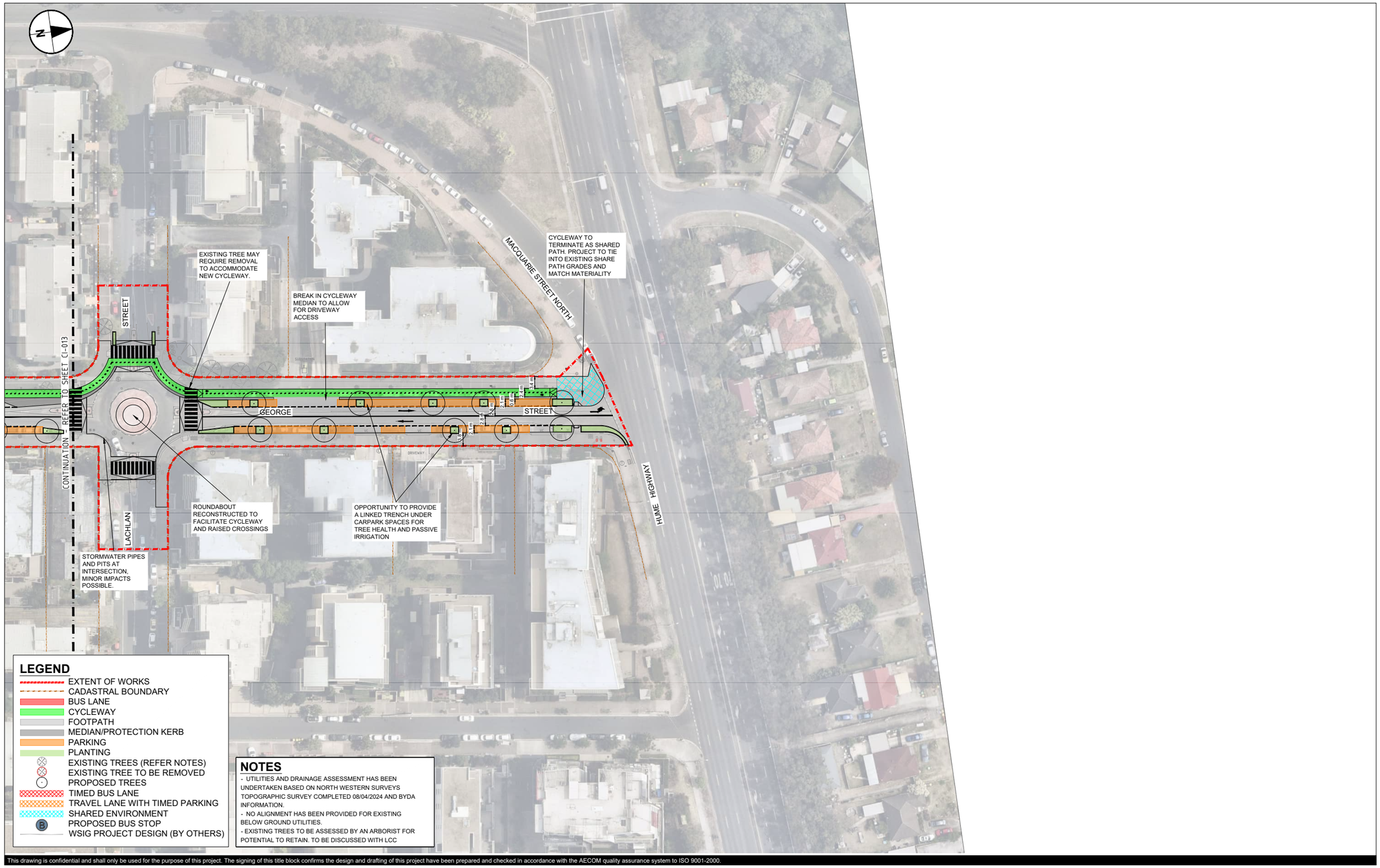
PROJECT NUMBER
60737859

SHEET TITLE
GENERAL ARRANGMENT
SHEET 3
PREFERRED OPTION

SHEET NUMBER
60737859-SHT-00-1000-CI-0103

ISO A1 594mm x 841mm



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PROJECT
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CLIENT
LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR
0 12.5 25 m
1:500

KEY PLAN

PROJECT MANAGEMENT INITIALS

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DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

ISSUE/REVISION

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I/R	DATE	DESCRIPTION

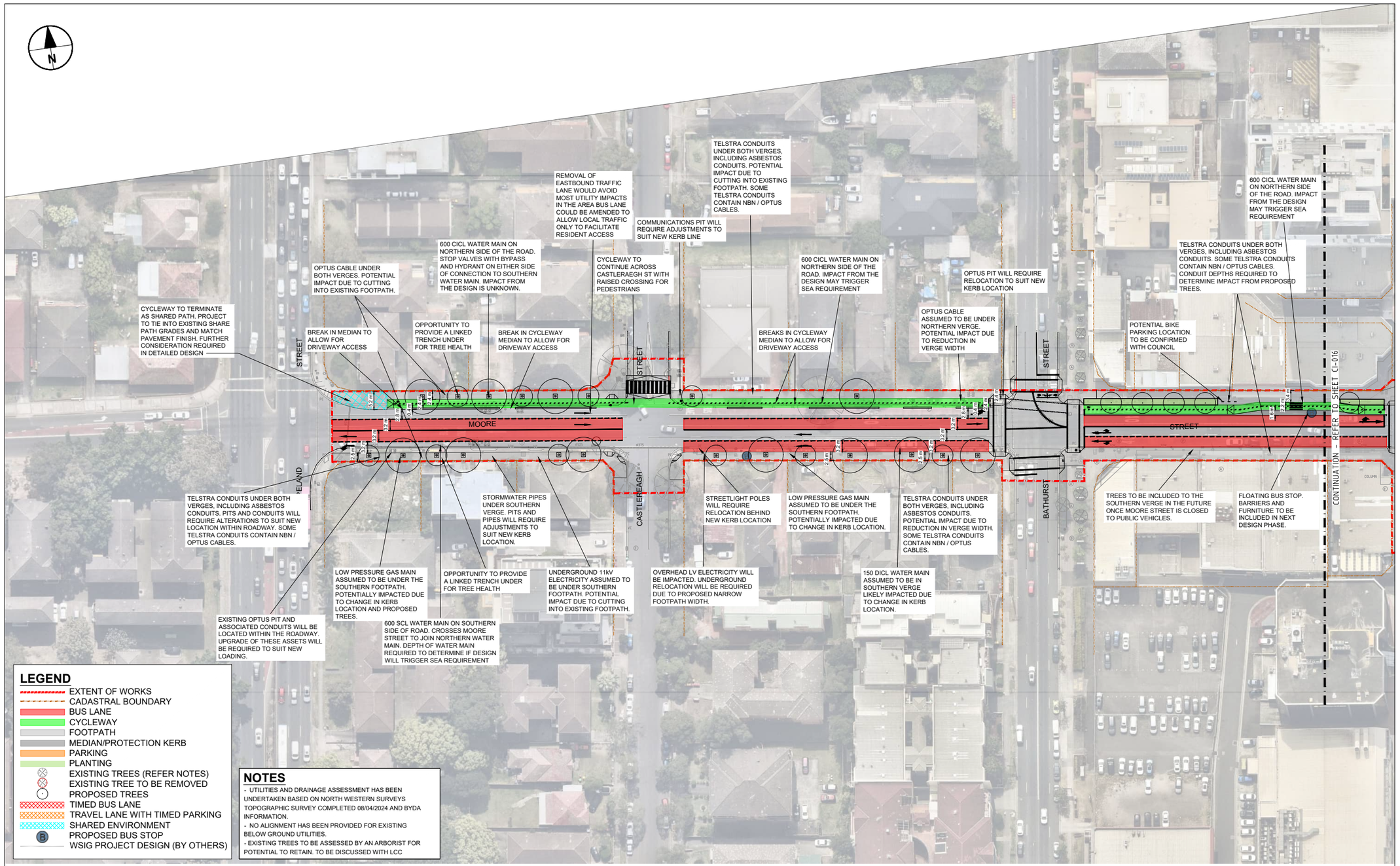
FOR INFORMATION ONLY

PROJECT NUMBER
60737859

SHEET TITLE
GENERAL ARRANGMENT
SHEET 4
PREFERRED OPTION

SHEET NUMBER
60737859-SHT-00-1000-CI-0104

ISO A1 594mm x 841mm



LEGEND

- EXTENT OF WORKS
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- BUS LANE
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PROJECT

MOORE STREET AND GEORGE STREET CYCLEWAY

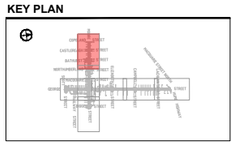
CLIENT

LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR

0 12.5 25 m
1:500

KEY PLAN



PROJECT MANAGEMENT INITIALS

P.DAWADI	G. DONAHOO	M. MALIA
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
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FOR INFORMATION ONLY

PROJECT NUMBER

60737859

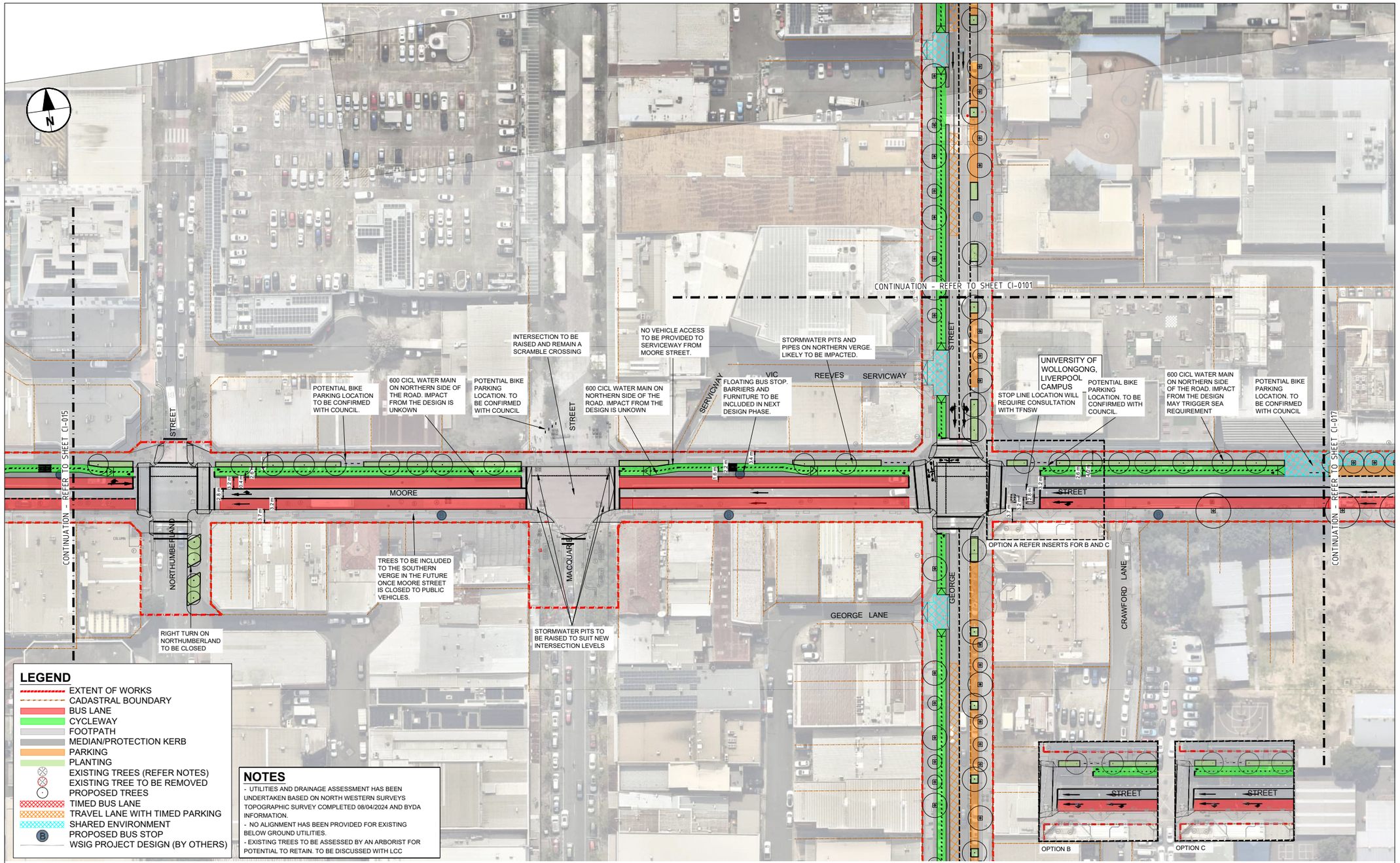
SHEET TITLE

GENERAL ARRANGMENT
SHEET 5
PREFERRED OPTION

SHEET NUMBER

60737859-SHT-00-1000-CI-0105

ISO A1 594mm x 841mm



LEGEND

- EXTENT OF WORKS
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- BUS LANE
- CYCLEWAY
- FOOTPATH
- MEDIAN/PROTECTION KERB
- PARKING
- PLANTING
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PROJECT
MOORE STREET AND GEORGE STREET CYCLEWAY

CLIENT
LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR
0 12.5 25 m
1:500

KEY PLAN

PROJECT MANAGEMENT INITIALS

P.DAWADI	G. DONAHOO	M. MALIA
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

ISSUE/REVISION

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FOR INFORMATION ONLY

PROJECT NUMBER
60737859

SHEET TITLE
GENERAL ARRANGMENT
SHEET 6
PREFERRED OPTION

SHEET NUMBER
60737859-SHT-00-1000-CI-0106

ISO A1 594mm x 841mm

LEGEND

- EXTENT OF WORKS
- CADASTRAL BOUNDARY
- BUS LANE
- CYCLEWAY
- FOOTPATH
- MEDIAN/PROTECTION KERB
- PARKING
- PLANTING
- EXISTING TREES (REFER NOTES)
- EXISTING TREE TO BE REMOVED
- PROPOSED TREES
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PROJECT
MOORE STREET AND GEORGE STREET CYCLEWAY

CLIENT
LIVERPOOL CITY COUNCIL
33 MOORE STREET, LIVERPOOL
NSW 2170

SCALE BAR
0 12.5 25 m
1:500

KEY PLAN

PROJECT MANAGEMENT INITIALS

P.DAWADI	G. DONAHOO	M. MALIA
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
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FOR INFORMATION ONLY

PROJECT NUMBER
60737859

SHEET TITLE
GENERAL ARRANGMENT
SHEET 7
PREFERRED OPTION

SHEET NUMBER
60737859-SHT-00-1000-CI-0107

Appendix B

Safety in Design register

Design Safety Assessment (DSA)

Design Safety Assessment		Date	4-Mar-25
Project Name	Liverpool City Council Cycleways		
Project Location	George Street and Moore Street, Liverpool NSW		
Project Team	Liverpool City Council (LCC): AECOM: Martin Mallia, Belinda Dods, Sara Hu, Trudie Lee-Jones, Philip Shiels		
Business Unit	CPP		
Designer or Design Consultants	AECOM		

					INITIAL ASSESSMENT				REVISED ASSESSMENT					
	Life Phase	Hazard Identified	Location and work activity of WHS Hazard	Potential impact of hazard	Persons Affected	Likelihood	Consequences	Risk Rating	Alternatives/Suggested Controls	Likelihood	Consequences	Risk Rating	Responsibility/ Management	Residual Risk	Additional Requirements
1.0	**Buildability**														
1.1	Site Establishment	Traffic Management	Entire site	Driver's confusion, collisions, insufficient space for larger vehicles	Public	B	3	8	Submit staging of works and traffic management plan for approvals, provide sufficient signage and traffic management, stage trial setups if unclear	C	3	12	Project manager, Contractor	non compliance	Ensure traffic management plant works with the staging of works and movement of construction vehicles
1.2	Demolition	Removal, delivery and storage of materials	Entire site	Truck movements, materials handling ,safe storage	Principal , Contractor, sub contractor, public.	B	3	8	Identify staging of works, storage locations, advise Contractor on responsibilities to obtain approvals and comply with WHS requirements.	C	3	12	Project manager, Contractor	non compliance	Preparation and approval of required traffic management plans, and road occupation permits. Ongoing monitoring and management during construction.
1.3	Demolition	Noise impacting nearby schools, businesses and residents	Entire site	Noise, dust, vibration, projectiles.	Principal , Contractor, public.	D	3	18	Provide noise mitigation where required. Keep public informed of construction program and scope. Staging of works to keep access and avoid sensitive hours	E	3	20	Project manager, Contractor		Contractor to implement noise mitigation measures and communications as part of CEMP
1.4	Demolition	Conflict between construction activity and use of driveways by general public	Project wide - demolition and construction of road surfaces etc.	Construction traffic movements. Being struck by vehicles	Principal , Contractor, sub contractor, public,	B	3	8	Identify staging of works, advise Contractor on responsibilities to obtain approvals and comply with WHS requirements.	C	3	12	Project manager, Contractor	non compliance	Preparation and approval of required traffic management plans, and road occupation permits. Ongoing monitoring and management during construction.
1.5	Installation of kerbs, stone paving and landscaping	Construction Method	Cutting paving, kerbs to desired size and shape.	Noise, dust, vibration, projectiles.	Principal , Contractor, sub contractor, public.	B	3	8	The design standardises material sizes allowing stone to be delivered in pre-cut modules. The requires stone cutting to be carried away from the general public and if unavoidable, the appropriate protection and control measures to be undertaken.	C	3	12	Project manager, Contractor	non compliance	Preparation and approval of required traffic and pedestrian management plans, and road occupation permits. Ongoing monitoring and management during construction.
		Working Environment	Heavy lifting	Risk of back injuries	Contractor	B	3	8	Use of appropriate machinery such as mechanical kerb lifters, stage implementation to reduce carrying distance of materials. Advise Contractor on responsibilities to obtain approvals and comply with WHS requirements.	C	2	17	Project manager, Contractor	non compliance	Preparation and approval of required traffic management plans, and road occupation permits. Ongoing monitoring and management during construction.
1.6	Utilities or Services	Utilities and Services	Recently installed utilities not being tracked	Accidental conflict with utility. Service disruption, possible personal injury and equipment damage	Principal , Contractor, sub contractor, public.	C	5	6	Obtain work as executed drawings from service providers as early as possible. Complete service locating before mobilising to site.	C	3	12	Project manager, Contractor	Accidental impact /disruption during construction.	Preparation and approval of required traffic management plans, and road occupation permits. Ongoing monitoring and management during construction.
		Utilities and Services	Clearance to underground conduits	Accidental conflict with utility. Service disruption, possible personal injury and equipment damage	Principal , Contractor, sub contractor, public.	C	5	6	Identify all overhead services on site and identify clearances. Provide tiger tails on overhead wires.	C	3	12	Project manager, Contractor	Accidental contact with utility.	Preparation and approval of required traffic management plans, and road occupation permits. Ongoing monitoring and management during construction.
1.7	Construction of cycleway alongside other construction sites eg. Underground services relocations, substation relocation, and construction sites	Utilities and Services	Multiple contractors and construction activities and programs	Vehicles double parking or stopping in unsafe locations due to reduced parking availability during construction	Contractors and general public	C	1	21	Gain an understanding of current and proposed activities to ensure programmed works don't clash or result in abortive work	D	1	23	Project Manager, contractor	non compliance	Preparation and onging management of construction program. Ongoing monitoring and management during construction
1.8	Site establishment	Interface with LCC; land is owned by LCC	All location	Delay of the site estalishment	Project Manager, Principal Contractor	C	1	21	Keep contact with LCC	D	1	23	Project manager, Principal Contractor	Risk significantly reduced	
1.9	Construction	Danger to workers and public safety during construction	All location	Danger to workers and public safety during construction	Project Manager, Principal Contractor	D	3	18	Contractor to comply with LCC's WHS policy and requirements, submit Site Management Plan and Safe Work Method Statement as necessary	E	3	20	Project manager, Principal Contractor	Accident or unforeseen circumstances during construction	Contractor to provide site inductions for all / new employees and daily toolbox talks of construction works to be carried out

Design Safety Assessment (DSA)

Design Safety Assessment		Date	4-Mar-25
Project Name	Liverpool City Council Cycleways		
Project Location	George Street and Moore Street, Liverpool NSW		
Project Team	Liverpool City Council (LCC): AECOM: Martin Mallia, Belinda Dods, Sara Hu, Trudie Lee-Jones, Philip Shiels		
Business Unit	CPP		
Designer or Design Consultants	AECOM		

					INITIAL ASSESSMENT				REVISED ASSESSMENT					
Life Phase	Hazard Identified	Location and work activity of WHS Hazard	Potential impact of hazard	Persons Affected	Likelihood	Consequences	Risk Rating	Alternatives/Suggested Controls	Likelihood	Consequences	Risk Rating	Responsibility/ Management	Residual Risk	Additional Requirements
2.0 Maintainability														
2.1 Maintenance	Slips, Trips and Falls	Cleaning of cycleway	Hazard to cyclists of litter/gravel/glass/ plant material collecting on cycleway	Maintenace team, cyclist and pedestrians	B	1	**16**	Keep maintenance crew informed on the frequency for cleaning Scehdule cleaning for after hours during which the cycleway can be closed without impacting cyclists	C	2	**17**	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
2.2 Maintenance	Traffic Management	Waste collection activities	Reduced road carriageway and additional kerb infrastructure	Maintenace team, cyclist and pedestrians	B	1	**16**	Consult with maintenance crew on the needs for kerb side bin collection	C	2	**17**	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
2.3 Maintenance	Traffic Management	Proposed landscaping / garden beds	Maintenance vehicle occupying road, cycleway or footpath for maintenance	Maintenace team, cyclist and pedestrians	B	1	**16**	Design to propose vegetation with low maintenance requirements. This will reduce the frequency of maintenance required	C	2	**17**	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
2.4 Maintenance	Traffic Management	Existing electrical pits	Maintenance vehicle occupying road, cycleway or footpath for maintenance	Ausgrid, cyclist and pedestrians	B	1	**16**	Consult with Ausgrid on their maintenance needs and any concerns with access	C	2	**17**	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
2.5 Maintenance	Uneven cycleway surfacing	Post construction works affecting the integrity and condition of the cycleway surfacing (e.g. trench reinstatement)	Risk of cyclist accident due to uneven riding surface	Cyclists	D	3	**18**	Ensure construction quality of works. Smooth riding surface is maintained at all times post construction and that inspections are undertaken following any excavation works to ensure appropriate reinstatement.	E	3	**20**	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
2.6 Maintenance	Fading or damage to painted Asphalt	Cycleway	Reduced awareness of the share way	Cyclists and motorists	C	2	**17**	Ensure the product used for painted asphalt is compliant to LCC's specification and is a common product for maintenance by LCC	D	3	**18**	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
2.7 Maintenance	Damage to constructed cycleway over time by wear or accidental impacts	All locations	Reduce useability, increase risks for trips and falls	Pedestrian, Cyclists and motorists	D	3	**18**	Ensure the product used for construction is compliant to LCC's specification and is a common product for maintenance by LCC	E	3	**20**	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication

Design Safety Assessment (DSA)

Design Safety Assessment		Date	4-Mar-25
Project Name	Liverpool City Council Cycleways		
Project Location	George Street and Moore Street, Liverpool NSW		
Project Team	Liverpool City Council (LCC): AECOM: Martin Mallia, Belinda Dods, Sara Hu, Trudie Lee-Jones, Philip Shields		
Business Unit	CPP		
Designer or Design Consultants	AECOM		

					INITIAL ASSESSMENT				REVISED ASSESSMENT					
	Life Phase	Hazard Identified	Location and work activity of WHS Hazard	Potential impact of hazard	Persons Affected	Likelihood	Consequences	Risk Rating	Alternatives/Suggested Controls	Likelihood	Consequences	Risk Rating	Responsibility/ Management	Residual Risk	Additional Requirements
4.0	**Decommissioning**														
4.1	Decommissioning	Damage to constructed cycleway over time by wear or accidental impacts	All locations	Reduce useability, increase risks for trips and falls	Pedestrian, Cyclists and motorists	D	3	**18**	Ensure the product used for construction is compliant to LCC/TfNSW specification and is a common product for maintenance and replacement by the LCC. Ensure as-built drawings are submitted to the LCC's requirement so all completed works are documented	E	3	**20**	Project manager, Principal Contractor	Risk Reduced but cannot completely be removed	
4.2	Decommissioning	Poor site and traffic management during decomissioning	Overall site	Conflicts with road traffic and works, impact on traffic safety from traffic control measures	Public, Contractor	D	3	**18**	Any reasphalting or repair works to be undertaken with approved traffic control measures	E	2	**24**	Contractor	Works will be required within carriageways, essential that appropriate management techniques are applied.	
4.3	Decommissioning	Injury from conflicts between vehicles, motorists, pedestrians, cyclists and construction staff	Overall Project	Conflicts between construction staff and truck and vehicle movements through the construction site	Construction staff	D	2	**22**	Haul routes to be clearly defined and separated from pedestrian routes. Design to consider improving traffic calming for vehicles in the highly dense area of pedestrians and cyclists.CTMP to capture	E	2	**24**	Contractor/Designer	Construction traffic will be required to move through narrow corridors in close proximity to construction staff	
4.4	Decommissioning	Disconnection of downpipes during decomissioning	Overall Project	Stormwater discharge from properties interrupted, causing backup	Residents, public	D	1	**23**	Ensure timing of works allows disconnection and temporary reconnection of stormwater to outflow.	E	1	**25**	Project Manager, Contractor	Risk of property damage cannot be completely eliminated	
4.5	Decommissioning	Provision and maintaining record keeping for future reference	Overall Project		Principal contractor and CP&P and CITO	D	1	**23**	Obtain As-built study, audits, design, warranties. CTMP, GPR.	E	1	**25**	Contractor, City & CITO	Passing docs on to new staff.	

Design Safety Assessment (DSA)

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Project Name	Liverpool City Council Cycleways		
Project Location	George Street and Moore Street, Liverpool NSW		
Project Team	Liverpool City Council (LCC): AECOM: Martin Mallia, Belinda Dods, Sara Hu, Trudie Lee-Jones, Philip Shiels		
Business Unit	CPP		
Designer or Design Consultants	AECOM		

						INITIAL ASSESSMENT				REVISED ASSESSMENT					
	Life Phase	Hazard Identified	Location and work activity of WHS Hazard	Potential impact of hazard	Persons Affected	Likelihood	Consequences	Risk Rating	Alternatives/Suggested Controls	Likelihood	Consequences	Risk Rating	Responsibility/ Management	Residual Risk	Additional Requirements
3.0	**Useability**														
3.01	Operation	Clash with different users of the cycleway / shared environments / footpath	Cycleway adjacent to footpath	Collision	cyclist, pedestrian, vehicle	D	4	13	Design to utilise standard/tried and tested treatments, including use of grade separation, line marking and signage to deter pedestrians crossing the cycleway and alert vehicles to a changed environment. Clear sightlines.	E	3	20	Design team	Pedestrians, cyclists and vehicles may still cross over despite clear delineation	Ongoing monitoring and communication
3.02	Operation	Clash between pedestrians and cyclists / vehicles	entrace and exit to the Westfield car park of George Street	Collision	cyclist, pedestrian, vehicle	B	4	5	Design to utilise standard/tried and tested treatments, including use of grade separation, line marking and signage to alert vehicles to the pedestrian and cyclists priority. Clear sightlines, especially for exitting vehicles. Consider funnellling pedestrians and cyclists closer to the kerb to provide more visibility to drivers. Consider consultation with Westfields for speed hump / alrm interventions within thier premises.	B	3	8	Design team	Pedestrians, cyclists and vehicles may still cross over despite clear delineation	Ongoing monitoring and communication
3.03	Operation	Slips, Trips and Falls	Vehicle overhang intrudes on cycleway	Side mirror/wide vehicle hits cyclist	vehicle, cyclist	D	3	18	Median separator is built to appropriate width. Traffic speed and lane width reduction to be reviewed.	E	3	20	Design team, Comms	Risk significantly reduced	
3.04	Operation	Slips, Trips and Falls	Car door opening into cycleway	Car door hits cyclist	vehicle, cyclist	D	3	18	Median designed to minimum 1m wide where vehicles and cyclists are facing the same direction. Where vehicles users can see on coming cyclists, median can be reduced to 0.7m wide. Signage and linemarking for awareness	E	3	20	Design team, Comms	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
3.05	Operation	Slips, Trips and Falls	Shared environments	bike tires slipping out when on wet pavement	cyclist	B	3	8	Consider materiality of the pavement for shared environments that have an appropriate slip resistance	C	3	12	Design team	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
3.06	Operation	Cycleway used by vehicles	Use by vehicles	cyclist/ vehicle conflict	vehicle, cyclist	E	3	20	Signage, markings and rangers/ police monitoring for misuse of the cycleway by motorists.	E	2	24	Operations	Pedestrians and cyclists may still cross over despite clear delineation	Ongoing monitoring and communication
3.07	Operation	There are both shared environments and separated cycle paths; Less confident cyclists may cycle on the footpath in areas where separate cycle paths are provided	All Site	cyclist/ pedestrian conflict	cyclist, pedestrian	D	3	18	Appropriate signage, line markings to be provided to guide cyclists to use the separated cycleway.	E	3	20	Design Team	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
3.08	Operation	Heavy vehicle movements near cycleway	All site	cyclist/ heavy vehicle conflict	cyclist, heavy vehicle	D	4	13	Appropriate signage, line markings to be provided for awareness	D	4	13	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication

3.09	Operation	Bus stops/ pedestrians crosing the cycleway	All site	cyclist/ pedestrian conflict	cyclist,pedestrian	B	4	**5**	Provide grade seperation to length of floating bus stop to alert cyclists to change in environment, and provide a pedestrian crossing. Use of barriers / furniture and landscaping to funnel pedestrians to use the pedestrian crossing. Appropriate signage, line markings to be provided for awareness	C	4	**9**	Design Team	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
3.10	Operation	Bus stops adjacent to cycleways	All site	cyclist/ bus conflict	cyclist, bus	D	4	**13**	Provide build outs and floating bus stops to provide seperation between buses and cyclists and avoid buses needing to make turnign movements adjacent to the bus stop	D	3	**18**	Design Team	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
3.11	Operation	Cycle phases a running at same phase as vehicles	Potential conflict between cyclists and vehicles particularly for turning movements	Collision	vehicle, cyclist	D	2	**22**	Appropriate signage, line markings to be provided for awareness, incorporate turn holds where needed	D	2	**22**	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
3.12	Operation	Cyclist using the pedestrian crossing	Macquarie Street / Moore Street, Railway Street / George Street, Scott Street, George Street	cyclist/ pedestrian conflict	cyclist, pedestrian	D	2	**22**	Appropriate signage, line markings to be provided for awareness	D	2	**22**	Operations	Risk Reduced but cannot completely be removed	Ongoing monitoring and communication
3.13	Operation	Cyclist collision with medians and kerbs as a result of lack of visual contrast	All cyclepaths	Injury to cyclists	Cyclist	D	4	**13**	Design considers material selection and palette as per LCC/TfNSW standard to achieve visual contrast requirements.	E	3	**20**	Operations	Unexpected cyclist behaviour may result in these conflicts occurring, regardless of measures adopted	Regular monitoring of incidents and near misses is recommended
3.14	Operation	Risk to cyclists, pedestrians and motorists due to insufficient drainage and blocking of overland flow paths	Where cycle paths are present	Flooding and ponding leading to vehicle and cyclist safety issues such as tyre slipping, buoyancy, swerving, slipping etc. Blockage of inlets/drains/pipes/pits and if occurred frequently over time can reshape road pavement. Danger to pedestrians and cyclists as a result of fast moving flows.	Public	D	4	**13**	Drainage design to review pre- and post-development conditions and to ensure overland flow will not be made worse as a result of the works.	E	3	**20**	Asset Manager	Blockage of pits and flow path by rubbish	Ongoing monitoring and maintenance
3.15	Operation	Branches and leaves from trees falling and obstructing cycleway	All cycleways	Time loss or injury to cyclists	Public	D	2	**22**	Appropriate plant and tree selection. Regular maintenance of trees adjacent to cycleway path	E	2	**24**	Design Team / Maintenance contractor	Debris left on cycleway between maintenance periods	Ongoing monitoring and maintenance
3.16	Operation	Loss of parking causing greater congestion in surrounding area	Overall Project	Traffic hazards	Public	C	2	**17**	Removal of parking has been minimised as much as practical within the constraints of the project scope	D	2	**22**	Asset Manager	Additional congestion acts as traffic calming, however motorist frustration may cause dangerous behaviour especially through intersections and crossings	Regular review of traffic behaviour, implementation of remedial measures where this is not consistent with safe operations
3.17	Operation	Cars waiting on the cycleway to wait for pedestrians to cross the raised crossing	Castlereagh Street / Moore Street intersection	Time loss or injury to cyclists	Public	C	3	**12**	Appropriate signage, line markings to be provided for awareness. Assess and see if the issue occurs, consider additional signage and linemarking	D	3	**18**	Design Team / Asset Manager	Injury to cyclists riding into the waiting car blocking the cycleway	Regular review of traffic behaviour, implementation of remedial measures where this is not consistent with safe operations
3.18	Operation	Cars not giving way to cyclists on the roundabout	Lachlan Street	Time loss or injury to cyclists	Public	C	3	**12**	Appropriate signage, line markings to be provided for awareness. Assess and see if the issue occurs, consider additional signage and linemarking	D	3	**18**	Design Team / Asset Manager	Injury to cyclists riding into the waiting car blocking the cycleway	Regular review of traffic behaviour, implementation of remedial measures where this is not consistent with safe operations

3.19	Operation	Cycle wait boxes	Intersection of George Street / Moore Street and Moore Street / Bathurst Street	Collision	vehicle, cyclist	C	4	**9**	Appropriate signage, line markings to be provided for awareness. Communication for the public of how to use the facilities	D	4	**13**	Design Team / Comms	Risk Reduced but cannot completely be removed		Ongoing monitoring and communication
3.20	Operation	Clash between vehicles / cyclists at driveways	Overall Project	Collision	vehicle, cyclist	C	3	**12**	Appropriate signage, line markings to be provided for awareness. Grade seperation for laneways and service ways. Cocoloured paint to private driveways. Clear sight lines	D	3	**18**	Design Team / Comms	Risk Reduced but cannot completely be removed		Ongoing monitoring and communication
3.21	Operation	Clash between cyclists and pedestrians	Outside the Medical Centre on Moore Street	Collision	pedestrian, cyclist	C	4	**9**	Appropriate signage, line markings to be provided for awareness. Changed to a shared environment to slow cyclists	D	4	**13**	Design Team / Comms	Risk Reduced but cannot completely be removed		Ongoing monitoring and communication

Appendix C

Design issues register

Design Issues Register

Key Points to remember while using this Design Issues and Actions Log:
Record all design related issues and actions originating from reviews, audits and team meetings in this Actions Log.
After the Safety by Design workshop, those issues are to be added to this Actions Log.

Impact / Risk Rating:

MINOR	A design issue with minimal impact on safety, accessibility, or functionality. It may require small refinements and can be resolved with minimal cost or delay.
MODERATE	An issue that could affect the safety, usability, or compliance if unaddressed. This may require design modifications to prevent potential hazards or non-compliance
HIGH	A critical issue that significantly affects the safety, feasibility, or compliance. Requires immediate attention and major design changes

Design Issues Log for: Liverpool City Council Cycleway

Design Phase: Concept

ID	Date raised	Where is this issue	Impact / Risk	The issue / problem / change is …..	Affected Discipline	Action to Resolve or ID Close-out	Owner	Status	Comments
1	25.02.2025	Whole project	MINOR	We need to amend street trees species from the street tree mastreplan to relfect performance criteria of the changesd road	Landscape / Urban Design	LCC confirmed agreed species. AECOM to discuss in the design report	Belinda Dods	Closed	Offsets to trees taken from the LCC Public Domain Technical Manual. LCC provided documents to AECOM 25.02.2025
2	25.02.2025	Moore Street between George Street to Bathurst Street	MINOR	The south side awning exclude street trees on that side of the road.	Landscape / Urban Design	LCC to confirm approach	Belinda Dods	Closed	Considering the future updates in this section to extend the footpath, trees would be added durring those future works. LCC supportive of this approach in meeting 25.02.2025
3	25.02.2025	George Street between Elizabeth Street and Hume Hwy	MODERATE	Exisiting trees are generally poor quality and lack consistency. Suggested approach is to provide proposed locations to create consistency and rhythm to tree planting as well as larger healthier trees with appropriate soil volumes to support growth	Landscape / Urban Design	LCC to confirm approach	Belinda Dods	Closed	LCC generally accepting of the approach to remove and replace where there is a good rationale to do so. Meeting 25.02.2025
4	25.02.2025	Whole project	HIGH	Without services alignment there is a high risk some of the proposed trees will no be able to included in the proposed locations.	Landscape / Urban Design	LCC to acknowledge risk	Belinda Dods	Closed	Indicative locations based on current survey information and site visits. Proposed tree locations will need to be reviewed in subsequent design phases to identify and address design clashes with utilities. AECOM informed LCC of this risk in meeting 25.02.2025
5	25.02.2025	George Street between Scott Street and Moore Street and a half block north of Moore Street	MINOR	The LCC Public Domain Technical Manual suggests a 1m offset between the edge of awnings and the centre line of a tree. This can not be achieved. In most cases we have 300-60mm offset. Suggestion is that planting still occurs with species appropriate to be pruned and grow toward the light	Landscape / Urban Design	LCC to confirm approach	Belinda Dods	Open	Alternate option is to provide trees bwetween parking spaces, however this would reduce the number of spaces. Meeting to be set up seperately with LCC to discuss
6	25.02.2025	Moore Street between George Street and Bigge Street	HIGH	The current arrangement of the lanes creates a turn path clash with the on road cycleway.We have three options to be resolved in consultation with TfNSW. A) Ban the left turn for buses from George Street onto Moore Street B) Set the cycleway stop line back into Moore Street to accomodate the bus swept path C) Set all stop lines back into Moore Street to accomodate the bus swept path.	Traffic / Civil / Urban Design	LCC to confirm approach with TfNSW	Martin Mallia	Open	AECOM to provide the three design options as part of the 50% deliverables, and LCC to confirm with TfNSW the approach to progressed
7	25.02.2025	Moore Street and George Street intersection	MODERATE	Request to ban the right hand turn to allow for simplification of that intersection.	Traffic / Civil / Urban Design	LCC to confirm approach with TfNSW	Martin Mallia	Closed	Confirmed in meeting with TfNSW 06.03.2025 that the right hard turn should remain
8	18.02.2025	Intersection of George Street / Railway	MODERATE	Project team were keen to provide a future proofed connection to Railway Street and the train station and Liverpool Public School. A protected intersection was proposed.	Traffic / Civil / Urban Design	LCC to confirm	Belinda Dods	Closed	LCC rejected this approach finding that the potential impact to cueing to turn right onto Scott was unacceptable in a meeting on the 18th of Feb 2025. The approach is to provide a shared path to the western verge and for cyclists to dismount and cross with pedestrians
9	18.02.2025	Intersection of George Street and Lachlan	MODERATE	Proposal to reduce the centre island to provide more space for pedestrian / cycle connection	Traffic / Civil / Urban Design	LCC to confirm	Belinda Dods	Closed	LCC approved of the general concept in a meetign on the 18th of February 2025. AECOM presented new design in meeting 25.02.2025
10	18.03.2025	Whole project	MODERATE	Cycleways are provided with a width of between 2.4m - 2.6m. The cycleway toolkit recommends minimum cycleway widths of 3.0m. Assumed 2.4m bare minimum cycleway to be acceptable but may be an approval risk	Traffic	AIP required from TfNSW 50% documentation review.	Martin Mallia	Open	In principle agreement with TfNSW verbally.

11	18.03.2025	Whole project	MODERATE	Traffic lanes are provided with a minimum width of 2.8m along non-bus routes, and 3.2m along bus routes. Based on prescedent and discussions with TfNSW, it is assumed these minimum widths are acceptable but may be an approval risk	Traffic	AIP required from TfNSW 50% documentation review.	Martin Mallia	Open	In principle agreement with TfNSW verbally.
12	18.03.2025	Whole project	MODERATE	Parking bays are provided at 2.1m wide. AS2890.5 allows a minimum of 2.1m wide parking bays in constrained areas with low turnover. These parking bays are high turnover. May not fully accommodate very large vehicles.	Traffic	Council approved the use of this dimension	Martin Mallia	Closed	
13	18.03.2025	George Street between Elizabeth Street and Campbell Street	MODERATE	A shared path is proposed for this block due to geometry constraints. Design is to standard, however there may be an approval risk with TfNSW due to the project requiring dedicated on road cycle facilities.	Traffic	AIP required from TfNSW 50% documentation review.	Martin Mallia	Open	In principle agreement with TfNSW verbally.
14	18.03.2025	Moore Street between George Street and Bigge Street	MODERATE	A shared path is proposed for half of this block due to geometry constraints. Design is to standard, however there may be an approval risk with TfNSW due to the project requiring dedicated on road cycle facilities.	Traffic	AIP required from TfNSW 50% documentation review.	Martin Mallia	Open	In principle agreement with TfNSW verbally.
15	18.03.2025	George Street between Elizabeth Street and Campbell Street	MINOR	Planters are proposed along the eastern kerbline where the school pickup / drop off parking is located. This may restrict easy access to the parking spaces	Traffic / Urban Design	LCC to advise if they would like the planting at this location	Belinda Dods	Open	Won't necessarily accommodate more parking by removing the planting, but may make the spaces easier to access / egress
16	18.03.2025	Whole project	MINOR	The project proposed to use in lane bus stops along George Street to maximise parking and improve bus efficiency.This may cause additonal queing when buses are boarding / alighting passengers	Traffic	AIP required from TfNSW 50% documentation review.	Martin Mallia	Open	In principle agreement with TfNSW verbally.
17	18.03.2025	Moore Street Eastbound	MINOR	Due to the design only having a single eastbound bus lane, when a bus is stopped to board and alight passengers, trailing buses will be queued behind the stopped bus. Floating bus stops provided to the specifications required in principle by TfNSW	Traffic	AIP required from TfNSW 50% documentation review.	Martin Mallia	Open	In principle agreement with TfNSW verbally.
18	18.03.2025	Moore Street Westbound	MINOR	The through westbound traffic lane has been designed with a width of 2.8m, and the bus lane 3.2m. When a bus is stopped to board and alight passengers, trailing buses may overtake the stopped bus in a narrow traffic lane	Traffic	AIP required from TfNSW 50% documentation review.	Martin Mallia	Open	In principle agreement with TfNSW verbally.
19	18.03.2025	Moore Street	MODERATE	The project proposes to make Moore Street one way for general traffic in a westbound direction, with buses permitted to travel eastbound.	Traffic	AIP required from TfNSW in stage 3 upon submission of the Traffic Management Plan	Martin Mallia	Open	In principle agreement with TfNSW verbally.
20	18.03.2025	Moore Street and Maquarie Street	MINOR	As per the request from Council, the design shows a raised crossing at this intersection. This is out of scope and therefore a feasibility assessment has not been undertaken as part of this project. This is to be investigated separately by Council	Traffic / Civil / Urban Design	Council to further investigate raised threshold	LCC	Closed	
21	18.03.2025	Vic Reeves Serviceway	MINOR	There is currently a dropped kerb on Moore Street that provides historical vehicular access to Vic Reeves Servieway. There is a bollard in the middle of the serviceway opening to prohibit vehicular traffic. The design proposes to extend the floating bus island accross the serviceway opening.	Traffic / Civil / Urban Design	Council confirmed this is an acceptable approach as the serviceway is for pedestrian access only.	LCC	Closed	
22	18.03.2025	George Street between Elizabeth Street and Moore Street	MINOR	The project proposes to remove the existing zebra crossing on this block as it is currently not designed to standard (crosses two traffic lanes in one direction).	Traffic / Civil / Urban Design	Council confirmed this is an acceptable approach as the existing zebra crossing not required anymore due to changes in the land use and building tenants in the area.	LCC	Closed	
23	18.03.2025	Whole project	MODERATE	After consultation with TfNSW, it was determined that all bus turning movements needed to be tested for a design vehicle of 14.5m. We have tested this design vehicle and it cannot be achieved across the project. This is consistent with existing conditions. A 12.5m design vehicle has been used, and at key constrained locations a 12.5m check vehicle has been used, and an 8.8m design vehicle.	Traffic / Civil	AIP required from TfNSW in stage 3 upon submission of the Traffic Management Plan	Martin Mallia	Open	In principle agreement with TfNSW verbally.
24	20.02.2025	George Street between Scott Street and Railway Street	MINOR	An existing NBN pit lid at the corner of George Street and Railway Street will need to be adjusted to suit new verge levels.	Civil	Consultation and agreement from authority on required treatments	Philip Shiels	Open	

25	20.02.2025	George Street	MINOR	Existing TCS poles will require relocation as part of the intersection design.	Civil	Agreement from TfNSW on new signalised intersection design	Philip Shiels	Open	
26	20.02.2025	George Street at Railway Street	MODERATE	The existing sewer manhole will be lifted from the roadway into the new verge as part of the design.	Civil	Consultation and agreement from Sydney Water is required for the change in manhole height.	Philip Shiels	Open	
27	20.02.2025	George Street at Railway Street	MINOR	Existing junction pit to be left in roadway. Kerb and gutter to be constructed around pit.	Civil	LCC to confirm acceptance of approach	Philip Shiels	Open	
28	20.02.2025	George Street between Railway Street and Moore Street	MINOR	Drainage pits to be lifted to suit new kerb levels at George Lane, Vic Reeves Serviceway and the South eastern corner of George Street and Moore Street.	Civil	LCC to confirm acceptance of approach	Philip Shiels	Open	
29	20.02.2025	Whole project	HIGH	No below ground survey has been commented across the project site. The location of stormwater pipes and utilities conduits have been inferred by the provided feature survey features and BYDA information. Further quality level A and B survey will be required to finalise the impact to the existing utilities and stormwater utilities through the project area.	Civil	LCC to confirm acceptance of approach and to advice when design will receive updated survey inputs.	Philip Shiels	Open	
30	20.02.2025	Intersection of George Street and Moore Street	HIGH	The location of stop lines at the intersection of George Street and Moore Street are to be resolved through further consultation at the next phase of the design.	Civil	LCC to confirm acceptance of approach	Philip Shiels	Open	
31	20.02.2025	George Street between Moore Street and Elizabeth Street	MINOR	Stormwater pipes under the western verge between Hanwell Serviceway and Vic Reeves Serviceway may be impacted due to a change in kerb location. The existing stormwater inlet pit at the Hanwell Serviceway is to be reconstructed to suit the new kerb.	Civil	LCC to confirm acceptance of approach	Philip Shiels	Open	
32	20.02.2025	George Street between Elizabeth Street and Campbell Street	MINOR	Stormwater inlet pits will be reconstructed to suit new kerb alignments.	Civil	LCC to confirm acceptance of approach	Philip Shiels	Open	
33	20.02.2025	George Street between Elizabeth Street and Campbell Street	MINOR	The Westfield carpark entrance is to be maintained, with vehicle access details to be developed in the next stage of design to establish a safe outcome for all users.	Civil	LCC to confirm approach	Philip Shiels	Open	
34	20.02.2025	George Street between Elizabeth Street and Campbell Street	MINOR	Potential impacts to the following assets may occur due to cutting into the existing western verge/footpath: - Underground 11kV electricity line - Telstra conduits, including asbestos conduits, noting that some Telstra conduits contain NBN/Optus cables - AARNET fibre optic - Optus IOF cable - 100 Cicl water main.	Civil	Detailed below ground survey required for consultation with authorities on acceptance of verge treatments.	Philip Shiels	Open	
35	20.02.2025	Intersections of George Street with Campbell Street and Lachlan Street.	MINOR	Minor impacts possible to the stormwater pipes and pits at the intersections.	Civil	Location of new drainage pits to be determined as part of detailed drainage assessment.	Philip Shiels	Open	
36	20.02.2025	Moore Street between Copeland Street and Bathurst Street	MODERATE	Existing overhead power lines will be located in the roadway in the proposed design.	Civil	Power lines need to be relocated below ground to suit the reduced width verge	Philip Shiels	Open	
37	20.02.2025	Moore Street between Copeland Street and Bathurst Street	HIGH	Existing Optus pit and conduits will be located under the roadway in the proposed design. An optus pit will require relocation to suit new kerb location.	Civil	Detailed below ground survey is required for consultation with Optus on a proposed treatment of their assets to suit new loading.	Philip Shiels	Open	
38	20.02.2025	Moore Street	MODERATE	Telstra conduits are located under both verges between Copeland Street and George Street, and the northern verge between George Street and Bigge Street, including asbestos conduits. Pits and conduits will require alterations to suit the new location within the roadway, noting some Telstra conduits contain NBN/Optus cables.Conduit depths required to determine impact from proposed trees.	Civil	Detailed below ground survey required for consultation with authorities on acceptance of verge treatments.	Philip Shiels	Open	

39	20.02.2025	Moore Street	MODERATE	A 600 mm PVC water main runs on the northern side of the road, with stop valves and a hydrant on either side of the connection, to the southern water main. The impact from the design is currently unknown.	Civil	Sydney Water will need to be consulted on the impact to this asset and an SEA may be required. Detailed below ground survey is required for consultation on acceptance of works above this asset.	Philip Shiels	Open	
40	20.02.2025	Moore Street between Copeland Street and Castlereagh Street	MODERATE	A water main is present on the southern side of the road, crossing Moore Street to join the northern water main. The depth of the water main is required to determine the impact from the design.	Civil	Sydney Water will need to be consulted on the impact to this asset and an SEA may be required. Detailed below ground survey is required for consultation on acceptance of works above this asset.	Philip Shiels	Open	
41	20.02.2025	Moore Street between Copeland Street and Bathurst Street	MINOR	Potential impacts to the following assets may occur due to cutting into the southern verge/footpath: - A low pressure gas main - Stormwater pits and pipes - Underground 11kV electricity line - Streetlight poles	Civil	Detailed below ground survey required for consultation with authorities on acceptance of verge treatments.	Philip Shiels	Open	
42	20.02.2025	Northumberland Street	MINOR	Right turn on Northumberland Street into Moore Street to be closed.	Traffic / Civil	LCC to confirm acceptance of approach	Philip Shiels	Open	

43	20.02.2025	Moore Street between Northumberland Street and George Street	MINOR	Stormwater pits and pipes on the northern verge will require relocation to suit new kerb locations, and stormwater pits are to be raised to suit new intersection levels at the intersection of Macquarie Street and Moore Street.	Civil	Detailed below ground survey required for consultation with authorities on acceptance of verge treatments.	Philip Shiels	Open	
44	20.02.2025	Moore Street between Macquarie Street and George Street	MINOR	No vehicle access will be provided to the serviceway from Moore Street.	Civil	LCC to confirm acceptance of approach	Philip Shiels	Open	
45	20.02.2025	Intersection of Moore Street and George Street	MODERATE	Stop line location on Moore Street will require consultation with TfNSW.	Civil	Agreement from TfNSW on new signalised intersection design	Philip Shiels	Open	
46	20.02.2025	Moore Street between George Street and Bigge Street	MINOR	Stormwater pits and pipes on the southern verge are not expected to be impacted. A detailed drainage assessment is required for kerb impacts at the drainage low point.	Civil	Detailed below ground survey required for consultation with authorities on acceptance of verge treatments.	Philip Shiels	Open	
47	20.02.2025	Moore Street between George Street and Bigge Street	MODERATE	Transition from shared path to cycle lane on Moore Street to be resolved in the next stage of design.	Civil	LCC to confirm acceptance of approach	Philip Shiels	Open	

Appendix D

Existing Lighting Assessment Summary

AECOM Australia
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RESULTS FOR RUNNING SAASTAN WITH NOMINATED SPACINGS
[AUSTRALIA MODE]

Job name: Liverpool Cycleway - George Street V1

Luminaire I-table: C:\Users\LeungC3\Desktop\- Projects\- Photometric files\Ausgrid\Signify Photometric Files - 2023\cie \V Cat\39213704.cie
Luminaire Description: 39213704 19506 lms
Light Source: LED
Stores Code: Luminous Flux: 19.5 Klms
Upcast Angle: -5 Degrees Arrangement: 1 Single-Left
Mounting Height: 9 m Maintenance Factor: 0.8
Overhang 1st Row: 2.5 m
Outreach Size: 3
Road Surface: CIE R3
Traffic Flow: Two Way ----> <----

Lighting Category: V3 Carriageway Width: 11 m

Spacing (m)	Traffic Direction	Lbar (>=0.75) or (>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Esl (>=50) "	Esr (>=50) "	Comply with V3
36.00	Normal	1.81	0.38	0.92	.01	14.79	59.69	44.41	NO
36.00	Oncoming	1.86	0.39	0.83	.01	8.12	44.41	59.69	NO
37.00	Normal	1.76	0.37	0.89	.01	14.99	59.67	44.50	NO
37.00	Oncoming	1.81	0.39	0.82	.01	8.25	44.50	59.67	NO
38.00	Normal	1.71	0.37	0.85	.01	15.21	59.67	44.61	NO
38.00	Oncoming	1.76	0.39	0.80	.01	8.39	44.61	59.67	NO
39.00	Normal	1.67	0.37	0.82	.01	15.41	59.66	44.71	NO
39.00	Oncoming	1.72	0.39	0.78	.01	8.53	44.71	59.66	NO
40.00	Normal	1.63	0.37	0.80	.01	15.62	59.65	44.77	NO
40.00	Oncoming	1.68	0.39	0.76	.01	8.66	44.77	59.65	NO
41.00	Normal	1.59	0.36	0.77	.01	15.84	59.70	44.67	NO
41.00	Oncoming	1.64	0.38	0.74	.01	8.80	44.67	59.70	NO
42.00	Normal	1.55	0.37	0.74	.01	16.05	59.73	44.57	NO
42.00	Oncoming	1.60	0.38	0.72	.01	8.94	44.57	59.73	NO
43.00	Normal	1.52	0.37	0.72	.01	16.26	59.74	44.63	NO
43.00	Oncoming	1.56	0.38	0.70	.01	9.19	44.63	59.74	NO
44.00	Normal	1.49	0.37	0.69	.01	16.47	59.73	44.63	NO
44.00	Oncoming	1.53	0.37	0.68	.01	9.33	44.63	59.73	NO
45.00	Normal	1.45	0.36	0.66	.01	16.70	59.70	44.41	NO
45.00	Oncoming	1.49	0.38	0.65	.01	9.48	44.41	59.70	NO
46.00	Normal	1.42	0.36	0.63	.01	16.92	59.71	44.39	NO
46.00	Oncoming	1.46	0.37	0.63	.01	9.62	44.39	59.71	NO
47.00	Normal	1.39	0.35	0.61	.01	17.21	59.70	44.47	NO
47.00	Oncoming	1.43	0.37	0.61	.01	9.76	44.47	59.70	NO
48.00	Normal	1.36	0.34	0.58	.01	17.47	59.67	44.31	NO
48.00	Oncoming	1.40	0.37	0.59	.01	9.90	44.31	59.67	NO
49.00	Normal	1.34	0.33	0.55	.01	17.70	59.67	44.05	NO
49.00	Oncoming	1.37	0.36	0.56	.01	10.04	44.05	59.67	NO
50.00	Normal	1.31	0.32	0.53	.01	17.95	59.70	44.05	NO
50.00	Oncoming	1.34	0.35	0.55	.01	10.20	44.05	59.70	NO

Lighting Category: V3 Carriageway Width: 12 m

Spacing	Traffic	Lbar	Uo	Ul	UWLR	TI	Esl	Esr	Comply

(m)	Direct- ion	(>=0.75) or(>=0.83)	(>=0.33) (>=0.31)	(>=0.5) "	(=<3) "	(=<20) "	(>=50) "	(>=50) "	with V3
36.00	Normal	1.71	0.29	0.91	.01	15.48	59.69	36.98	NO
36.00	Oncoming	1.76	0.30	0.87	.01	7.51	36.98	59.69	NO
37.00	Normal	1.66	0.29	0.88	.01	15.69	59.67	37.10	NO
37.00	Oncoming	1.71	0.30	0.85	.01	7.64	37.10	59.67	NO
38.00	Normal	1.62	0.29	0.84	.01	15.92	59.67	37.16	NO
38.00	Oncoming	1.67	0.29	0.84	.01	7.77	37.16	59.67	NO
39.00	Normal	1.58	0.29	0.81	.01	16.13	59.66	37.22	NO
39.00	Oncoming	1.63	0.29	0.82	.01	7.89	37.22	59.66	NO
40.00	Normal	1.54	0.29	0.79	.01	16.35	59.65	37.38	NO
40.00	Oncoming	1.59	0.29	0.80	.01	8.02	37.38	59.65	NO
41.00	Normal	1.50	0.28	0.76	.01	16.58	59.70	37.46	NO
41.00	Oncoming	1.55	0.29	0.78	.01	8.15	37.46	59.70	NO
42.00	Normal	1.47	0.28	0.73	.01	16.81	59.73	37.36	NO
42.00	Oncoming	1.51	0.29	0.75	.01	8.28	37.36	59.73	NO
43.00	Normal	1.44	0.28	0.71	.01	17.02	59.74	37.40	NO
43.00	Oncoming	1.48	0.29	0.73	.01	8.52	37.40	59.74	NO
44.00	Normal	1.40	0.28	0.68	.01	17.25	59.73	37.39	NO
44.00	Oncoming	1.45	0.28	0.71	.01	8.66	37.39	59.73	NO
45.00	Normal	1.37	0.28	0.65	.01	17.50	59.70	37.02	NO
45.00	Oncoming	1.41	0.28	0.69	.01	8.80	37.02	59.70	NO
46.00	Normal	1.34	0.28	0.62	.01	17.73	59.71	37.03	NO
46.00	Oncoming	1.38	0.28	0.67	.01	8.93	37.03	59.71	NO
47.00	Normal	1.31	0.28	0.59	.01	18.03	59.70	37.13	NO
47.00	Oncoming	1.35	0.28	0.63	.01	9.06	37.13	59.70	NO
48.00	Normal	1.29	0.28	0.57	.01	18.31	59.67	37.08	NO
48.00	Oncoming	1.33	0.28	0.61	.01	9.19	37.08	59.67	NO
49.00	Normal	1.26	0.28	0.55	.01	18.55	59.67	36.77	NO
49.00	Oncoming	1.30	0.28	0.59	.01	9.32	36.77	59.67	NO
50.00	Normal	1.24	0.29	0.52	.01	18.82	59.70	36.86	NO
50.00	Oncoming	1.27	0.29	0.57	.01	9.46	36.86	59.70	NO

NOTES: 1) Where 'Normal' &/or 'Oncoming' lines are shown, compliance with the nominated Category, at a particular spacing, is only applicable when there is a 'Yes' on each line i.e. ANY 'No' indicates failure at that spacing.
2) Calculations use the original SAASTAN software

PleVcat - Vers 5.09 (Built: 10/ 4/13) Run: 19/ 3/2025 at 15:53:03

AECOM Australia
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RESULTS FOR RUNNING SAASTAN WITH NOMINATED SPACINGS
[AUSTRALIA MODE]

Job name: Liverpool Cycleway - George Street V3

Luminaire I-table: C:\Users\LeungC3\Desktop\- Projects\- Photometric files\Ausgrid\Aldridge Photometric Files - 2023\cie\P Cat\P14W.N7P.3K.AG.CIE
Luminaire Description: OSL0526 PLED II 17W AE 3000K 2172.2 lms
Light Source: LED
Stores Code: Luminous Flux: 2.17 Klms
Upcast Angle: -5 Degrees Arrangement: 1 Single-Left
Mounting Height: 9 m Maintenance Factor: 0.8
Overhang 1st Row: 2.5 m
Outreach Size: 3
Road Surface: CIE R3
Traffic Flow: Two Way ----> <----

Lighting Category: V3 Carriageway Width: 11 m

Spacing (m)	Traffic Direction	Lbar (>=0.75) or (>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Esl (>=50) "	Esr (>=50) "	Comply with V3
38.00	Normal	.15	0.36	0.66	.41	14.39	81.43	88.32	NO
38.00	Oncoming	.16	0.38	0.61	.41	9.18	88.32	81.43	NO
39.00	Normal	.15	0.37	0.65	.41	14.50	81.49	88.24	NO
39.00	Oncoming	.16	0.38	0.60	.41	9.26	88.24	81.49	NO
40.00	Normal	.15	0.37	0.64	.41	14.60	81.61	88.24	NO
40.00	Oncoming	.15	0.38	0.60	.41	9.34	88.24	81.61	NO
41.00	Normal	.14	0.34	0.63	.41	14.72	81.75	88.08	NO
41.00	Oncoming	.15	0.36	0.60	.41	9.44	88.08	81.75	NO
42.00	Normal	.14	0.34	0.62	.41	14.62	82.01	88.04	NO
42.00	Oncoming	.15	0.36	0.60	.41	9.41	88.04	82.01	NO
43.00	Normal	.14	0.34	0.60	.41	14.71	82.07	87.97	NO
43.00	Oncoming	.14	0.36	0.61	.41	9.48	87.97	82.07	NO
44.00	Normal	.13	0.34	0.59	.41	14.81	82.07	87.97	NO
44.00	Oncoming	.14	0.36	0.60	.41	9.56	87.97	82.07	NO
45.00	Normal	.13	0.34	0.58	.41	14.94	82.08	88.04	NO
45.00	Oncoming	.14	0.35	0.56	.41	9.66	88.04	82.08	NO
46.00	Normal	.13	0.34	0.57	.41	15.02	82.04	88.16	NO
46.00	Oncoming	.13	0.35	0.55	.41	9.74	88.16	82.04	NO
47.00	Normal	.12	0.35	0.55	.41	15.13	81.96	88.41	NO
47.00	Oncoming	.13	0.36	0.54	.41	9.82	88.41	81.96	NO
48.00	Normal	.12	0.35	0.54	.41	15.16	81.88	88.31	NO
48.00	Oncoming	.13	0.36	0.54	.41	9.90	88.31	81.88	NO
49.00	Normal	.12	0.35	0.52	.41	15.25	81.85	88.33	NO
49.00	Oncoming	.13	0.36	0.54	.41	9.99	88.33	81.84	NO
50.00	Normal	.12	0.35	0.51	.41	15.41	81.76	88.34	NO
50.00	Oncoming	.12	0.36	0.53	.41	10.10	88.34	81.76	NO

Lighting Category: V3 Carriageway Width: 12 m

Spacing (m)	Traffic Direction	Lbar (>=0.75) or (>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Esl (>=50) "	Esr (>=50) "	Comply with V3
38.00	Normal	.15	0.36	0.66	.41	14.91	81.43	82.64	NO
38.00	Oncoming	.16	0.36	0.60	.41	8.61	82.64	81.43	NO

39.00	Normal	.14	0.36	0.65	.41	15.02	81.49	82.69	NO
39.00	Oncoming	.15	0.36	0.59	.41	8.69	82.69	81.49	NO
40.00	Normal	.14	0.36	0.63	.41	15.12	81.61	82.72	NO
40.00	Oncoming	.15	0.36	0.59	.41	8.76	82.72	81.61	NO
41.00	Normal	.14	0.33	0.62	.41	15.25	81.75	82.66	NO
41.00	Oncoming	.14	0.34	0.59	.41	8.85	82.66	81.75	NO
42.00	Normal	.13	0.33	0.61	.41	15.15	82.01	82.62	NO
42.00	Oncoming	.14	0.34	0.59	.41	8.93	82.62	82.01	NO
43.00	Normal	.13	0.33	0.60	.41	15.24	82.07	82.60	NO
43.00	Oncoming	.14	0.34	0.59	.41	8.90	82.60	82.07	NO
44.00	Normal	.13	0.33	0.58	.41	15.35	82.07	82.63	NO
44.00	Oncoming	.14	0.34	0.58	.41	8.98	82.63	82.07	NO
45.00	Normal	.12	0.33	0.57	.41	15.49	82.08	82.59	NO
45.00	Oncoming	.13	0.34	0.55	.41	9.08	82.59	82.08	NO
46.00	Normal	.12	0.33	0.56	.41	15.57	82.04	82.68	NO
46.00	Oncoming	.13	0.34	0.54	.41	9.15	82.68	82.04	NO
47.00	Normal	.12	0.34	0.54	.41	15.69	81.96	82.70	NO
47.00	Oncoming	.13	0.34	0.54	.41	9.23	82.70	81.96	NO
48.00	Normal	.12	0.34	0.52	.41	15.72	81.88	82.67	NO
48.00	Oncoming	.12	0.35	0.54	.41	9.28	82.67	81.88	NO
49.00	Normal	.11	0.33	0.51	.41	15.82	81.85	82.71	NO
49.00	Oncoming	.12	0.33	0.54	.41	9.37	82.71	81.84	NO
50.00	Normal	.11	0.33	0.50	.41	15.98	81.76	82.75	NO
50.00	Oncoming	.12	0.33	0.54	.41	9.47	82.75	81.76	NO

NOTES: 1) Where 'Normal' &/or 'Oncoming' lines are shown, compliance with the nominated Category, at a particular spacing, is only applicable when there is a 'Yes' on each line i.e. ANY 'No' indicates failure at that spacing.
2) Calculations use the original SAASTAN software

PleVcat - Vers 5.09 (Built: 10/ 4/13) Run: 19/ 3/2025 at 15:56:49

AECOM Australia
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RESULTS FOR RUNNING SAASTAN WITH NOMINATED SPACINGS
[AUSTRALIA MODE]

Job name: Liverpool Cycleway - Moore Street V1

Luminaire I-table: C:\Users\LeungC3\Desktop\- Projects\- Photometric files\Ausgrid\Signify Photometric Files - 2023\cie \V Cat\39213704.cie
Luminaire Description: 39213704 19506 lms
Light Source: LED
Stores Code: Luminous Flux: 19.5 Klms
Upcast Angle: -5 Degrees Arrangement: 3 Single-Stagger
Mounting Height: 9 m Maintenance Factor: 0.8
Overhang 1st Row: 2.5 m Overhang 2nd Row: 2.5 m
Outreach Size: 3 Outreach Size: 3
Road Surface: CIE R3
Traffic Flow: Two Way ----> <----

Lighting Category: V1 Carriageway Width: 11 m

Spacing (m)	Traffic Direction	Lbar (>=1.50) or (>=1.65)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Esl (>=50) "	Esr (>=50) "	Comply with V1
25.00	Normal	2.65	0.49	0.67	.01	11.18	53.22	53.22	YES
26.00	Normal	2.55	0.48	0.63	.01	11.37	53.51	53.47	YES
27.00	Normal	2.46	0.48	0.60	.01	11.57	53.30	53.49	YES
28.00	Normal	2.37	0.48	0.57	.01	11.74	53.40	53.40	YES
29.00	Normal	2.29	0.48	0.56	.01	12.03	53.30	53.30	YES
30.00	Normal	2.21	0.47	0.54	.01	12.26	53.22	53.22	YES
31.00	Normal	2.15	0.47	0.52	.01	12.46	53.46	53.45	YES
32.00	Normal	2.08	0.46	0.51	.01	12.68	53.30	53.49	YES
33.00	Normal	2.02	0.46	0.48	.01	12.90	53.40	53.40	NO
34.00	Normal	1.96	0.45	0.47	.01	13.12	53.31	53.30	NO
35.00	Normal	1.90	0.44	0.45	.01	13.36	53.22	53.22	NO
36.00	Normal	1.85	0.43	0.44	.01	13.57	53.45	53.45	NO
37.00	Normal	1.80	0.42	0.43	.01	13.76	53.30	53.50	NO

Lighting Category: V1 Carriageway Width: 12 m

Spacing (m)	Traffic Direction	Lbar (>=1.50) or (>=1.65)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Esl (>=50) "	Esr (>=50) "	Comply with V1
25.00	Normal	2.50	0.44	0.66	.01	11.57	51.39	51.39	YES
26.00	Normal	2.41	0.42	0.61	.01	11.74	51.60	51.51	YES
27.00	Normal	2.32	0.42	0.58	.01	11.96	51.43	51.53	YES
28.00	Normal	2.24	0.42	0.56	.01	12.19	51.47	51.47	YES
29.00	Normal	2.17	0.41	0.53	.01	12.48	51.43	51.43	YES
30.00	Normal	2.09	0.41	0.51	.01	12.74	51.39	51.39	YES
31.00	Normal	2.03	0.39	0.49	.01	12.96	51.60	51.50	NO
32.00	Normal	1.97	0.39	0.48	.01	13.19	51.43	51.54	NO
33.00	Normal	1.91	0.40	0.45	.01	13.42	51.48	51.48	NO
34.00	Normal	1.85	0.39	0.44	.01	13.66	51.43	51.43	NO
35.00	Normal	1.80	0.38	0.42	.01	13.92	51.39	51.39	NO
36.00	Normal	1.75	0.37	0.41	.01	14.10	51.58	51.49	NO
37.00	Normal	1.70	0.37	0.39	.01	14.34	51.44	51.55	NO

NOTES: 1) Where 'Normal' &/or 'Oncoming' lines are shown, compliance with the nominated Category, at a particular spacing, is only applicable when there is a 'Yes' on each line i.e. ANY 'No' indicates failure at that spacing.
2) Calculations use the original SAASTAN software

PleVcat - Vers 5.09 (Built: 10/ 4/13) Run: 19/ 3/2025 at 15:51:11

AECOM Australia
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RESULTS FOR RUNNING SAASTAN WITH NOMINATED SPACINGS
[AUSTRALIA MODE]

Job name: Liverpool Cycleway - Moore Street V3

Luminaire I-table: C:\Users\LeungC3\Desktop\- Projects\- Photometric files\Ausgrid\Signify Photometric Files - 2023\cie\V Cat\39213704.cie
Luminaire Description: 39213704 19506 lms
Light Source: LED
Stores Code: Luminous Flux: 19.5 Klms
Upcast Angle: -5 Degrees Arrangement: 3 Single-Stagger
Mounting Height: 9 m Maintenance Factor: 0.8
Overhang 1st Row: 2.5 m Overhang 2nd Row: 2.5 m
Outreach Size: 3 Outreach Size: 3
Road Surface: CIE R3
Traffic Flow: Two Way ----> <----

Lighting Category: V3 **Carriageway Width: 11 m**

Spacing (m)	Traffic Direction	Lbar (>=0.75) or (>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Esl (>=50) "	Esr (>=50) "	Comply with V3
36.00	Normal	1.85	0.43	0.44	.01	13.57	53.45	53.45	NO
37.00	Normal	1.80	0.42	0.43	.01	13.76	53.30	53.50	NO
38.00	Normal	1.76	0.41	0.41	.01	13.99	53.34	53.34	NO
39.00	Normal	1.71	0.40	0.40	.01	14.22	53.21	53.21	NO
40.00	Normal	1.67	0.39	0.38	.01	14.48	53.22	53.22	NO
41.00	Normal	1.63	0.39	0.37	.01	14.69	53.44	53.48	NO
42.00	Normal	1.59	0.38	0.36	.01	14.92	53.30	53.51	NO
43.00	Normal	1.56	0.38	0.35	.01	15.21	53.32	53.32	NO
44.00	Normal	1.52	0.37	0.33	.01	15.45	53.21	53.21	NO
45.00	Normal	1.49	0.36	0.32	.01	15.71	53.22	53.22	NO
46.00	Normal	1.46	0.36	0.31	.01	15.92	53.42	53.47	NO
47.00	Normal	1.43	0.35	0.30	.01	16.20	53.30	53.51	NO
48.00	Normal	1.40	0.34	0.28	.01	16.44	53.32	53.32	NO
49.00	Normal	1.37	0.33	0.27	.01	16.67	53.21	53.21	NO
50.00	Normal	1.34	0.32	0.26	.01	16.93	53.22	53.22	NO

Lighting Category: V3 **Carriageway Width: 12 m**

Spacing (m)	Traffic Direction	Lbar (>=0.75) or (>=0.83)	Uo (>=0.33) (>=0.31)	Ul (>=0.5) "	UWLR (=<3) "	TI (=<20) "	Esl (>=50) "	Esr (>=50) "	Comply with V3
36.00	Normal	1.75	0.37	0.41	.01	14.10	51.58	51.49	NO
37.00	Normal	1.70	0.37	0.39	.01	14.34	51.44	51.55	NO
38.00	Normal	1.66	0.37	0.38	.01	14.59	51.47	51.47	NO
39.00	Normal	1.62	0.37	0.37	.01	14.83	51.33	51.33	NO
40.00	Normal	1.58	0.36	0.35	.01	15.11	51.39	51.39	NO
41.00	Normal	1.54	0.35	0.35	.01	15.33	51.57	51.52	NO
42.00	Normal	1.51	0.35	0.34	.01	15.58	51.44	51.54	NO
43.00	Normal	1.47	0.35	0.32	.01	15.89	51.45	51.45	NO
44.00	Normal	1.44	0.35	0.31	.01	16.14	51.33	51.34	NO
45.00	Normal	1.40	0.34	0.30	.01	16.42	51.39	51.39	NO
46.00	Normal	1.38	0.35	0.29	.01	16.64	51.56	51.51	NO
47.00	Normal	1.35	0.35	0.28	.01	16.95	51.44	51.54	NO
48.00	Normal	1.32	0.34	0.26	.01	17.20	51.45	51.45	NO
49.00	Normal	1.30	0.34	0.25	.01	17.45	51.34	51.34	NO
50.00	Normal	1.27	0.32	0.24	.01	17.72	51.39	51.39	NO

NOTES: 1) Where 'Normal' &/or 'Oncoming' lines are shown, compliance with the nominated Category, at a particular spacing, is only applicable when there is a 'Yes' on each line i.e. ANY 'No' indicates failure at that spacing.
2) Calculations use the original SAASTAN software

PleVcat - Vers 5.09 (Built: 10/ 4/13) Run: 19/ 3/2025 at 15:52:09