24-000366

TRAFFIC IMPACT ASSESSMENT

60 LONDON CIRCUIT BLOCK 40 SECTION 100 CITY

Prepared for **Canberra Airport Group**

Document information

GENERAL INFORMATION

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EXECUTIVE SUMMARY

Introduction

Egis was engaged by Capital Property Group to prepare a Traffic Impact Assessment (TIA) report for the proposed development of City Block 40 Section 100, which is expected to operate predominantly as an office development. The site currently operates as an at-grade carpark accessible off Knowles Place, and is in close proximity to the ACT Law Courts and Reserve Bank of Australia. The site provides space for 280 carpark spaces.

The scope of this assessment is to review the transport impact of this development on the wider Civic road network. The review considers:

- The expected operation of the base surrounding road network in the year 2031, assuming no development of Block 40 Section 100.
- The expected traffic generation and development of vehicles from the development of the site.
- Review of possible improvements to access options in the nearby road network.
- General accessibility of the site by public transport and active travel means.

To support this assessment, the Parkes Way Southwest Corridor (PWSWC) model was sourced from TCCS to use for the base model conditions. In addition, carpark entry and exit volumes for the current site operation were sourced to inform the current traffic requirements of the site.

Road Network

The site is located within the City Centre, and is connected to a number of high-capacity roads to facilitate movement between the site and the wider Canberra road network. Notably, there are six arterial roads within close proximity that are expected to be used by traffic to and from the site. Several major and minor collector roads are also in close proximity, facilitating travel from the site to these arterial routes. With much of the road network lying within the city area, speed limits are reduced compared to what would generally be expected for roads of this capacity. Speed limits of 40km/h to 60km/h are typical within the bounds of Civic, while outside of this area, arterial roads increase to between 70km/h and 90km/h.

Active Travel Connectivity

The site lies within close proximity to a number of major off-road and on-road cycle routes that pass through Civic. On-road cycle infrastructure and footpaths associated with main community routes lie along London Circuit, allowing for convenient access to this site for either pedestrians or cyclists.

Public Transport Accessibility

The site has strong connectivity to a number of major public transport routes which travel throughout Canberra. The Civic Bus Interchange is within 300m of the site, and facilitates numerous rapid and local routes. A light rail stop is also within 300m of the site, and easily accessible by pedestrians. The future extension of the light rail down to Woden will further improve the connectivity and accessibility of the site by public transport.

Crash Data Assessment

A review of crash data recorded between 2019 and 2023 was undertaken as part of this investigation for the intersection of Northbourne Avenue / London Circuit and London Circuit between Hobart Place and Gordon Street. From review of this data, it was identified that main crash types along Northbourne Avenue were rear-end crashes and side-swipe crashes. Both these crash types signify issues with site distance and high volumes of vehicle weaving across lanes, which match observed conditions at the site. It is noted that these crash types typically do not result in injuries and occur at frequencies less than 5 per year, so are of low impact to the area.

Weaving Data Assessment

A review of weaving data along Northbourne Avenue between Vernon Circle and London Circuit was conducted. From the data collected, it was identified that weaving is a common occurrence in this section of road, reaching 18% of the total road volume in the AM peak. Weaving is however typically limited to across a single lane, and is mostly from the middle lane in the AM peak and to the middle lane in the PM peak. It is also noted that the driver for weaving movements in this section, notedly being the right-turn movement onto London Circuit, is being removed as part of the current Light Rail Stage 2A works. The installation of the proposed LILO access to the site would be expected to increase weaving again in future conditions, however with the right-turn movement removed, vehicles would have far greater distance to make lane changes, and so the safety concerns are considered limited.

Proposed Development

The development proposed within the site is considering three developments. The usage of these developments is still to be confirmed, however is expected to consist mostly of office usage. Given the generation and distribution of office buildings, this usage is expected to match the tidal flow of the current city traffic, so would have the greatest impact on the traffic movements within the road network. As such, the development has been assumed to be all office with some ancillary restaurant and café uses on the ground floor.

Across the three buildings, a total of 62,700 sqm GFA of office use and 2,300 sqm GFA of food and beverage use are proposed. This equates to a total of 647 vph in the AM peak, and 720 vph in the PM peak period from the development's operation.

In addition to the proposed development, traffic generation of the current at-grade carpark is expected to be maintained in the future development, as the public parking spaces are being replaced within the new development. From available survey data, this will add an additional 101 vehicles in the AM peak and 142 vehicles in the PM peak to the site movements.

Distribution of these vehicles through the road network has been determined through the use of household travel survey data and Australian Census Journey to Work data. This data was assessed for the Civic region, and the applied to the relevant centroids within the microsimulation model.

Surrounding Network Considerations

Besides the development proposed for Block 40 Section 100, several other changes to the base microsimulation model are proposed to match in with the understanding of what will be in place in the future, and what possible improvements would be suitable for the area. The changes which were considered include:

- The development of the nearby City Block 19 Section 23 into an office development.
- Signalisation of Knowles Place / Edinburgh Avenue to support movements from the development
- A LILO access to Knowles Place from Northbourne Avenue.

The development of Block 19 Section 23 was allowed for in all models run, while the other two intersection changes were assessed as options within the development models to see how they impacted traffic movements.

Microsimulation Modelling

Modelling for this assessment was undertaken using the Aimsun Next 22.0.3 modelling software, and was used to run the microsimulation scenarios within the PWSWC model. The model area accounted for the civic area, along with majority of Parkes Way and the Tuggeranong Parkway extent. Parameters from the PWSWC model were left as was provided where possible, however updates to the geometry, traffic generations, control plans, and path assignments were adopted to allow for the modelling of future development scenarios.

The assessment reviewed the outputs of 10 different model scenarios, summarised below:

1. 2031 Base AM Conditions
2. 2031 Base PM Conditions
3. 2031 Dev AM Conditions – 1a Arrangement
4. 2031 Dev PM Conditions – 1a Arrangement
5. 2031 Dev AM Conditions – 1b Arrangement

6. 2031 Dev PM Conditions – 1b Arrangement
7. 2031 Dev AM Conditions – 2a Arrangement
8. 2031 Dev PM Conditions – 2a Arrangement
9. 2031 Dev AM Conditions – 2b Arrangement
10. 2031 Dev PM Conditions – 2b Arrangement

Parameters assessed were consistent with what is advised within the ACT Microsimulation Modelling Guidelines document, and included VKT, VHT, Average Travel Speed, Average Travel Time, key areas of queuing, and the intersection delay of specific key intersection within the network.

From review of the network parameters, it was found that performance was most heavily impacted in the PM period, with the increased volumes of traffic leaving the site and travelling along Knowles Place leading to some reduction in performance. The overall impact of the development site on the network was however still viewed as minor, with the increases to travel distance, travel time, and speed all only changing by small amounts. The impacts from the AM period were seen to be even less than those from the PM period, and as such it could be concluded that the development of this site does not significantly impact the operation of Civic road network during peak periods.

From review of the performance of individual intersections in proximity to the site, it was found that generally, delays at these intersections did not increase by significant amounts. The AM period in particular saw only minor changes to the delay periods, and none of the key intersections exceeding delays of 57 seconds (LOS E). In the PM period, increases in delay were more substantial, however maintained suitable operating delays for five of the seven key intersections. For the intersection of Knowles Place / Edinburgh Avenue and the 4-way intersection along Knowles Place, delays did exceed 70 seconds (LOS F) under certain development scenarios. Generally, the increased traffic volumes along Knowles Place from the development resulted in limited gaps for vehicles from a different office development along Knowles Place (scenarios 1a and 2a), and required more green time than was available to clear queues back from Edinburgh Avenue (scenarios 1b and 2b). Interestingly, the queues back from Edinburgh Avenue which form in scenarios 1b and 2b are also attributed to providing breaks in the traffic along Knowles Place and allowing vehicles to exit the other office development site, preventing the high delays observed in scenarios 1a and 2a. Ultimately, the performance of the intersections along Knowles Place are expected to worsen under addition of the Block 40 Section 100 development, however these delays are limited to a local road and do not cause impacts to any of the major roads through the network. As such, the higher delays at these locations are not viewed as detrimental to the operation of the Civic road network.

From review of the impact the development had on queuing, it was seen that there was minimal impact from the AM peak period, however the PM peak period resulted in significant queuing along Knowles Place and queues back into the basement carparks along that length. These queues were typically limited to Knowles Place, so did not impact the surrounding road network significantly. Queues along Knowles Place were observed to be worst within the 1b and 2b scenarios, where the signalisation of Edinburgh Avenue intersection delays movements. Inversely though, the additional vehicles along Knowles Place remove a number of vehicles from the virtual queues of the basement carparks, resulting in lower internal queues.

Parking Considerations

As part of the deed requirements for the site, the 280 parking spaces available within the current at-grade carpark are to be replaced within the development, being provided within the basement carparks proposed for the site. In addition to these spaces, the existing disability accessible and vulnerable persons parking available along Knowles Place is also proposed to be replaced or re-established along Knowles Place.

In contrast, the parking provided for use by the development is proposed to be limited, falling below the requirements specified within the Territory Plan. This is to assist with the meeting of Green Star requirements, which requires prioritising of active travel, public transport, and electric vehicle usage over private fossil fuel vehicles. Given the high connectivity to both active travel and public transport networks, the reduced parking volumes for the site are not viewed as being an issue.

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

1 INTRODUCTION

In May 2024, Egis was engaged by Capital Property Group (CPG) to prepare a Traffic Impact Assessment (TIA) report in support of the development of three buildings at Block 40 Section 100 of Canberra Central City (60 London Circuit). The buildings are expected to operate predominantly as office use with space for food and beverage on the ground floor to assist with activating the area for pedestrians.

This investigation aims to review the current operation of the surrounding road network, and quantify the expected impact of the proposed development on traffic movements in the area. Several design geometries for the site access and nearby intersections are also being modelled to determine the difference in traffic performance caused by possible upgrades to the surrounding road which are being considered as part of this development.

1.1 Scope of Investigation

This assessment covers the transport implications of the wider civic area from the development of this site. Key aspects include:

- Existing traffic conditions within the microsimulation extent of the Parkes Way and Southwest Corridor model (PWSWC).
- Traffic generation and distribution of the proposed development.
- Review of the suitability for access arrangements to the site.
- Review of the feasibility of signalising the Edinburgh Avenue / Knowles Place intersection
- Pedestrian and bicycle accessibility to the site.
- Public transport availability to the site.

1.2 Study Area

The development site of 60 London Circuit is located entirely within City Block 40 Section 100, and can be found just northwest of City Hill within the Canberra City centre. It is bounded to the east by Northbourne Avenue, the north by London Circuit, west by Knowles Place, and south by Vernon Circle. The site is directly adjacent to the ACT Law Courts and the Reserve Bank of Australia. The location can be seen in Figure 1.1.

FIGURE 1.1 SITE LOCATION OF 60 LONDON CIRCUIT DEVELOPMENT

1.3 Data Collection

To undertake this assessment, the following data was received on the advised dates:

- PWSWC 2031-Base Hybrid Aimsun Model and supporting files – 3rd July 2024
- Parking boom gate counts for B40 S100 at-grade carpark – 3rd May to 17th May 2024

As the PWSWC model is already considered calibrated and validated, no additional SCATS, CSTM, or count data was required to enable modelling.

In addition to this data, the crash heatmap dataset was downloaded on the 11th November 2024 to help inform crash statistics within the area. Follow-up crash data was provided by TCCS on the 24th January 2025.

In support of identifying safety issues along Northbourne Avenue, weaving data was also collected by Austraffic for three days between the 28th January 2025 and the 30th January 2025.

2 REVIEW OF PREVIOUS STUDIES

Prior to the commencement of modelling activities, a review of available traffic assessments which have been conducted in the nearby Civic areas was undertaken. This was done to gain an understanding of conditions surrounding the proposed development, as well as identify the general assumptions which have been adopted previously for similar developments. From this review, two reports were identified, with details of each specified below.

2.1 City Section 100 Block 40 Transport Impact Assessment Report (Indesco, 2021)

This traffic report was completed by Indesco in June 2021 for City Block 40 Section 100, which is the same site as which this report is investigating development of. The development investigated in the Indesco report is similar in scope to what is currently proposed, with the investigation looking into the feasibility of office buildings being developed on this site. This report also assessed the area using a microsimulation model, although adopted a slightly smaller scope than is proposed within this assessment, with the focus limited on the bounds of the Inner-City Civic area.

Relevant information regarding traffic generation rates for office sites was available within this document, as well as traffic survey data for similar land uses in the area.

Model results from this assessment identified that traffic modelling for the area is operating at levels of high congestion due to the large volumes of traffic through the network. Several mitigation measures were considered to improve the operation of the network, predominantly around optimising signal phasing for nearby key intersections. Under these measures, capacity was improved for the network, however was still considered at or over capacity. These conditions were considered to be caused by the existing operation of the road network, with the development having minimal impact on these results.

2.2 Section 100 Traffic Study Update (SMEC, 2021)

A traffic report was prepared by SMEC in June 2021 in support of a DA lodgement for City Section 100, Blocks 8-11. This development looked into the development of a predominantly office development with retail land uses on the ground floor. Access to this site is proposed to occur along Knowles Place, and as such it is expected to interact with the proposed 60 London Circuit development traffic as it exits the site.

This assessment looked at both strategic modelling for the wider North Canberra city region, and microsimulation modelling for the west civic area. Results from this assessment found that a number of the key roads within the network are congested in 2031 period, and operate with high delays. Notably, Parkes Way, Northbourne Avenue, Edinburgh Avenue, and sections of London Circuit were operating at or above the road capacity.

3 EXISTING CONDITIONS

3.1 Project Site Operation

As mentioned above, the site is located within City Block 40 Section 100. The 11,380 sqm block currently operates as an at-grade public carpark with access provided off Knowles Place. The site provides 280 public parking spaces for use by the surrounding developments, with a breakdown of the parking category provided in Table 3.1.

TABLE 3.1 EXISTING PUBLIC PARKING BREAKDOWN – CITY BLOCK 40 SECTION 100

Parking Category	Quantity
Government Vehicles – Knowles Place	4
Court Authorised Vehicles – Knowles Place Extension	5
4-hour Parking	241
Medical Permit	10
Accessible Parking	9
Ride Share	8
Electric Vehicle Charging	2
Motorcycle	1
Total	**280**

3.2 Road Network

Northbourne Avenue is an arterial road that extends between Barton Highway in the north and Vernon Circle in the South. Northbourne Avenue generally provides a six lane, two-way divided carriageway with a wide light rail corridor in the median. Northbourne Avenue is subject to a posted speed limit of 40km/h in the study area, while the posted speed limit for outer sections of Northbourne Avenue is typically 60 km/h.

London Circuit is a major collector road that circulates around City Hill and Vernon Circle, providing connections to Constitution Avenue, Northbourne Avenue and Commonwealth Avenue. London Circuit generally provides a four lane, two-way divided carriageway with a wide median (ranging from 1.0m-4.0m in width). Parking is typically not permitted on either side of the road near the subject site. London Circuit is subject to a designated 40km/h area between Gordon Street and Constitution Avenue in a clockwise direction and 60km/h between Constitution Avenue and Gordon Street.

Vernon Circle is an arterial road that circulates around City Hill and connects Commonwealth Avenue to Northbourne Avenue. Vernon Circle provides three lanes circulating City Hill on each side, with City Hill effectively separating northbound and southbound traffic. A single lane is provided to allow northbound and southbound traffic to interchange (allowing full circulation). Vernon Circle is subject to a posted speed limit of 60km/h.

Commonwealth Avenue is an arterial road that extends between Vernon Circle in the north and State Circle in the South, with bridged sections crossing over London Circuit, Parks Way and Lake Burley Griffin. A cloverleaf interchange between Commonwealth Avenue and London Circuit allows the following movements to be made:

- Northbound on Commonwealth Avenue to westbound on London Circuit,
- Northbound on Commonwealth Avenue to eastbound on London Circuit, and
- Westbound on London Circuit to southbound on Commonwealth Avenue.

Commonwealth Avenue generally provides a six lane, two-way divided carriageway with a wide median of approximately 12m in width. Parking is typically not permit on either side of Commonwealth Avenue and is subject to a posted speed limit of 70km/h.

Edinburgh Avenue is an arterial road that currently extends from Parkes Way in the southwest to Vernon Circle in the northeast. Edinburgh Avenue generally provides a four lane, two-way divided carriageway separated by a concrete median which varies from 1m to 3.5m in width. The speed limit along this road is 60km/h near Parkes Way, however does drop to 40km/h just before intersecting with London Circuit.

Marcus Clarke Street is a major collector road that extends from Barry Drive in the north to Edinburgh Avenue in the south. The number of lanes along Marcus Clarke Street is typically four, except where is runs past the Australian National University, where the road narrows to two lanes. Cycle lanes are provided along both sides of the road. Marcus Clarke Street is subject to a posted speed limit of 40km/h.

Barry Drive is an arterial road that extends from Northbourne Avenue in the east to Belconnen Way in the west. Barry Drive generally provides a four lane, two-way divided carriageway separated by a concrete median. Barry Drive is subject to a posted speed limit of 40km/h in the study area, while the posted speed limit for outer sections of Barry Drive is 60 km/h and 80 km/h.

Knowles Place is a local access street that provides access from London Circuit to the car park and developments east of London Circuit. The road operates as a one-way street where it passes in front of the Law Courts, but allows two-way traffic on a single carriageway as the road travels south. The full length of Knowles Place operates under a 40km/h speed limit.

Parkes Way is an arterial road that extends from Glenloch Interchange in the west to Kings Avenue in the east. Parkes Way provides three lanes in each direction across two carriageways between Glenloch Interchange and Edinburgh Avenue overpass, and has a speed limit of 90km/h. To the east of this, the speed limit drops to 80km/h, and traffic lanes decrease to two lanes in each direction.

3.3 Road Hierarchy

The hierarchy of the roads around the study area can be seen in Figure 3.1. The key arterial road connections which will be used by vehicles travelling to and from the site are listed below:

- Northbourne Avenue
- Barry Drive
- Commonwealth Avenue
- Vernon Circle
- Constitution Avenue
- Edinburgh Avenue
- Parkes Way

Each of the above roads connect to the wider Canberra network, and will facilitate majority of trips between usual residence and the site. Marcus Clarke Street and London Circuit are classified as major collector roads, and connect the arterial roads to the local road network. The remaining roads in the area are classified as minor collector roads or lower, and would predominantly only handle traffic journeying to the land uses directly present along them. The key roads for the site would be Knowles Place, as it provides direct access to the site.

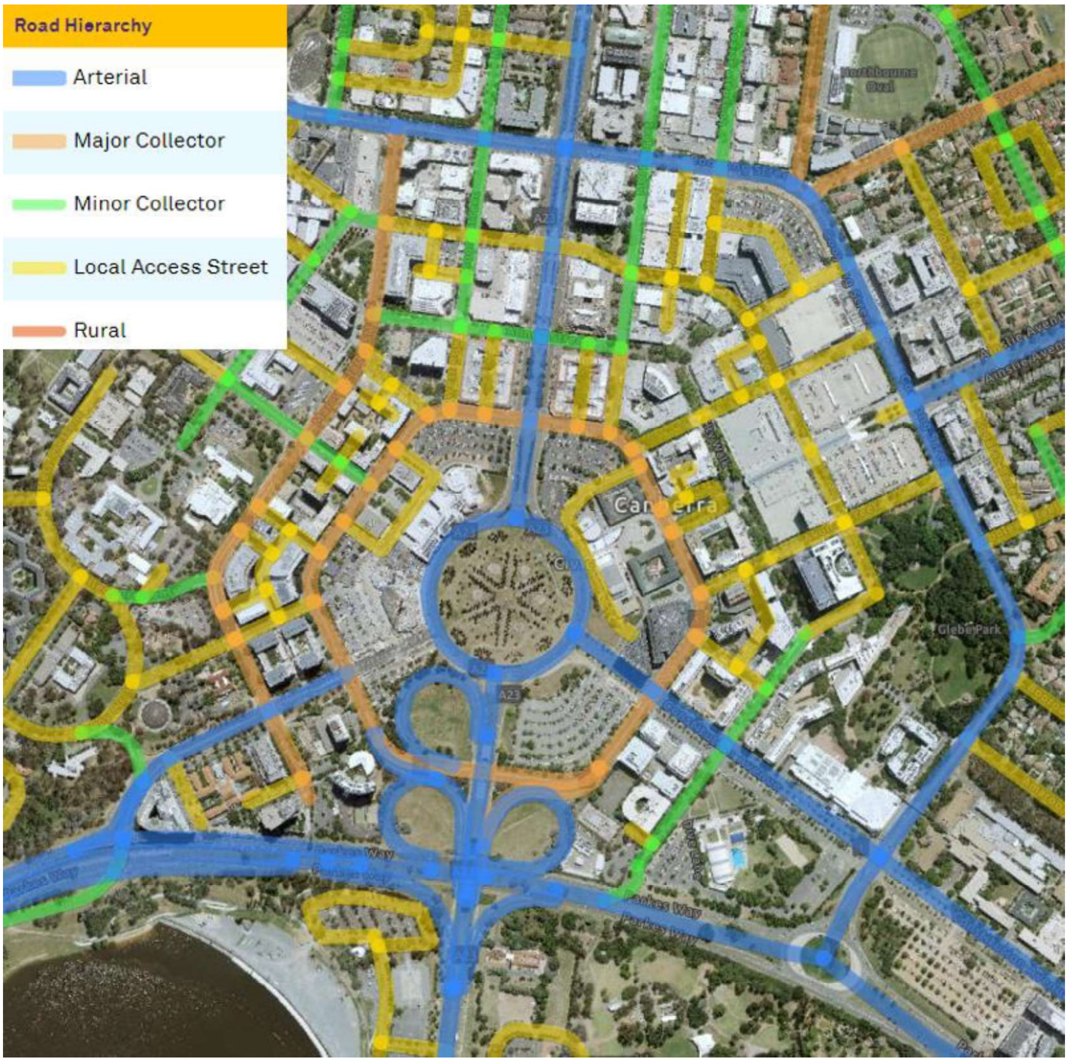

FIGURE 3.1 ROAD HIERARCHY

3.4 Speed Environment

With many of the surrounding roads lying within the city area, a large number of the roads either have a posted speed of 40km/h, or are slow speed / shared environments. The arterial road connections typically have speed limits of 80km/h or 90km/h outside of the city extents, but reduce to between 40km/h and 60km/h within the city. A diagram of the speed limits present within the area surrounding the site, as modelled within the PWSWC Model, can be seen in Figure 3.2.

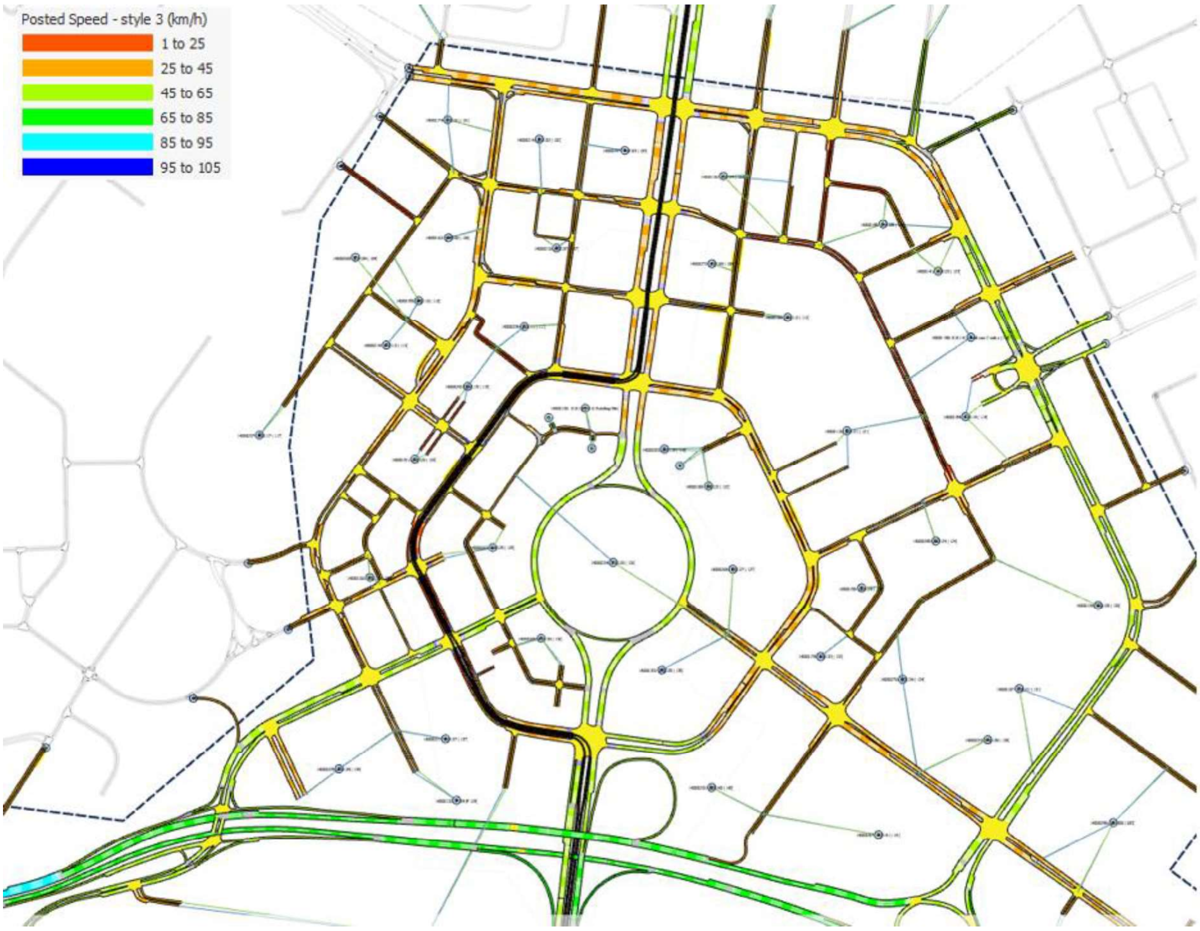

FIGURE 3.2 ROAD NETWORK SPEED LIMITS

3.5 Active Travel Connectivity

With the site being located within the City Centre, a large amount of infrastructure is present to provide improved amenity for walkers and cyclists in the area and could be used by this proposed development. These are outlined below.

3.5.1 Off Road Cycle network

The subject site is served by an existing off-road path network that provides active travel connections across the broader city area. Of these, several are classified as CBR Cycle Routes, and typically connect the city to the other major centres across the ACT. Notable of these are the C1: City-Gungahlin, C2: City-Queanbeyan, C3: City-Belconnen, and C4: City-Tuggeranong via Woden. There are also several loops available which provide better ability for cyclist distribution and leisure activities. These include the C8: City loop and LBG: Lake Burley Griffin circuit. The location of each of these routes can be seen within the map provided in Figure 3.3.

In addition to these key named routes, principal cycle routes are specified as being present along Edinburgh Avenue, around Vernon Circle, and along the southern extent of London Circuit. Main active travel routes are present along the northern extent of London Circuit, and along Constitution Place. Local community routes are also present in the surrounding area, creating a loop around London Circuit, running along Moore Street, Mort Street, and University Avenue, and providing several other local connections which facilitate active travel through the area.

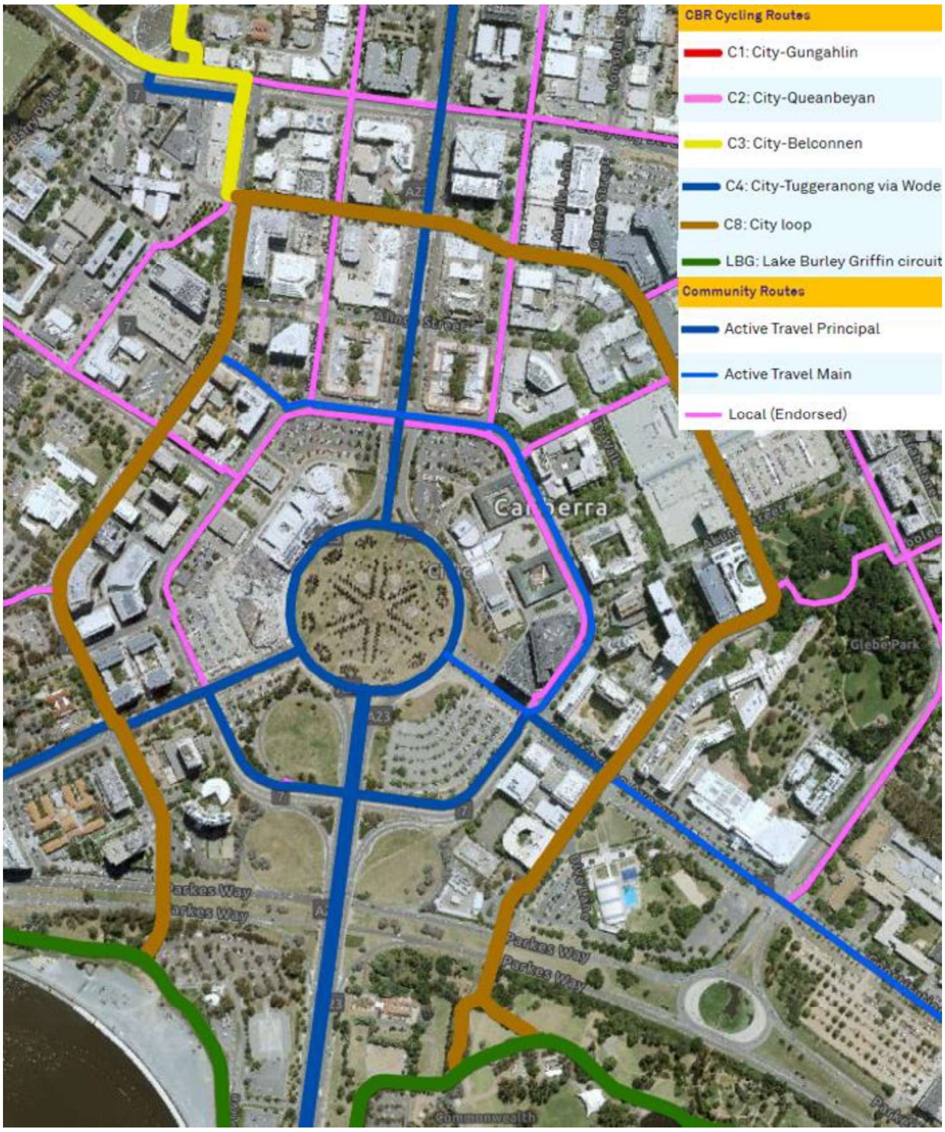

FIGURE 3.3 OFF-ROAD ACTIVE TRAVEL NETWORK

3.5.2 On-Road Cycle Network

In addition to the off-road path network mentioned above, several of the roads in the area also have on-road cycle lanes present, which increase the connectivity of the area for cyclists. The key roads in proximity to the site which have an on-road cycle lane along one or both sides of the road are London Circuit, Constitution Place, Commonwealth Avenue, Northbourne Avenue, and Barry Drive. Parkes Way to the west of the city also has an on-road cycle route present, however this transitions to an off-road path along the southern verge. Along the northern verge, the on-road cycle lane diverts off Parkes Way and onto the Edinburgh Avenue eastbound off-ramp, where it connects into the London Circuit on-road network. This network can be seen in Figure 3.4.

FIGURE 3.4 ON-ROAD CYCLE LANES (RED)

3.6 Public Transport

With the site located within the city centre, several options for public transport are available within close proximity. These are detailed below.

3.6.1 Light Rail Connectivity

Currently, the light rail network for the ACT extends from Gungahlin Place, along Flemington Road, down Northbourne Avenue, and ends at the Alinga Street stop within the city. On weekdays, the light rail operates every 5 minutes in the peak hour, and every 15 minutes outside of peak hours between 6am and 11pm. On weekends, the light rail operates every 15 minutes between 6am and 12:30am (Sat) and 7am and 11pm (Sun). Currently, the closest stop to the site is approximately 200m away.

3.6.1.1 Future Light Rail Extension

Stage 2 of the Light Rail network is proposed to extend between the City and Woden via City West and Barton (the parliamentary zone), as shown in Figure 3.5 below. This stage will extend the existing route through to Woden, connecting south Canberra to the light rail network. This route will take the light rail along the west side of London Circuit, and is expected to improve public transport connectivity to the site from the south. The closest stop to the site will remain the Alinga Street Stop, however a new stop at Edinburgh Avenue will be constructed, which is 500m from the site.

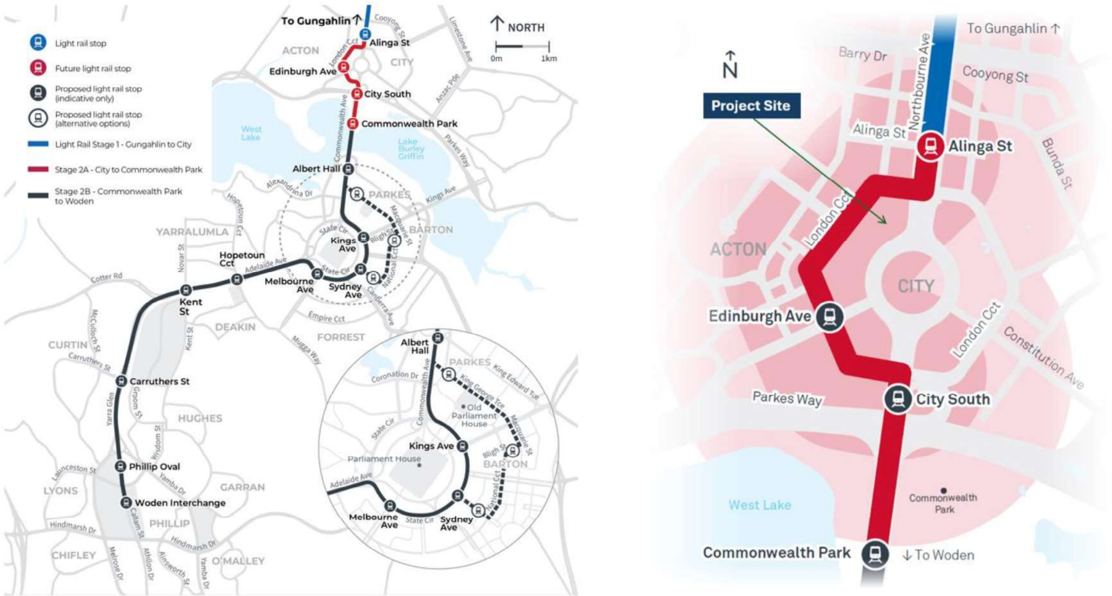

FIGURE 3.5 STAGE 2 LIGHT RAIL ROUTE

3.6.2 Bus Network

The City Bus Interchange is located along East Row and Alinga Street. All the major bus stops in the interchange are within 300m of the site, and easily accessible through the path network and road crossings provided. The interchange handles majority of the ACT rapid route busses, with routes 2-7 and 10 passing through the interchange. In addition, numerous local bus routes through the surrounding suburbs are also available from this location. Details on the provided bus routes and their movements along the local road networks can be seen in Figure 3.6.

Rapid routes typically run every 5 to 30 minutes on the weekdays, and every 30 to 60 minutes on weekends. Local routes run less frequently, typically only having one service every 30 to 60 minutes on weekdays, and hourly on weekends.

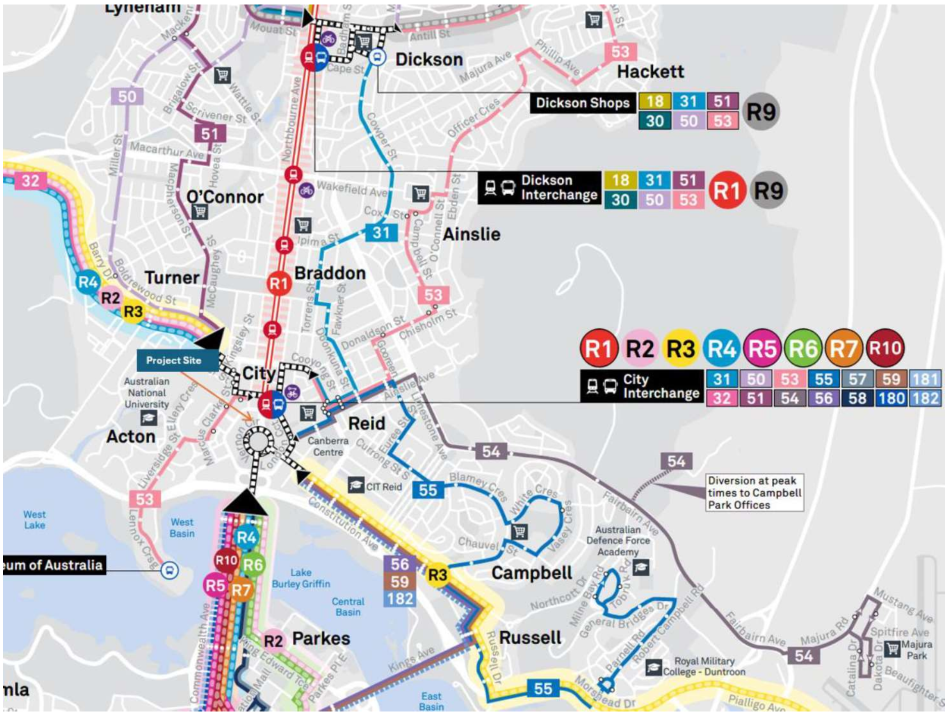

FIGURE 3.6 PUBLIC TRANSPORT ROUTES

3.7 Existing Network Crash Data

As part of the assessment of existing conditions within the road network, the crash data subset for the areas of London Circuit and Northbourne Avenue surrounding the site were requested from TCCS and provided on 24th January 2025. This data includes a history of reported crashes from between the start of 2019 and the end of 2023, and lists the location, time, crash type, severity, and road conditions at the time of the collisions.

This data shows that the majority of Civic roads and intersections have a moderate to high quantity of crashes recorded, which is mostly attributed to the large volumes of traffic in the area and congested peak periods, which lead to driver frustration and leaves minimal room for driver error. Of key interest to the operation of the proposed development within 60 London Circuit are the areas listed below, which have been reviewed in greater detail:

- Intersection of Northbourne Avenue and London Circuit
- London Circuit between Hobart Place and Gordon Street

The minor road extents and intersections which this development is expected to impact upon were reviewed as part of this assessment, but were found to not have significant volumes of crashes. As such, it has been assumed that no existing safety issues are present in these areas, or traffic volumes are not high enough for issues to regularly arise.

Of the intersections which are expected to be impacted by the development, the intersection of Knowles Place and Edinburgh Avenue could not be assessed from the available crash data. This is due to the Edinburgh Avenue extension to Vernon Circle only having occurred at the end of 2020, while the connection of Knowles Place to it occurred within mid-2022. As such, the available data for these roads is minimal, and no conclusions could be drawn on the safety of this intersection.

3.7.1 Northbourne Avenue / London Circuit Crash History

Crash Types

From review of the Northbourne Avenue / London Circuit intersection, it can be seen that a total of 73 crashes have been reported through this intersection between 2019 and 2023, which averages to 15 crashes per year.

From review of the data, it could be seen that the most common types of crashes were rear-end collisions (21), right-angle collisions (12), and same direction side-swipes (34). All other crash types were observed to occur less than 5 times over the course of the 5-year period, and so are attributed to random accidents as opposed to road conditions.

For the right-angle crashes, the majority of these crashes (7) occur between eastbound vehicles along London Circuit and southbound vehicles along Northbourne Avenue. This is assumed to be caused by the eastbound storage section between the northbound and southbound carriageways, with vehicles likely turning right into it and assuming they have a green to continue through, or rushing to avoid being caught in the median. These crashes also have a high chance of injury, with approximately 30% of the crashes resulting in at least one injury. While this crash type is common and dangerous, it is not expected to be as predominant in the future when the site is operating, as the proposed light rail upgrades to the intersection will remove the northbound right-turn lane and median storage. The development of the site is also not expected to increase the likelihood of this crash type from any direction, as it is distant enough from the intersection for vehicles to notice an orange / red light.

The other two prominent crash types of rear-end crashes and side-swipe crashes suggest issues with unexpectedly stopping vehicles and poor gap selection when changing lanes. Both these factors suggest that gap selection is limited and vehicles stop and start erratically, which is consistent to observations of this intersection during peak periods.

Rear-end crashes are most prominent travelling northbound (10) along Northbourne Avenue, which is attributed to the downgrade of the road and horizontal curve limiting sightlines when exiting Vernon Circle.

Eastbound and southbound directions have slightly less rear-end collisions recorded, with 4 and 5 crashes respectively. While common, these crash types do not pose significant danger to road users, with all crashes of this type recorded only resulting in property damage due to the low speeds which these crashes occur at. The installation of the LILO intersection from the site would be expected to worsen the frequency of rear-end crashes along the northbound approach, with vehicles entering the road with low sight distance and stop-start traffic conditions. Having said this, the current frequency is only 2 crashes per year on average, and has no history of causing driver injury. As such, the impact on any increase at this location is not viewed as a significant concern at this site.

As with the rear-end crash types, side-swipe crashes are most prominent along the northbound traffic movement along Northbourne Avenue, with 13 crashes in total along this leg. The other legs are recorded to have less, with between 6 and 9 crashes recorded on each of the eastbound, northbound, and westbound legs. This crash type seems to have a low risk of injury at this intersection as well, with only 1 crash in the last 5 years having resulted in an injury. The installation of the LILO intersection connected to the site would again be expected to lead to an increase in side-swipe crashes along the northbound approach, as vehicles to or from the site may promote vehicles rapidly crossing multiple lanes. Having said this, currently there are on average 3 crashes of this type along this approach per year, which are highly unlikely to result in injuries. While it is impossible to estimate the increase in this crash type caused by the addition of the LILO, it is not expected to result in a dramatic increase in frequency or severity of these crashes.

The quantity of each crash type associated with the northbound lane has been presented in graphical format, and can be found below in Figure 3.7.

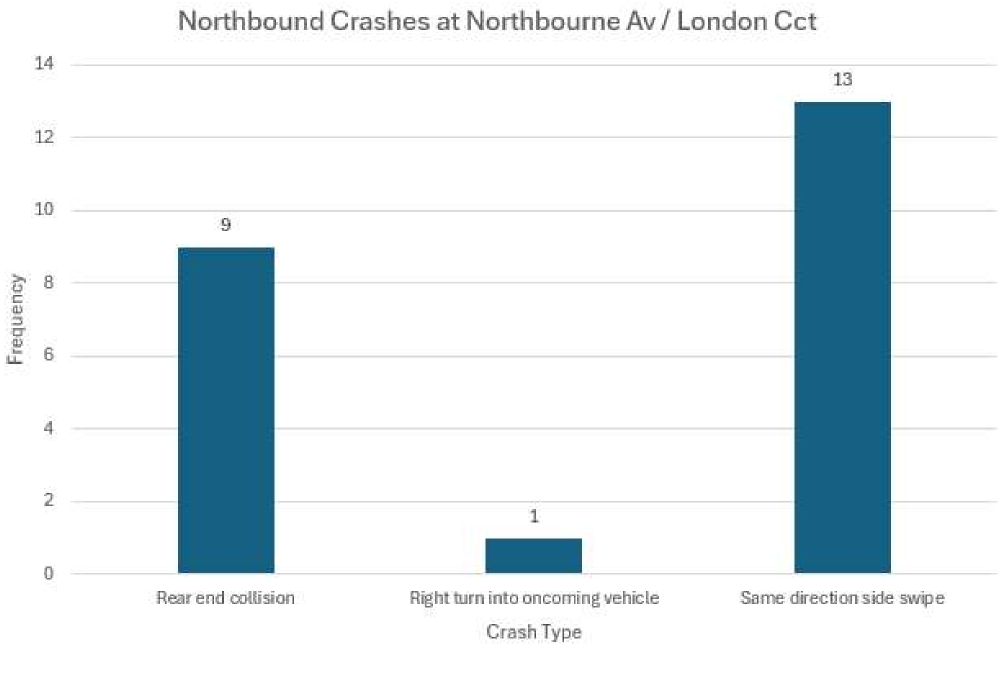

FIGURE 3.7 NORTHBOUND CRASH VOLUMES AT LONDON CCT / NORTHBOURNE AVE INTERSECTION

Factors Influencing Crash Frequency

While the road conditions are the most prominent factor in the frequency and severity of the crash types observed, a review of other conditions within the area surrounding the intersection was conducted. The two key factors beyond crash type worth considering were time of day and weather conditions.

The time of day could factor into the cause of crashes through several means, notably whether crashes occur during peak hours, and if there is an issue with road lighting or glare. From review of the data, it can be seen that majority of crashes occurred in the evening, with the peak occurring between 3pm and 5pm and between 7pm and 9pm. The 3-5pm peak overlaps with typical pm commuter peak times within the city, and so is likely resultant on the greater volumes of vehicles on the road at this time. A similar peak is not observed in the AM period, suggesting that safety concerns are greater travelling southbound, out of the city than they are travelling northbound into the city.

For the 7-9pm evening peak, it is noted that the city has a bustling nightlife, with restaurants, entertainment facilities, and pubs/nightclubs in close vicinity to this intersection. With the two large surface carparks currently present either side of this intersection, it is assumed that this peak is due to increased movements towards the carparks combined with higher driver fatigue near the end of the day. The crash distribution over time can be seen in Figure 3.8.

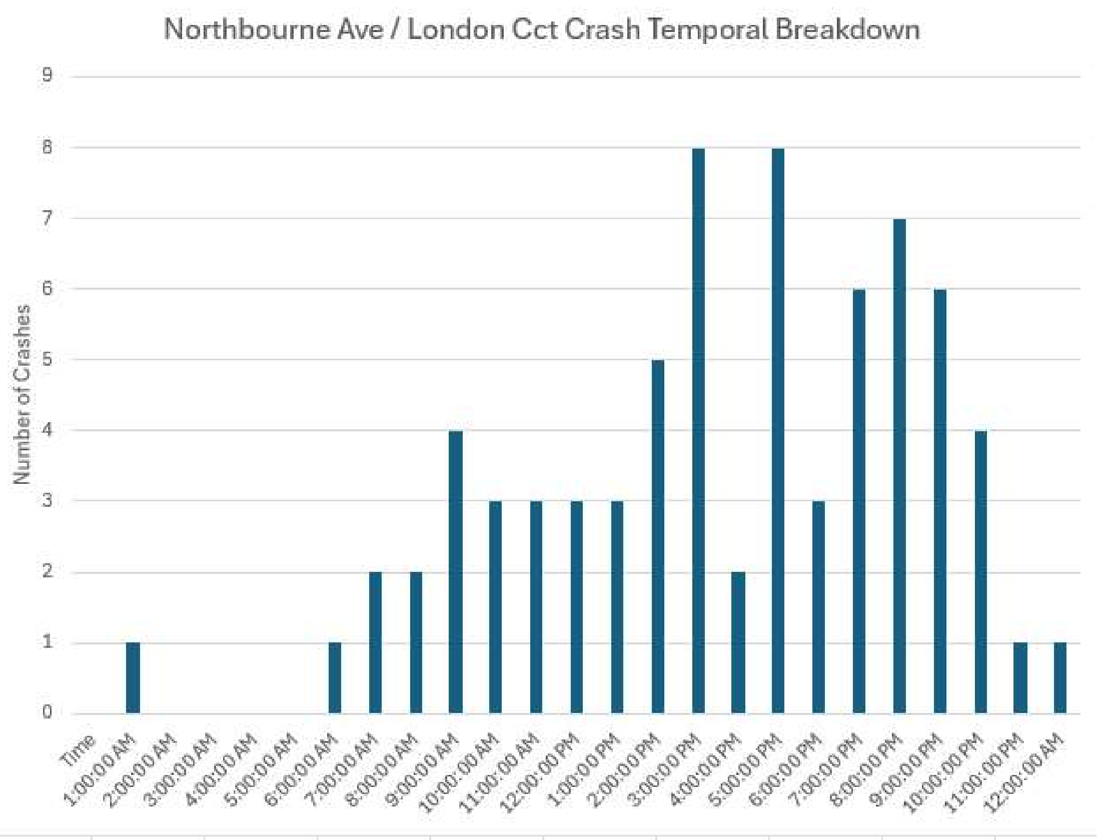

FIGURE 3.8 NORTHOURNE AVE / LONDON CCT INTERSECTION CRASH TEMPORAL DISTRIBUTION

From review of crashes in relation to weather conditions, it was seen that approximately 15% of crashes (10) occurred during wet weather conditions. From the Bureau of Meteorology (BOM) statistics, ACT rains on average 20% of days each year, so this statistic does not seem to be inflated beyond what would be a typical statistical spread. The spread of wet weather crashes across legs can also be seen to be pretty even, with 3 crashes along east, north, and south legs, and one crash along the west leg. As such, wet weather conditions at this intersection are not viewed as being statistically relevant to the crash data or distribution.

3.7.2 London Circuit Crash History

Crash Type

For the stretch of London Circuit which connects to Knowles Place, only 13 crashes were identified as occurring between Hobart Place and Gordon Street in the 5-year period between 2019 and 2023. Only a small number of crashes (average 3) are expected to occur each year, meaning this section of road is not viewed as having a high likelihood for collisions. Of the crashes which have occurred, only 3 of them resulted in injury, with the rest only causing property damage. This low number of injuries is not surprising for the area, as the speed limit is set to 40km/h, being part of the slow speed environment within the city region.

The majority of collisions (7) in this section were related to crashes with parked vehicles, notably parked vehicle rear ends (601) and door impacts of parked vehicles (604). Given the on-street parking and loading zones present along London Circuit, the 604 crashes are understandable and could possibly suggest parking bays are not wide enough for passengers to disembark without encroaching on traffic lanes. The rear end collisions with parked cars is unusual for this stretch of road given most parking and loading bays along the road are indented. As such, it is suspected that these collisions typically occur either along the side streets or within the adjacent carparks along this stretch.

All other crash types were observed to occur less than 5 times over the course of the 5-year period, and so are attributed to random accidents as opposed to road conditions.

The quantity of each crash type associated with the northbound lane has been presented in graphical format, and can be found below in Figure 3.9.

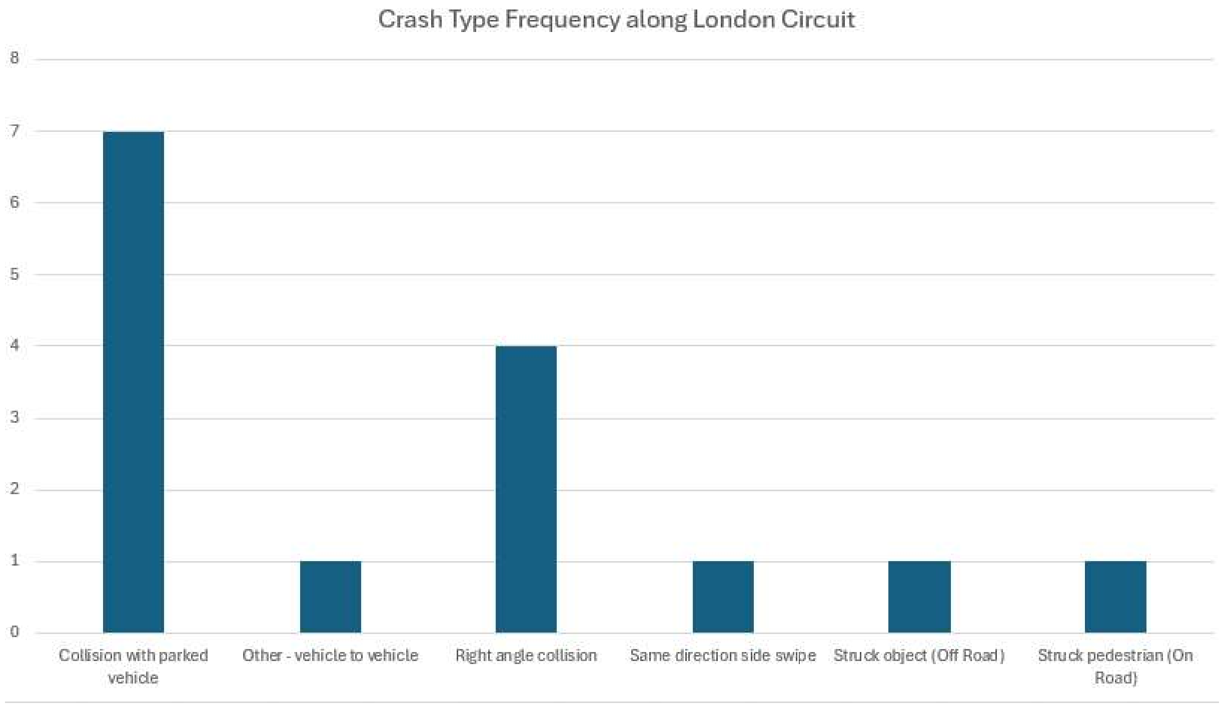

FIGURE 3.9 CRASH TYPE ALONG LONDON CCT WEST OF NORTHBOURNE AVE

It is noted that the inclusion of the London Circuit development would not be expected to significantly impact collisions with parked vehicles, as the generated vehicles would not be expected to heavily interact with parked vehicles. With the changes to London Circuit due to the Light Rail Stage 2A works, right angle collisions are also expected to not be impacted by the development, as all entries and exits to the site will be left-in, left-out. An increase in rear-end collisions could occur along this section of road as increased vehicle numbers turn out of Knowles Place, however given the low current volume of these crashes and slow speed environment, any increase to this crash type would not be expected to cause significant issues.

Factors Influencing Crash Frequency

With the low number of total crashes which have occurred along this stretch of road, it is generally not expected that there are significant factors present along this corridor that led to unsafe conditions and exacerbate the likelihood of collisions. From review of the temporal distribution of crashes, it showed that crashes were relatively evenly spread between 9am and 7pm, with no period seeing a significant peak over other hours. This data has been graphically presented in Figure 3.10. From review of crash data in relation to weather conditions, no statistically significant correlation was observed.

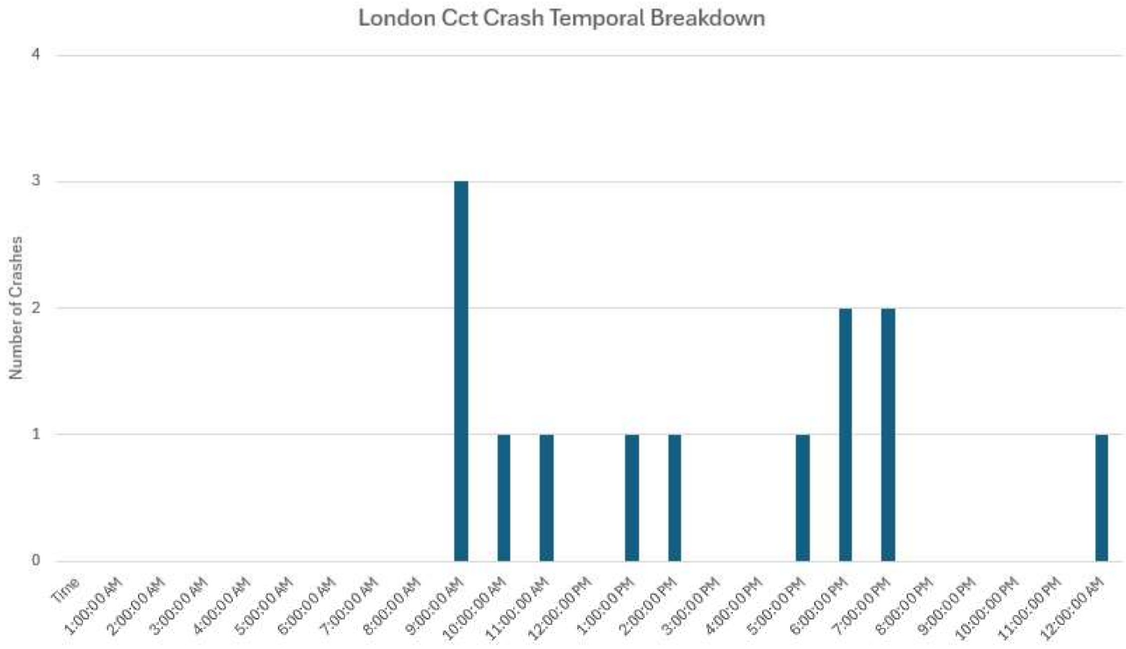

FIGURE 3.10 LONDON CCT CRASH TEMPORAL DISTRIBUTION

3.7.3 Impact of Light Rail Stage 2A Works on Crash Likelihood

As has been mentioned in passing above, the future development of Stage 2 of the Light Rail is expected to dramatically change the operation and crash statistics of Northbourne Avenue and London Circuit. With the light rail upgrades changing several full movement intersections along London Circuit to left-in left-out arrangements and removing the right-turn movement northbound at the London Circuit / Northbourne Avenue intersection, safety is expected to be improved for the area due to the reduced conflict points. This would also be expected to limit the impact that the proposed London Circuit development has on crash frequency, limiting the need for weaving and reducing the likelihood of right, angle crashes.

The impact of these changes on safety and crash frequency won't be fully understood until the upgrades have been made.

3.8 Northbourne Avenue Weaving Behaviour

As part of the review of Revision 1 of this report, TCCS raised concerns regarding the existing weaving behaviour along Northbourne Avenue, and how the proposed LILO site access would exacerbate this issue. To assess the current conditions at this location, Austraffic was engaged to undertake a weaving survey for the northbound carriageway of Northbourne Avenue. Details of this assessment and findings can be found in the sections below.

3.8.1 Weaving Collection Methodology

To collect the weaving data, survey cameras were set up along Northbourne Avenue between Vernon Circle and London Circuit, which could clearly see all three northbound traffic lanes and the vehicles moving across them. The camera location and survey extent can be seen in Figure 3.11. The cameras were set up for a three-day period between Tuesday 28th January 2025 and Thursday 30th January 2025, and recorded all lane movements of vehicles along this extent. Data was provided at 15-minute intervals for the 2-hour period between 7am and 9am in the morning, and between 4pm and 6pm in the afternoon.

It is noted that this data was collected outside of optimal periods, occurring within the last week of ACT school holidays and within the same week as a public holiday. This was the only period that data could be collected however as Light Rail Stage 2A temporary traffic management was installed the following week, which restricted movements through the intersection and dramatically changed behaviour. As this data is focussed on driver behaviour and not total volumes, this timing was deemed as suitable.

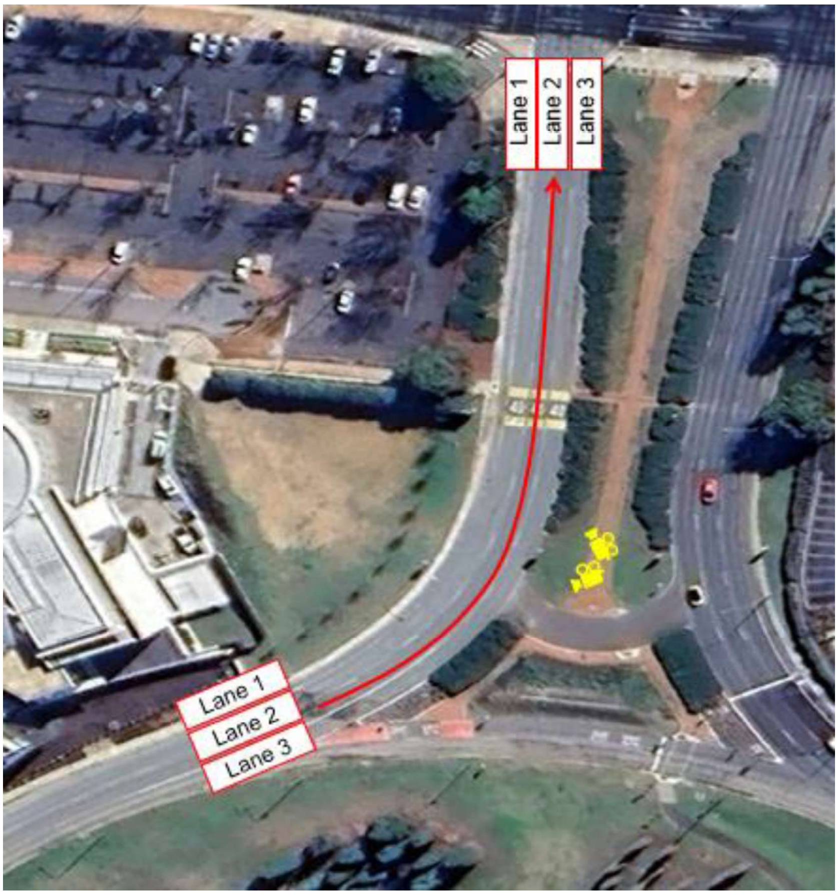

FIGURE 3.11 WEAVING SURVEY EXTENT

3.8.2 Existing Weaving Results

A summary of the weaving data collected can be seen in Table 3.2 below.

TABLE 3.2 WEAVING DATA SUMMARY

Day	Total Traffic Volume	East-moving Weave	West-moving Weave	Avoidance Weave
AM Peak Period				
Tues	1099 vph	145 vph	51 vph	3 vph
Wed	1078 vph	150 vph	35 vph	-
Thur	1101 vph	163 vph	52 vph	1 vph
Percentage of Total Traffic		**13%**	**5%**	**0.1%**
PM Peak Period				
Tues	1297 vph	38 vph	83 vph	-
Wed	1387 vph	36 vph	113 vph	-
Thur	1463 vph	39 vph	109 vph	1 vph
Percentage of Total Traffic		**3%**	**7%**	**0.02%**

From this data, it can be seen that on average, approximately 18% of the carriageway traffic volume undertakes a weaving manoeuvre in the AM peak within this section of road. The majority of these movements (14%) are weaving to the east, likely so they can make a right-turn movement onto London Circuit, or be in position for a right turn at Bunda Street further to the north. A much smaller percentage of vehicles (4%) was observed to be weaving to the west, likely so they can make a left turn movement onto London Circuit, or to be in position for a left turn movement at Rudd Street. A very small percentage of vehicles (>1%) were observed to undertake weaving movements around vehicles, ending back in the same lane they started from. This is assumed to be to avoid queues or slow vehicles within the road, and isn't common enough to be of concern.

In the PM peak, the weaving movements are noted to be less frequent, averaging only 10% of the northbound carriageway volume across the hour. In the inverse of the AM peak, a greater volume (7%) of the movements are seen to be weaving westbound, while the remaining 3% saw weaving movements to the eastern lane. Again, a very small amount (>1%) of weaving movements were seen to end in the lane they started in, with the assumption that vehicles are avoiding queuing or slow vehicles through this motion.

Regarding the key lane changes recorded as part of this weaving analysis, the main movement for both peaks was from the central lane, with AM peak seeing vehicles travel to Lane 3, and to Lane 1 in the PM peak. In comparison, the number of vehicles from the outside lanes weaving to the middle lane, or weaving across two lanes in one go. Typically, movements from the central lane are 6.5x more frequent (avg. 170 vph) than movements from the outside lanes (avg. 30 vph) in the AM peak. This suggests that vehicles in the AM peak typically start changing lanes before the extent of this survey, which limits the impact that weaving would have on this section of the road and limits weaving movements to a single lane. The PM peak has a greater mix of vehicles moving from the outside lanes to the inside lane, with about 1.5x as many movements from the central lane compared from the outside lanes.

For both peaks, majority of weaving movements are limited to a single lane change, with weaving crossing all three lanes in a single movement occurring less than 5 times over the AM peak, and less than 15 times over the PM peak. This is likely due to the congestion along this road, making gaps for weaving movements across three lanes limited.

3.8.3 Impact of Future Developments on Weaving

With the addition of the development within 60 London Circuit and the proposed LILO intersection onto Northbourne Avenue, there is potential for weaving movements to increase in the area as vehicles exit and enter the site. This in turn could result in an increase to side-swipe crashes and rear-end crashes, as was mentioned in Section 3.7 above.

For vehicles entering the site, increased weaving is not viewed as a significant concern. As from the weaving data collected, it could be seen that majority of vehicles only changed one lane in close proximity to where the site access would be, suggesting that vehicles have sufficient space prior to the intersection to pick their desired lane. In addition, the U-turn bay prior to Vernon Circle which is available for southbound vehicles along Northbourne Avenue will be closed before the LILO becomes operational (refer Section 4.4.1). This would remove a portion of the existing weaving traffic, and eliminate potential vehicles weaving across 3 lanes to either access the site or turn left at London Circuit.

For vehicles exiting the site, weaving would be considered a significant risk in isolation to other developments in the area. With the location of the LILO, there would be a large risk of vehicles exiting the site and trying to turn right onto London Circuit. This movement would force vehicles to cross three lanes of traffic in approximately 60m, resulting in extreme weaving and potentially unsafe behaviour.

This is not however viewed as a significant risk in future years however due to the Light Rail Stage 2A works at the intersection of Northbourne Avenue and London Circuit. These works are proposing to remove the right turn at this intersection, likely resolving a portion of the current weaving issues and removing the desire for vehicles from the site to cross 3 lanes quickly. Instead, any vehicles wishing to turn right would need to use the Bunda Street turnoff, which is over 300m away from the LILO intersection.

With the Light Rail works and closure of the U-turn being implemented prior to the development coming online, the risk of weaving in the area is expected to be greatly reduced. As such, the risk of adding the LILO access would be minimised through disincentivising weaving movements to occur over such a short distance and not be expected to result in a major decrease in safety in the area.

4 PROPOSED DEVELOPMENT

4.1 Proposed Land Use

The development within the 60 London Circuit site is proposed to be an office-dominant building with associated facilities including parking for all vehicle types, end-of-trip facilities, and food & beverage area. The development will consist of three buildings, known as the north building, west building, and south building. The layout of the proposed development can be seen in Figure 4.1.

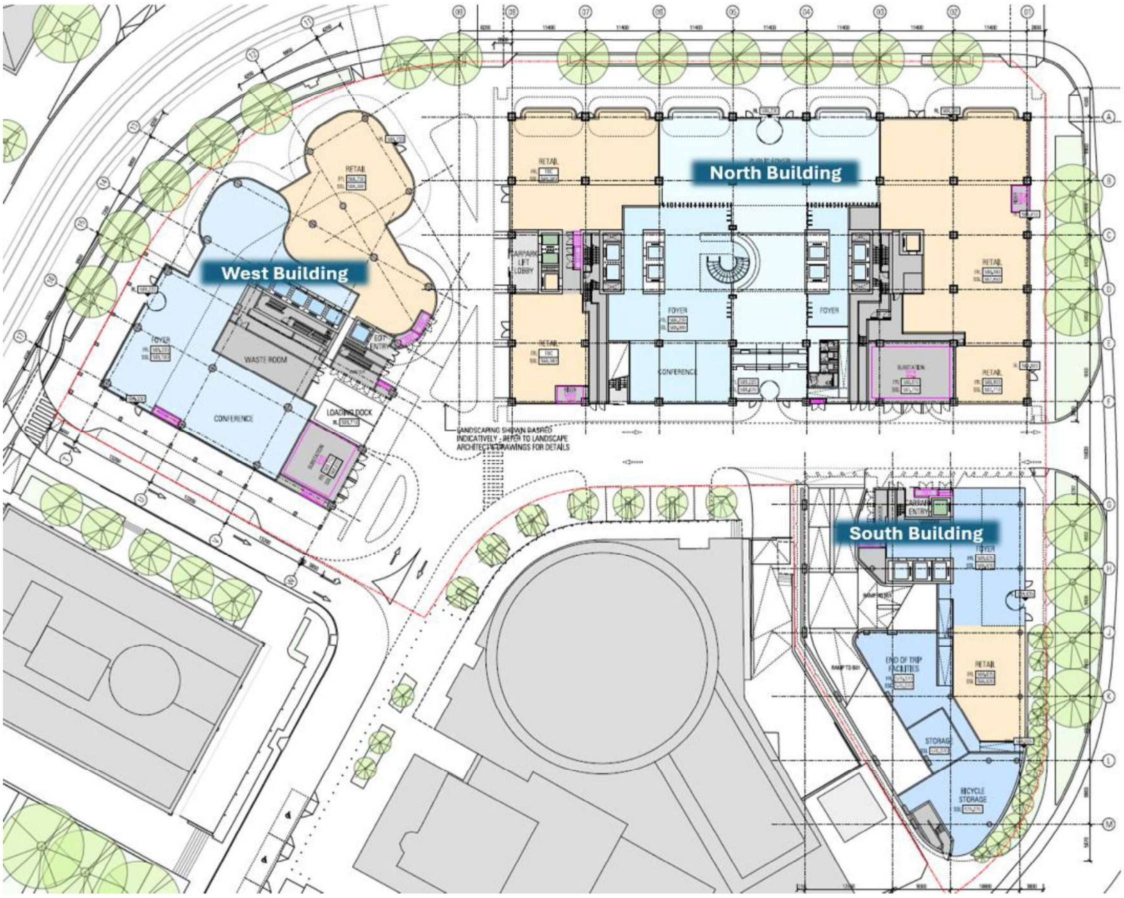

FIGURE 4.1 DEVELOPMENT LAYOUT

It is noted that the land use for all buildings has not yet been confirmed, with potential for hotel and residential development aspects to be included. To not limit the development in the future, a worst-case scenario has been considered. This assumes all buildings above ground floor will consist of office land use. Office land use will have the highest traffic generation out of the options considered, and will have tidal flow most aligned with the surrounding road network. As such, the impact of a full-office development is expected to have the greatest impact on the surrounding roads and intersections.

The proposed land yield of all three buildings can be seen in Table 4.1.

TABLE 4.1 PROPOSED BLOCK 40 SECTION 100 LAND USE

Building	Office Yield (sqm GFA)	Restaurant (sqm GFA)	Café (sqm GFA)
North Building	31,262	1,298	214
West Building	20,364	562	80
South Building	10,989	-	123

4.2 Proposed Traffic Generation

The traffic generation for the development was determined based upon the assumed type and size of each of the land uses specified in Table 4.1 above, and the generation rates provided in *RTA Guide to Traffic Generating Developments (2002)* and *TfNSW Survey Data – Offices*. The generation rates which have been used are listed below:

- Office within the city centre – 1vph per 100 sqm GFA for both AM and PM peaks.
- Restaurant – 5vph per 100 sqm GFA for PM peaks only.
- Café - 5vph per 100 sqm GFA for AM peaks only.

These generation rates were confirmed as acceptable by TCCS via email on the 23rd July 2024, with the correspondence included as part of Appendix A. Using these rates, the traffic generation shown in Table 4.2 and Table 4.3 was calculated for each building.

TABLE 4.2 PROPOSED DEVELOPMENT TRAFFIC GENERATION – AM PEAK

Building	Office Traffic Generation	Restaurant Traffic Generation	Café Traffic Generation	Total
North Building	312 vph	-	11 vph	**323 vph**
West Building	204 vph	-	4 vph	**208 vph**
South Building	110 vph	-	6 vph	**116 vph**
Total	***626 vph***		***21 vph***	***647 vph***

TABLE 4.3 PROPOSED DEVELOPMENT TRAFFIC GENERATION – PM PEAK

Building	Office Traffic Generation	Restaurant Traffic Generation	Café Traffic Generation	Total
North Building	312 vph	66 vph	-	**378 vph**
West Building	204 vph	28 vph	-	**232 vph**
South Building	110 vph	-	-	**110 vph**
Total	***626 vph***	***94 vph***		***720 vph***

4.2.1 Existing at-grade Carpark Traffic

It is noted that one of the deed requirements for the site is to maintain the number of public parking spaces currently available within the site. As such, the current traffic generation to and from the site is assumed to still apply under the future development scenarios. Traffic count data was collected from the toll gates present on the existing carpark to determine the volume of traffic movements entering and exiting this site at present.

This data was collected for the days between the 3rd May and the 17th May, and gave hourly entry and exit volumes for the 24-hour period. From this data, the average traffic volumes which are expected on the network due to the public carpark were calculated, and can be seen in Table 4.4.

As the toll gate data collected did not capture origin or destination information, the OD percentage split used in the existing base model for the carpark centroid was used.

TABLE 4.4 AT-GRADE CARPARK ENTRY AND EXIT VOLUMES

Period	Entry Volumes	Exit Volumes
AM Peak (8AM-9AM)	88 vph	23 vph
PM Peak (5pm-6pm)	105 vph	37 vph

4.3 Proposed Traffic Distribution

4.3.1 Directional In-Out Splits

For the purpose of calculating the volumes of traffic entering and exiting the basement carparks available within the site, the following splits have been assumed:

- For Office use
  - 90% inbound traffic and 10% outbound traffic in the AM peak
  - 10% inbound traffic and 90% outbound traffic in the PM peak
- For Café and Restaurant use
  - 50% inbound traffic and 50% outbound traffic in both peaks

These rates have been based off data available in the TfNSW data and analysis reports, as well as from general understanding of how these land uses would function in each peak. These splits are also consistent with previously assumed splits for the city centre area made in previous reports.

Adopting these splits results in the following traffic volumes entering and exiting the site in each peak period.

TABLE 4.5 PROPOSED DEVELOPMENT TRAFFIC IN-OUT DISTRIBUTION

Building	AM Peak In	AM Peak Out	PM Peak In	PM Peak Out
North Building	287 vph	37 vph	64 vph	314 vph
West Building	185 vph	22 vph	34 vph	197 vph
South Building	102 vph	14 vph	11 vph	99 vph
Total	**574 vph**	**73 vph**	**109 vph**	**610 vph**

4.3.2 Network Distribution

To determine the origin and destination locations of vehicles generated by the site, a percentage split was developed and applied to the relevant centroids within the Aimsun microsimulation model. To develop this distribution, the 2021 Australian Census Journey to Work data has been used, along with the Household Travel Survey data from the ACT / Queanbeyan region. The Victorian Integrated Survey of Travel and Activity (VISTA) was also reviewed due to its greater breakdown in trip data, allowing for greater understanding of origin-destination relations between specific land uses.

Given the assumed use of the land as commercial office space, the site was treated as a place of work. For this assessment, most of the movements are expected to be between this place of work and the place of usual residence. It has been assumed that any trips between schools or leisure activities would occur outside of the model extents on the way to or from the place of residence, and as such these trips have not been modelled directly. Trips to shops have however been captured in the assessment given the proximity of the Canberra Centre to the site, and its centroids being included in the modelled scope.

To simplify model assumptions, the places of residence were generalised into the key centroids which were present at the ends of major roads in the model. The use of these roads was determined through the shortest path of travel between them and the site. Through these assumptions, the general distribution of traffic from the site to the extents of the model was assumed to be as shown in Table 4.6. The location of the centroids has been shown in Figure 4.2.

TABLE 4.6 DISTRIBUTION SPLIT FOR B40 S100 SITE TRAFFIC

Centroid	AM Peak	PM Peak
Work	**100%**	**91%**
Morshead Drive (14000316)	*6.3%*	*5.7%*
Northbourne Avenue (14000099)	*24.8%*	*22.6%*
Barry Drive (14000338)	*21.4%*	*19.5%*
Caswell Drive (14000327)	*0%*	*0.0%*
William Hovell Drive (14000345)	*6.1%*	*5.6%*
Bindubi Street (140000347)	*1.0%*	*1.0%*
EW Arterial (14000078)	*2.8%*	*2.6%*
Tuggeranong Parkway (14000343)	*14.0%*	*12.8%*
Cotter Road (east) (14000056)	*0.6%*	*0.6%*
Cotter Road (west) (14000341)	*0.9%*	*0.8%*
Hindmarsh Drive (east) (14000139)	*2.2%*	*2.0%*
Hindmarsh Drive (west) (14000205)	*2.0%*	*1.8%*
Commonwealth Avenue (14000352)	*17.7%*	*16.1%*
Shops	**0%**	**8%**
Canberra Centre (14000190)	0%	*8%*

It is noted that for the purpose of this analysis, travel to the restaurant and café land uses has been assumed to match the above distribution. Given the restaurants and café's function in an ancillary capacity to the office developments, it is assumed that majority of trips to these uses in the peak periods will be from individuals who work nearby. For the café's especially, majority of trips would be expected to be from pedestrians or people already parking at the site with the intent to work. To be conservative, their traffic generation has still been included in the model, but distribution of the vehicles has been assumed to match that of the commercial building.

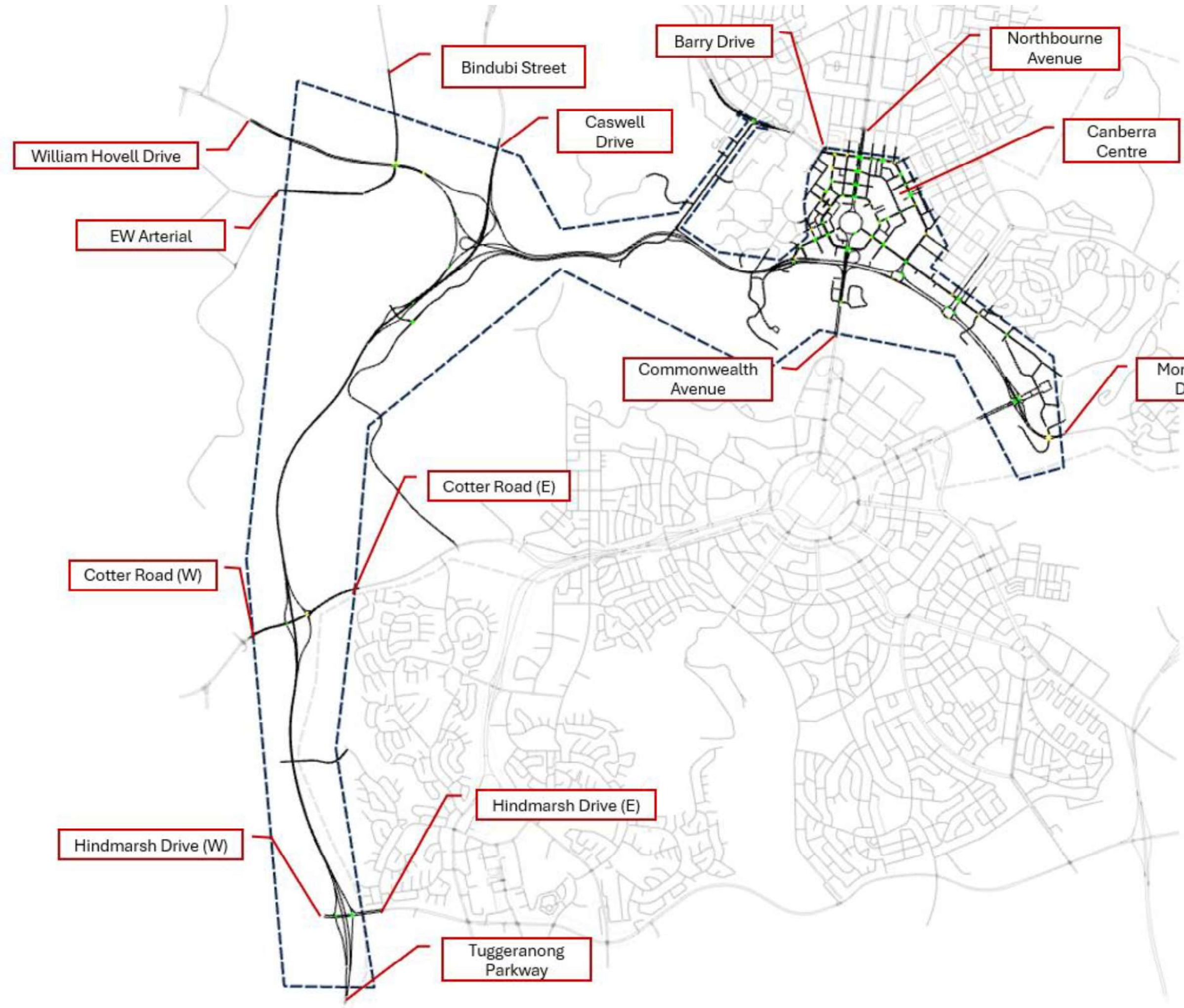

FIGURE 4.2 CENTROID LOCATION WITHIN THE MODEL

4.4 Site Access

For the site, two site access locations are proposed. The first of these is from the existing Knowles Place access along London Circuit. With the progression of Light Rail Stage 2 in this area, this access will function as a left-in only. This will connect to the current Knowles Place stub road, which will be left-in, straight-out arrangement. Given the arrangement of this road, vehicles exiting the site will need to continue along Knowles Place until it connects back into London Circuit as a left-out arrangement, or continue through to Edinburgh Avenue, which is currently operating as a left-in left-out (LILO) intersection.

A second entry location will also be present once the site is developed. This will consist of a left-in arrangement off Northbourne Avenue onto Knowles Place. There is a variation to this arrangement being investigated as part of this development however, which would see this operating as a LILO arrangement, providing a secondary exit to the site and providing more direct route selection for vehicles wishing to travel north or northeast from the site. The access arrangements and B99 vehicle turning movements for both access locations to the site can be seen in Figure 4.3. For further details on achievable movements to and from the site, refer to the swept path drawings included within Appendix D.

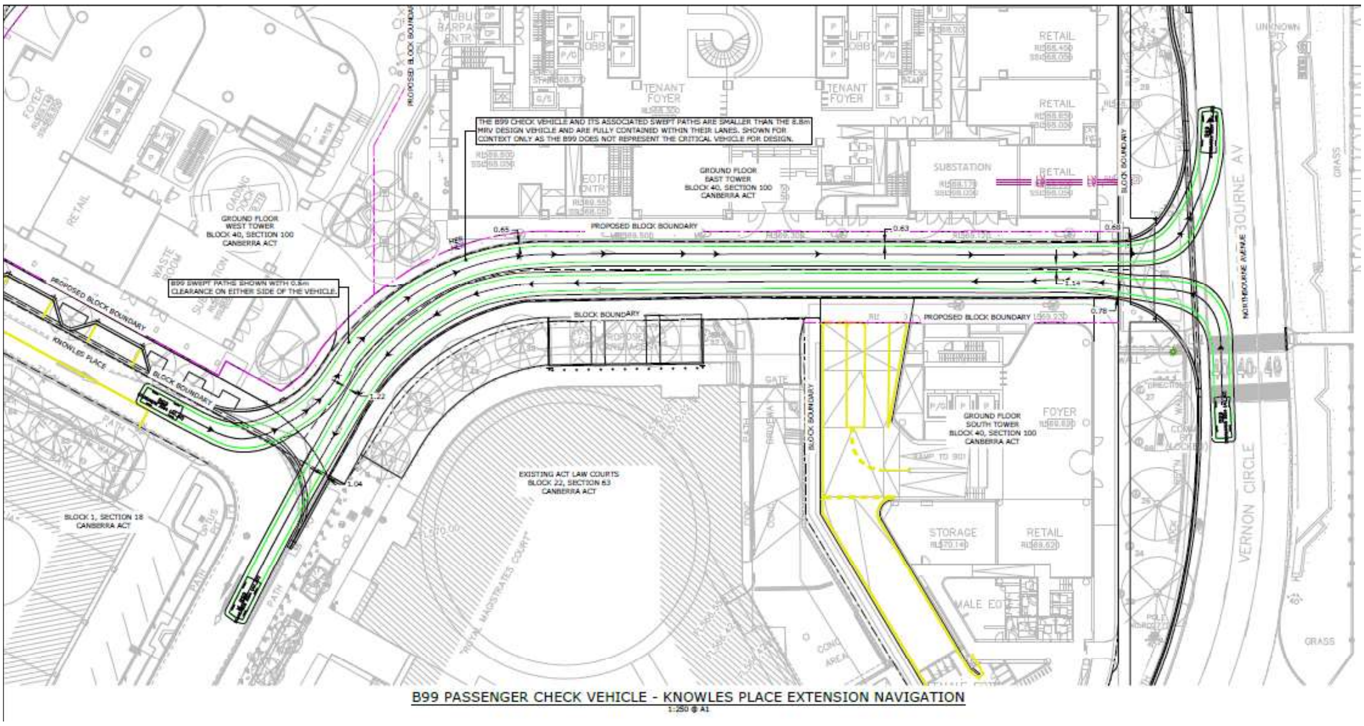

FIGURE 4.3 SITE ACCESS LOCATIONS AND B99 VEHICLE TURNING MOVEMENTS

4.4.1 Site Access Constraints

At the time of this report, formal approval on the Left-in left-out (LILO) intersection from Knowles Place onto Northbourne Avenue is still pending decision from TCCS. However, ongoing discussions with TCCS have identified several conditions which would need to be met should the access be approved. With the location of the access and expected worsening of vehicle weaving and rear-end crashes, it has been specified that the Light Rail Stage 2A works on the London Circuit / Northbourne Avenue intersection would need to be finished, particularly the closure of the northbound right-turn movement. In addition, the Northbourne Avenue U-turn bay would need to be permanently closed prior to the completion of the LILO access.

Both these timeframes are viewed as having limited impact of the operation of the development, and would not be expected to delay development of the site. Current estimates for the development timeline of 60 London Circuit sees it completed within late 2027 to early 2028. In contrast, completion of the Light Rail Stage 2A is set to be finalised in 2026, while the U-turn lane can be shut anytime and is expected to be closed as part of wider construction works in the area.

4.4.2 Site Carpark Access

Parking spaces for the site are proposed to be provided through a 3-level basement carpark structure. This carpark will provide 234 parking spaces for use by the tenants of the three buildings on-site, as well as the 280 public spaces to replace those being removed from the existing surface carpark. Access to this basement carpark will be provided via a single ramp into the south building off the Knowles Place extension. This access location can be seen in Figure 4.3, with turning movements presented in Figure 4.4.

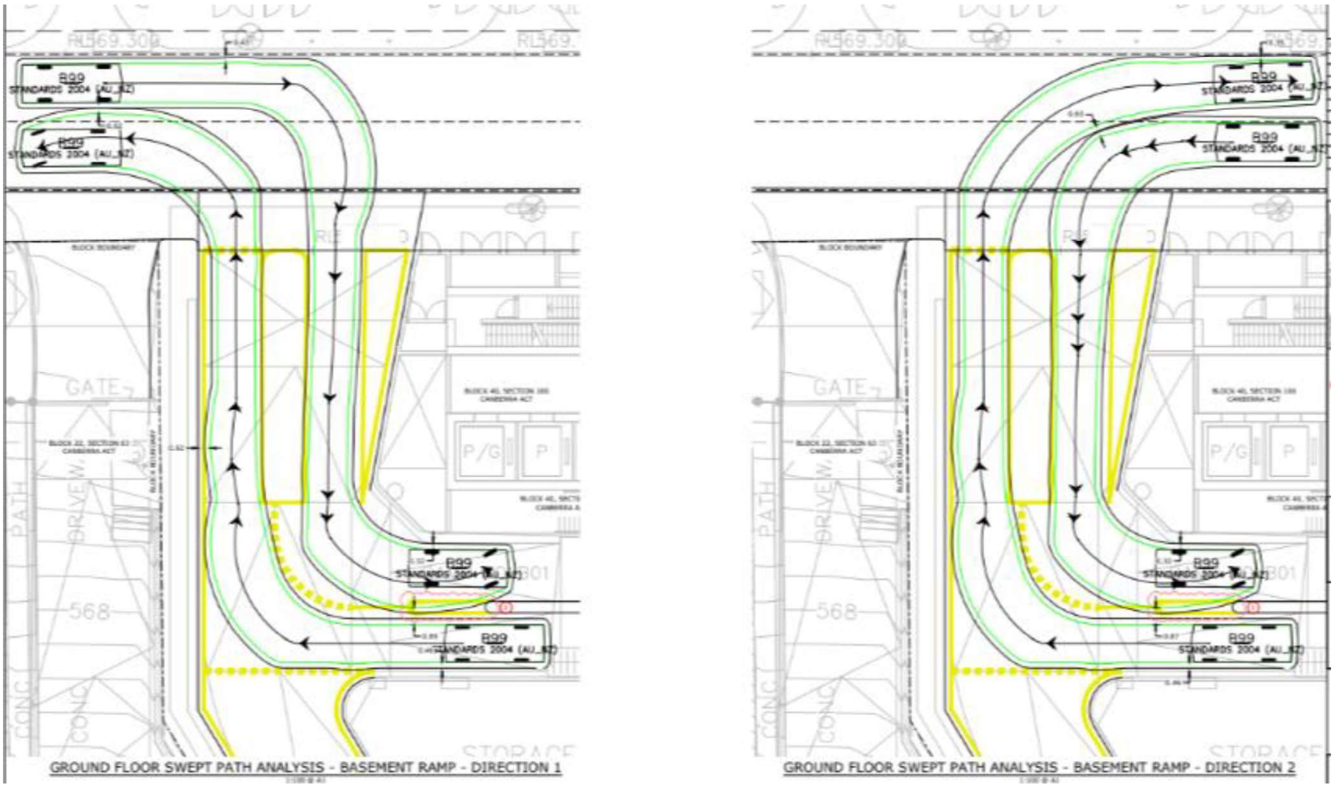

FIGURE 4.4 SITE CARPARK ACCESS B99 VEHICLE TURNING MOVEMENTS

5 SURROUNDING NETWORK CONSIDERATIONS

5.1 Block 19 Section 23 Office Development - CRA

As the traffic assessment has been completed using the PWSWC Model, the traffic generation and distribution of several future land uses in the area have already been accounted for in the network. TCCS did however advise that the proposed development within City Block 19 Section 23 had not yet been incorporated. This site is the current at-grade carpark directly east of Northbourne Avenue and the proposed CPG development. Land use and traffic generation for this site were both provided by TCCS in email correspondence provided on the 3rd July 2024, and are as shown in Figure 5.1. As no information on traffic distribution was provided, the distribution assumptions adopted for Block 40 Section 100 (Section 4.3.2) have been carried across to this development. For access to this site, all vehicles were expected to use the existing intersection of London Circuit and Theatre Lane.

Building	Type	Size	AM Rate	Move/Hour	PM Rate	Move/Hour
Building 1	Office	15,287 m2 GFA	1 trip / 100 m^2 GFA	153	1 trip / 100 m^2 GFA	153
Building 2	Office	13,382 m2 GFA	1 trip / 100 m^2 GFA	134	1 trip / 100 m^2 GFA	134
North Building	Office	4,434 m2 GFA	1 trip / 100 m^2 GFA	45	1 trip / 100 m^2 GFA	45
South Building	Office	4,434 m2 GFA	1 trip / 100 m^2 GFA	45	1 trip / 100 m^2 GFA	45
Total				**377**		**377**

FIGURE 5.1 CITY B19 S23 LAND USE AND TRAFFIC GENERATION (PROVIDED BY TCCS)

It is noted that this development is considering a dive structure accessible from the Northbourne Avenue median strip, which would be accessible from both City Block 19 Section 23 and City Block 40 Section 100 (the site). While this option has been proposed by CRA, it has not been considered by CPG in the operation of this site or its carpark. It is also believed that this option is still under consideration by TCCS and has not been formally agreed to.

Due to the uncertainty around this option, it has not been accounted for in the traffic modelling or considered further as part of this assessment. It is however noted that this option may still be pursued, with connection to Block 40 Section 100 possible in the future. Additional traffic modelling would be required for this option if it is progressed further. A concept drawing of the possible dive structure arrangement can be seen in Figure 5.2.

FIGURE 5.2 NORTHBOURNE AVENUE DIVE STRUCTURE – NOT CONSIDERED THIS ASSESSMENT

5.2 Edinburgh Avenue / Knowles Place Intersection Upgrade - Signalisation

The current intersection of Edinburgh Avenue and Knowles Place operates basically as a LILO arrangement. Knowles Place can only turn left towards Vernon Circle under the current arrangement, and crossing of the median is limited to westbound vehicles along Edinburgh Avenue into Knowles Place. This arrangement is proposed to be maintained into the future, with Knowles Place operating as a LILO in 2031. The current arrangement of the site can be seen in Figure 5.3.

FIGURE 5.3 EDINBURGH AVENUE / KNOWLES PLACE CURRENT INTERSECTION ARRANGEMENT

It is however noted that the deed associated with the development of Block 1 Section 121, which is directly south of the Knowles Place connection to Edinburgh Avenue lists the upgrade of this intersection to a 4-way signalised arrangement as part of the deed requirements. This arrangement is also considered beneficial for the development of Block 40, Section 100 as it would allow for greater flexibility and route choice options for movements exiting the development.

TCCS and Roads ACT have raised concerns with the signalisation of this intersection, notably around the complexities in the geometry, phasing, underground service clashes, traffic management, and the coordination of the site with the signals in close proximity to it from the north and west. To resolve this discrepancy in understanding of what works shall be undertaken at this location, TCCS has requested that separate scenarios be run which explore the operation of this intersection both under its current arrangement and as a signalised intersection.

As the traffic report prepared for Block 1 Section 121 could not be reviewed, the signalised arrangement of the intersection was developed based on the current road arrangement. Lane sizes and arrangements were not changed as part of this assessment. The signal phasing and timing was initially assessed using SIDRA modelling software to confirm the optimal average signal cycle. This was then translated into the microscopic model for the AM and PM period.

With the current arrangement of the intersection and median widths, it was not viewed as practical to adopt diamond phasing. As such, all movements for each leg were run within separate phases. The phase arrangements adopted for the site can be seen in Figure 5.4, while the timings are shown in Table 5.1.

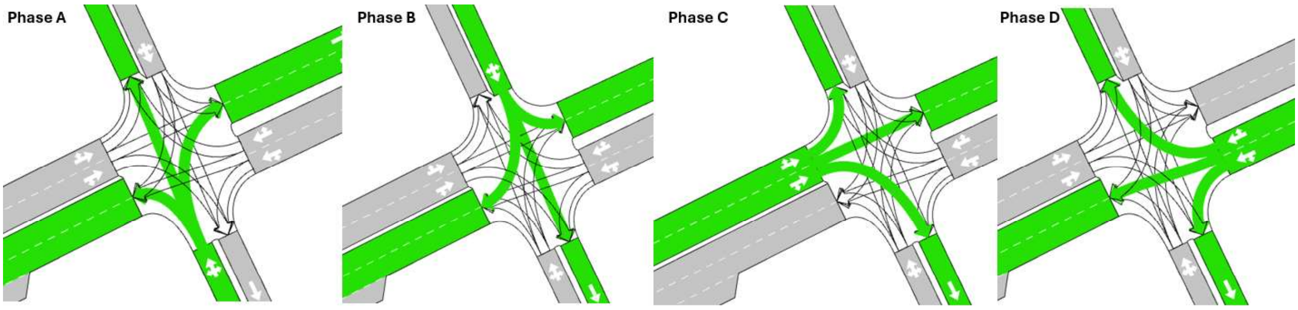

FIGURE 5.4 SIGNAL PHASING FOR EDINBURGH AVENUE / KNOWLES PLACE

TABLE 5.1 EDINBURGH AVENUE / KNOWLES PLACE SIGNAL TIMING

Phase	AM Phase Time	PM Peak
A	22 sec	12 sec
B	30 sec	55 sec
C	21 sec	18 sec
D	22 sec	15 sec
Total	**95 sec**	**100 sec**

5.3 Northbourne Avenue / Knowles Place Left-in Left-out

As part of the proposed road network upgrades captured in the 2031 PWSWC model, a left-in connection from Northbourne Avenue to Knowles Place has been included. This is proposed to provide a secondary entrance onto Knowles Place, allowing for improved movement into the development occurring on this site. To also allow for a secondary exit to the site, and improved movement for vehicles exiting the site and travelling north or northwest, CPG are proposing to adopt a left-in left-out (LILO) arrangement instead of just a left-in.

TCCS has raised some concerns around the inclusion of a LILO access at this location due to safety risks and the close proximity to the Northbourne Avenue / London Circuit intersection. As such, this assessment has considered performance under both the left-in and LILO arrangement in this location. The access arrangement for each can be found in Figure 5.5.

FIGURE 5.5 NORTHBOURNE AV / KNOWLES PL LEFT-IN (LEFT) AND LILO (RIGHT) ARRANGEMENTS

Intersection Design and Known Departures from Standards

The proposed design of this intersection can be seen in Figure 5.6. Further detail on the arrangement and suitable turning movements can be found in Appendix D below, or within the Works Approval drawing set which has been submitted as a separate document.

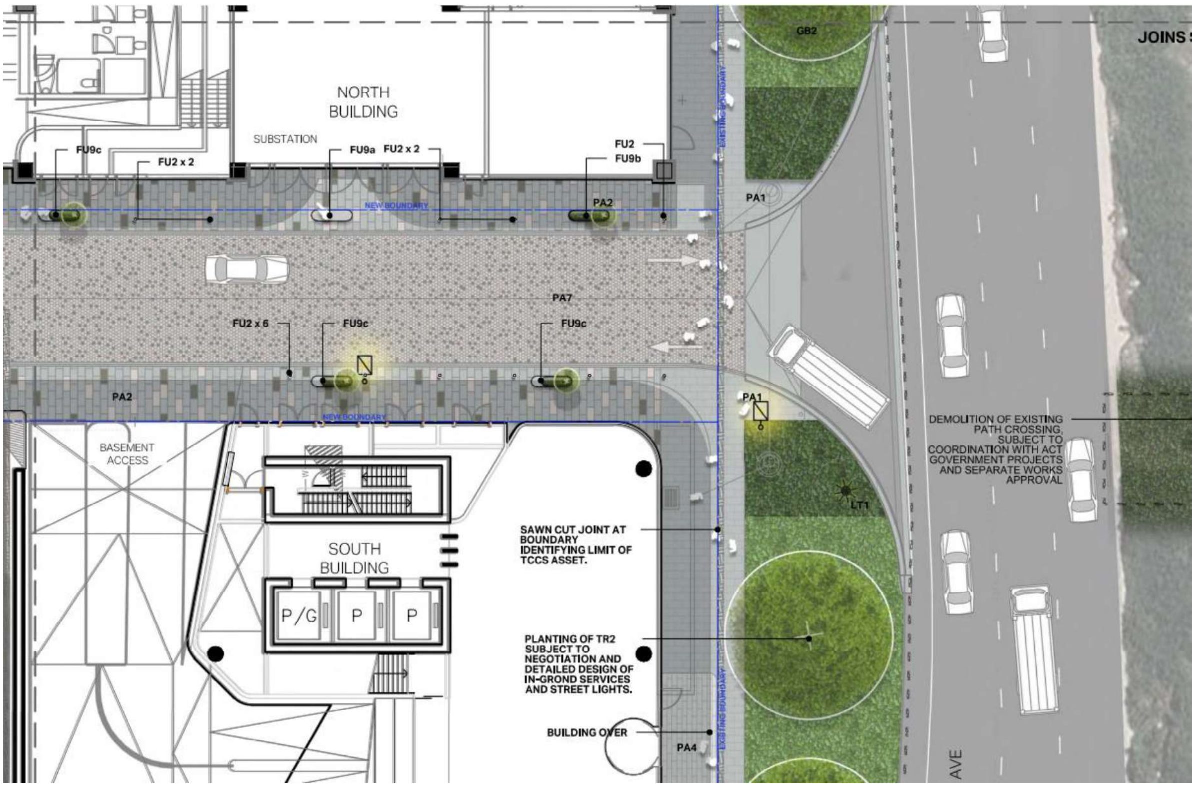

FIGURE 5.6 KNOWLES PLACE LEFT-IN LEFT-OUT GEOMETRIC ARRANGEMENT

There are several departures noted to be present within the design of this intersection, caused by the constrained site space and locality along Northbourne Avenue. The noted departures are:

- Sight Distance at 60km/h
- Functional area of adjacent intersection
- Treatment of the left-turn movement into the site

Greater detail on each of these departures is provided below.

Intersection Sight Distance

In accordance with AGRD P4A, the sight distance for this intersection has been reviewed to determine if there is sufficient visibility for vehicles to see approaching hazards. These reviews were completed allowing for a 60km/h posted speed limit along Northbourne Avenue, as that aligns with the current speed limit. From this assessment, it was found that the Safe Intersection Sight Distance (SISD) required for the LILO was 123m, which is not achievable given the horizontal and vertical geometry of Vernon Circle. This results in a potential safety hazard for vehicles both exiting the site, or if vehicle queues form back out of Knowles Place and encroach on Northbourne Avenue. Both these hazards could lead to an increase in rear-end crashes in the area.

It is noted that there are discussions within TCCS at the moment around potentially reducing the speed limit of Northbourne Avenue from Vernon Circle from 60km/h to 40km/h. At 40km/h, the SISD only requires 73m which is achievable by the site. As such, should the speed limit be lowered in this area, this departure would no longer be relevant. TCCS has noted in meetings that they have no objection to this speed reduction in-principal, however a determination on this reduction would be undertaken as a separate exercise to this development, and so cannot be accounted for within the design at present.

The sight distance extents for this intersection can be seen in Figure 5.7.

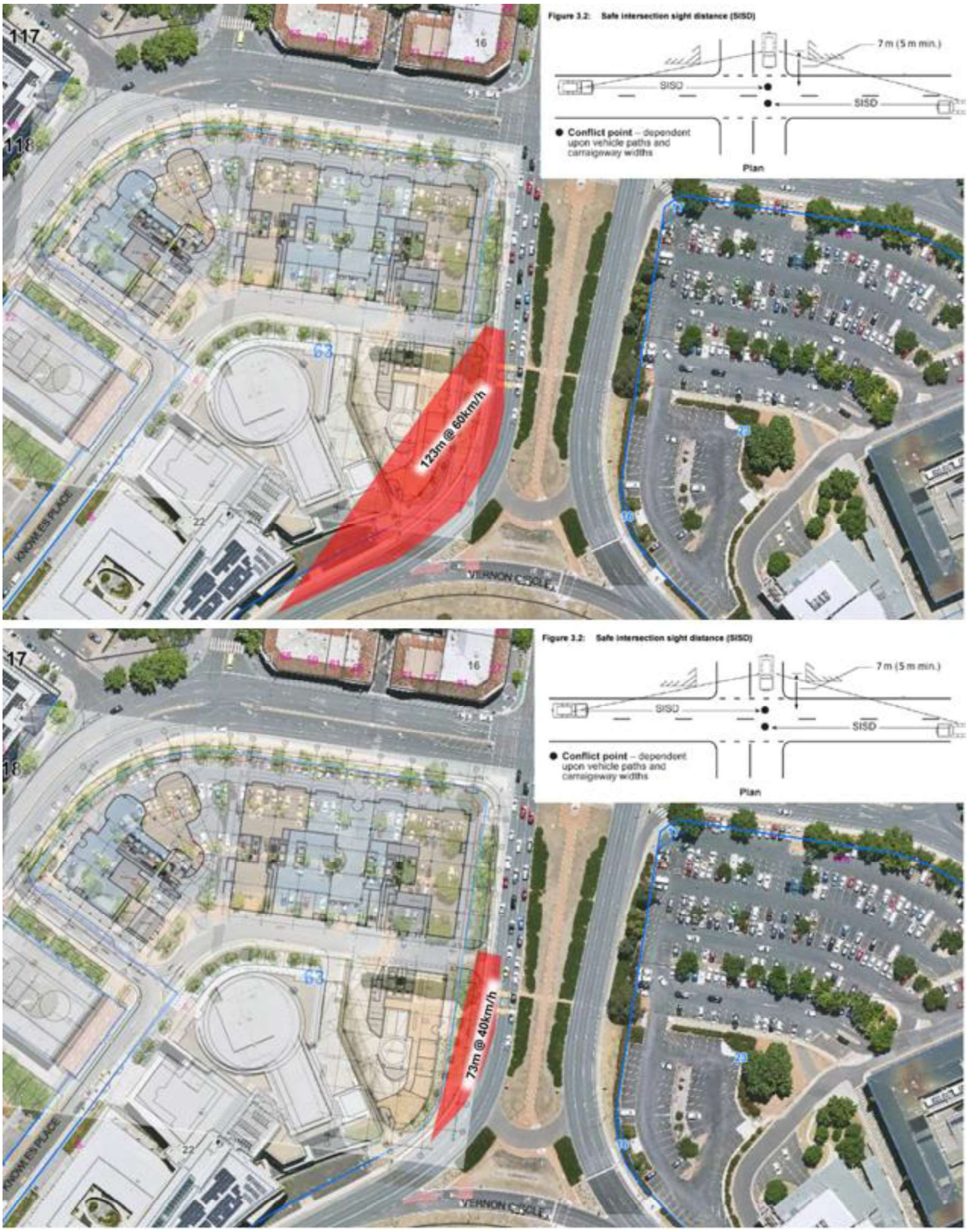

FIGURE 5.7 SAFE INTERSECTION SIGHT DISTANCE ALONG NORTHBOURNE AVENUE

Upstream Functional Area from London Circuit

Due to the current alignment of Knowles Place through the site, and the presence of the ACT Law Court development to the south of this road, the Knowles Place alignment through the development is restricted. This in turn restricts the location of the proposed left-in left-out (LILO) intersection onto Northbourne Avenue, with the furthest separation available from London Circuit being 60m. This falls within the upstream functional area of the London Circuit / Northbourne Avenue intersection, which assuming a 60km/h speed limit would be a minimum distance of 130km/h (excluding storage length). As per AGRD P4, it is advised that the functional area of intersections be protected from interference by traffic from accesses, as having access points within this zone have negative impacts on vehicle safety. In particular, an increase in weaving and rear-end collisions would be expected due to vehicles crossing lanes in too short a period and reduced sight distances.

Despite the LILO access for the site lying within the functional area of the London Circuit intersection, the preference of this development is to include the connection onto Northbourne Avenue to allow a second access from the site. Providing this second access grants advantages to the traffic performance along Knowles Place west of the site, and allows for a secondary access in the event of emergencies or blockage of the primary access. The secondary access also was shown to assist with delay times along Knowles Place by reducing traffic volumes travelling down to Edinburgh Avenue. As is mentioned in Section 3.7.1 and 3.8.3, the rear-end and weaving crash types do not typically result in injuries, and are expected to reduce in frequency due to the Light Rail Stage 2A works in the area. So while the impact of having the LILO access within the upstream functional area would be expected to worsen safety concerns in the area, the overall advantages of a second access are viewed as outweighing the detriments in this instance.

Left-turn Treatment

Another departure for this intersection is around the Austroads recommended treatment for a left-turn movement off a major road. As per Figure 3.25 of AGTM P6, it is recommended that turns into minor roads from major roads with high volumes be managed with either an auxiliary left-turn or a channelised left-turn arrangement. With approximately 1,050 through vehicles per hour along Northbourne Avenue and approximately 150 vehicles per hour turning out of Knowles Place (2a and 2b arrangements), this intersection qualifies for an auxiliary left turn treatment.

At the current Northbourne Avenue speed environment, this would require a minimum deceleration lane length of 40m. It has however been decided to not have the deceleration lane at this intersection due to safety concerns and difficulties achieving truck turning movements onto Knowles Place.

With the geometry of Northbourne Avenue sloping steeply down and curving to the left as it exits Vernon Circle, addition of this new slip lane was viewed as potentially causing safety issues with sightlines and interactions with the on-road cycle lane. In addition, issues were observed with achieving the turning movements for HRV vehicles into Knowles Place from the auxiliary lane, with trucks unable to make the turn without blocking the oncoming lane or impacting on pedestrian footpaths.

It is noted that the exclusion of this auxiliary lane would result in increased safety risks along Northbourne Avenue, with turning vehicles forced to slow down within the left-hand lane, increasing the risk of rear-end and side-swipe collisions to the south of the LILO intersection. In the event that queue lengths from the basement carpark extend back onto Northbourne Avenue, this would block a traffic lane with no auxiliary storage available. It is however noted that entry to the carparks is proposed to be licence plate recognition, so entry queues are not viewed as likely.

The risks of both braking and queuing vehicles along Northbourne Avenue would be exacerbated by the sight distance issues mentioned above, resulting in limited visibility of breaking or queued vehicles as vehicles travel towards London Circuit. From the crash data collected in Section 3.7, these crash types are noted to be the most frequent at this location, however both were unlikely to cause injuries of road users.

Due to the low risk of injuries for the worsened crash types, it has been decided for this design to exclude the auxiliary left-turn lane to improve upon the other flagged safety issues. It is noted that the lack of left-turn treatment at unsignalised intersections / driveways is relatively common along Northbourne Avenue and within the surrounding Civic area.

5.4 Gordon Street / Marcus Clarke Street Intersection

The current intersection of Gordon Street / Marcus Clarke Street operates with a LILO arrangement to the east onto Gordon Street, with the west leg allowing for all movements but straight. This arrangement can be seen within Figure 5.8.

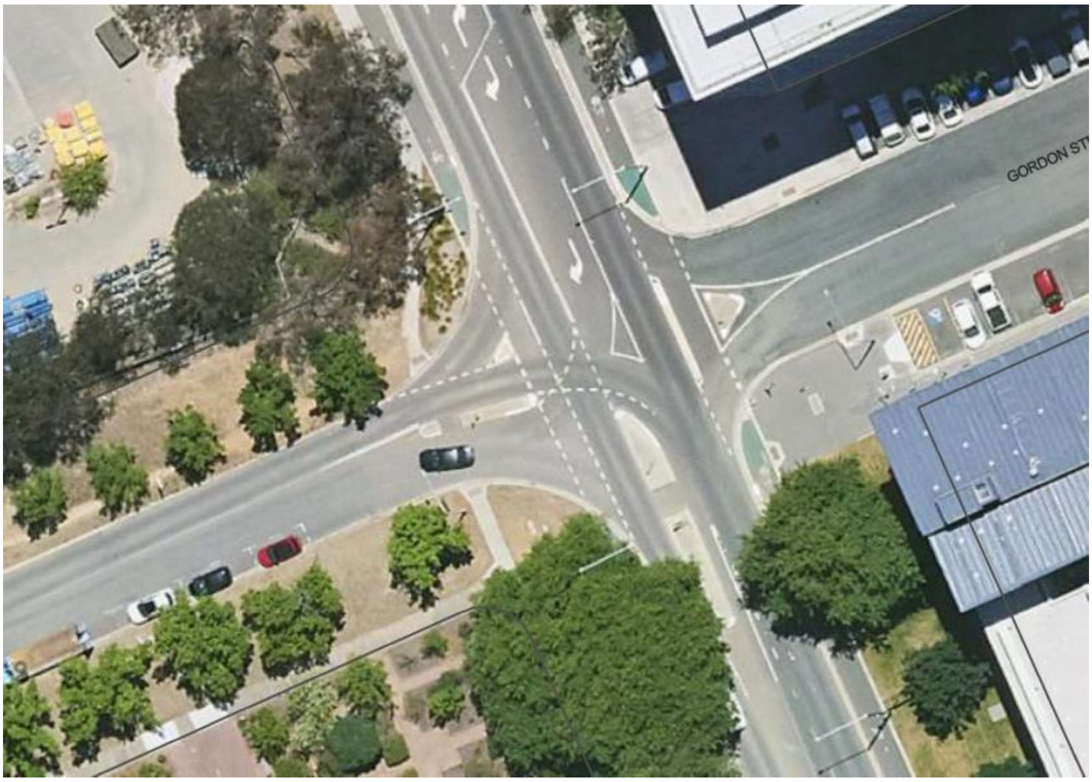

FIGURE 5.8 GORDON STREET / MARCUS CLARKE EXISTING ARRANGEMENT

As part of the deed requirements however, it is noted that there is a requirement to upgrade the intersection to allow for a new right-turn movement. While the deed does not specify which right-turn movement, it is assumed that the additional right turn movement will be from Gordon Street and allow for greater options for vehicles travelling north or west after the light rail stage 2 has occurred along London Circuit.

While this upgrade is specified in the deed, it has not been implemented in this modelling due to uncertainty around the design arrangement, noting no current design drawings are available and its upgrade has not been included in the 60 London Circuit development to date.

While it is noted that this change would be expected to change the vehicle movement profile across this section of the road network, adjustment of this intersection is expected to impact performance equally for both base scenarios and development scenarios. As such, its exclusion from this modelling is not viewed as having significant impact on the outcome of this assessment.

6 MICROSIMULATION MODELLING

To complete the modelling for this assessment, Aimsun Next 22.0.3 software was used. As mentioned in Section 1.3, the 2031 PWSWC model was provided to Egis by TCCS for use in undertaking this assessment. As part of the provision of this model, TCCS also requested several items be considered or adjusted in the modelling assessment. This correspondence can be found in Appendix A.

Where possible, network arrangement and model parameters have been kept the same as the provided base model to avoid significant differentiation of results. All changes made to the model have been detailed in the sections below for clarity.

6.1 Model Subnetwork Area

To provide more relevant results for this assessment and avoid the risk of any changes to conditions being lost in the larger operation of the model, a microscopic simulation was chosen as opposed to the full mesoscopic model extents. The microscopic model extents used matched those provided within the existing PWSWC microscopic extent, and included the majority of Civic, Parkes Way, and the extent south along the Tuggeranong Parkway. The microscopic model extents have been shown in Figure 6.1, and are the road sections coloured green and present within the navy dashed boundary.

FIGURE 6.1 EXTENT OF 60 LONDON CIRCUIT AIMSUN TRAFFIC MODELLING (GREEN)

A new microsimulation subnetwork was created for the above extent, and named "PWSWC_Micro". The creation of this new subnetwork included the generation of dynamic traversals across the subnetwork, generating a new centroid configuration to meet the new edges of the network, and checking the traffic demands and transit plans to ensure they still operated suitably within the microsimulation subnetwork.

6.2 Modelled Time Periods

From discussions with TCCS, it was confirmed that only the 2031 AM and PM models needed to be modelled as part of this assessment. It has been assumed that traffic growth allowances have been included in the preparation of the 2031 base models, and as such no additional background traffic growth has been added to the network.

The time periods of the models have also been kept the same as the PWSWC model, with the AM period model running between 7:15AM and 9:15AM, with a 1:15 hour cooldown period allowed at the end of the model to allow vehicles to clear from the network. The PM period model runs between 4:15PM and 6:00PM, and has a 1:30 hour cooldown period at the end of the model.

6.3 Modelled Scenarios

To fully model the operation of the road network with and without the proposed development, the following scenarios were run:

11. 2031 Base AM Conditions
12. 2031 Base PM Conditions
13. 2031 Dev AM Conditions – 1a Arrangement
14. 2031 Dev PM Conditions – 1a Arrangement
15. 2031 Dev AM Conditions – 1b Arrangement
16. 2031 Dev PM Conditions – 1b Arrangement
17. 2031 Dev AM Conditions – 2a Arrangement
18. 2031 Dev PM Conditions – 2a Arrangement
19. 2031 Dev AM Conditions – 2b Arrangement
20. 2031 Dev PM Conditions – 2b Arrangement

6.3.1 Base Scenarios

For the two scenarios denoted with a Base, these scenarios consider the operation of the road network without the inclusion of the City Block 40 Section 100 development proposed. These scenarios remain mostly unchanged from what was provided within the PWSWC Model. There are some changes from existing conditions included, most notably the addition of the Light Rail Stage 2 track along London Circuit, which has been considered in all modelled scenarios.

No changes to the provided road network or signal phasing at intersections has been made for the base scenarios. One centroid has however been added to represent the Block 19 Section 23 Office Development located to the east of our site (as discussed in Section 5.1). Details of this centroid are provided below.

Centroid ID	Name	Connects to
14046456	B23 S19 New Office Development	Theatre Lane (to/from)

6.3.2 Development Scenarios – Options

For the development scenarios, a number of options were considered. To differentiate each of these options, a modifier of 1 or 2, and a or b has been given to the model names. The 1 or 2 was used to denote whether the left-in option (1) or the LILO option (2) was considered for the connection between Northbourne Avenue and Knowles Place (as discussed in Section 5.3). The a or b was used to denote whether the intersection of Edinburgh Avenue and Knowles Place was operating as a LILO arrangement (a) or was signalised (b). A summary of what geometry is included for each of the scenarios is shown in Table 6.1.

TABLE 6.1 MODELLED DEVELOPMENT OPTIONS – GEOMETRY ADOPTED

Geometry Option	Option 1a	Option 1b	Option 2a	Option 2b
Northbourne Av Left-in	Yes	Yes	-	-
Northbourne Av LILO	-	-	Yes	Yes
Edinburgh Av LILO	Yes	-	Yes	-
Edinburgh Av Signals	-	Yes	-	Yes

Regardless of which geometry variations each development scenario adopted, all development scenarios include an additional centroid to represent the basement carpark access location as mentioned in Section 4.4.1. The details of these centroids are provided below:

Centroid ID	Name	Connects to
14030834	00X_South Building Access	Knowles Place Extension

All development scenarios also include a new Knowles Place Extension arrangement, providing specific access locations for the building carpark ramp. The change to the Knowles Place Extension arrangement can be seen in Figure 6.2.

FIGURE 6.2 KNOWLES PLACE EXTENSION MODEL GEOMETRY CHANGE

6.4 Traffic Demands and OD Matrices

As mentioned earlier, the PWSWC was converted into a new subnetwork extent, which involved the reduction of the model extents and redefining of centroid locations at the new extents of the network. The traffic demands for the OD matrices of this new subnetwork were calculated through the running of the hybrid model, with the traffic volumes present in the sections at the edges of the subnetwork directly applied to the OD matrices.

6.4.1 OD Matrices

OD Matrices have been adopted at 15-minute intervals over the course of the model runtime for both cars and trucks, which is consistent with what was done in the hybrid modelling. The cooldown OD matrix was only created for cars, and extends for 1:15 hrs in the AM period and 1:30 hrs in the PM period. This is again consistent with the Hybrid model.

Additional OD matrices were created for the model to capture the traffic generated by the Block 40 Section 100 development (volumes as per Section 4.2) and the Block 19 Section 23 development (as discussed in Section 5.1). These OD matrices were set up for an hour period, as the generation rates are set as vehicles per hour. New vehicle types were also set up for these OD matrices, to allow for trips between these developments to be distinguished from background traffic.

In addition to the new OD matrices, adjustments to the existing matrices were made to adjust the traffic volumes present from the existing at-grade carpark centroid on Block 40 Section 100. It is unsure what had been allowed on this site within the original model, however volumes appeared too great to be just for a surface carpark. As such, these volumes were replaced with volumes from the parking survey data collected for the site in each of the OD matrices, with volumes summarised in Section 4.2.1.

6.4.2 Traffic Demand Matrices

Regarding the traffic demand matrices, the base matrices were edited to include additional OD matrices for the Block 19 Section 23 development. As the OD matrix for this development were provided over an hour, the traffic volumes either side of the peak hour were represented using the same peak OD matrix scaled down to match the profile of the 15-minute background OD matrices.

New traffic demand matrices were created for the AM and PM development scenarios. These items were identical to the base traffic demand matrices, except they had the additional OD matrices for Block 40 Section 100 included.

6.5 Control Plans

The existing master control plans for the base scenario have not been altered as part of this assessment. The base master control plans have also been adopted for the development scenarios which do not alter the operation of the Edinburgh Avenue / Knowles Place LILO.

For the scenarios which have the intersection of Edinburgh Avenue / Knowles Place operating under signals, a new master control plan has been created which includes the signal phasing and timing of this new signalised intersection.

6.6 Transit Plans

Transit routes have been included in the existing PWSWC model for all the major bus routes and the light rail route within the network. These routes have been detailed in an AM and a PM Transit Plan for the site. These transit plans have not been changed from the base model, and have been adopted for all development scenarios. All routes were checked to ensure they do not traverse any of the new road sections which have been added to model the different arrangements discussed in Section 6.3.

6.7 Path Assignments

To assist with the selection of vehicle pathing through the microsimulation models, dynamic user equilibrium (DUE) scenarios were run for the base scenarios, as well as for each of the development scenario options. Path assignment files were then created using this data, and were input into their respective scenarios when running them.

It is noted that DUE files were only created and used for the PM peak period, as when adopted in the AM peak period, a high number of the scenario replications encountered issues with gridlock across the network due to the high traffic volumes and pathing selections. As replications in gridlock skew results for the worse and typically need to be excluded from consideration in results, it was chosen to adopt no path assignment for the AM peak instead, and let the vehicles traverse the network based on the shortest route calculations.

7 MODELLING RESULTS

7.1 Performance Criteria

To assess the performance of the network both with and without the addition of the development and changes to the surrounding road network along Northbourne Avenue and Edinburgh Avenue, model results for both the entire microsimulation network and for the local intersections within close proximity of the site were assessed. Parameters were selected for comparison based on the advice provided in the *ACT Traffic Microsimulation Modelling Guidelines*.

The parameters assessed at a network level are as follows:

- Output Count – This parameter is not directly assessed, and simply is a summation of the vehicles which have been released into the road network and exited through another centroid over the course of the model run period. It is used to assess total results on a "per vehicle" basis, and provide greater understanding on the impacts to the model on a vehicular level.
- Vehicle Kilometres Travelled (VKT) – The total distance travelled by all vehicles that have exited the road network, measured in km.
- Vehicle Kilometres Travelled / Count – The average distance travelled by an individual vehicle which has exited the network, measured in kilometres.
- Vehicle Hours Travelled (VHT) – the total time spent within the network by all vehicles to have exited the network, measured in hours.
- Vehicle Hours Travelled / Count – The average time a vehicle spent within the network, measured in minutes.
- Average Travel Speed – The average travel speed of all vehicles which have exited the network, measured in km/h.
- Average Travel Time – The average time for vehicles within the network to travel one kilometre, measured in sec/km.

It is noted that the modelling guidelines also requests review of the unreleased vehicles waiting to enter the network at the end of the model period. This has not been included given the use of the cooldown period within these models, which effectively allow for all virtual queues formed within the network to be cleared.

For the key intersections surrounding the site, the following parameters were assessed:

- Average Delay – The average approach delay of vehicles along all sections leading up to the intersection, measured in seconds. As Aimsun calculates delay by the section as opposed to where the queue ends, delay values have been calculated to either the back of queue, or to the next intersection.
- Level of Service – A method of quantifying the average delay for an intersection into a performance metric which defines the operation of the intersection in terms of suitable delay. The RTA NSW Method has been used for this assessment, and quantifies delays from A to F, which have been defined in Table 7.1.
- Queue Distance – The queue length present along key intersection approaches, measured in vehicles. As Aimsun calculates the queue length per section, and the close proximity of a number of intersections lead to compounding queue lengths through multiple intersections, queues have been assessed visually from the model outputs. These outputs are included in Appendix C.

TABLE 7.1 LOS CRITERIA FOR INTERSECTIONS

LOS	Average delay per vehicle	Description
A	≤ 14s	Good operation
B	15s – 28s	Acceptable delay with spare capacity
C	29s – 42s	Satisfactory operation with some spare capacity
D	43s – 56s	Intersection is approaching capacity
E	57s – 70s	High delays and minimal capacity remaining in the intersection. Not viewed as suitable for roundabouts or priority-control intersections.
F	≥ 70s	Overcapacity and excessive delays

The intersections considered as part of the core area and so most likely to be impacted by the development have been considered as:

1. Northbourne Avenue / Knowles Place access
2. Northbourne Avenue / London Circuit
3. London Circuit / Knowles Place (LILO intersection)
4. Knowles Place 4-way intersection
5. Knowles Place / Edinburgh Avenue
6. London Circuit / Edinburgh Avenue
7. Edinburgh Avenue / Vernon Circle

7.1.1 Model Output Limitations

It is noted that the provided model is operating under a large number of vehicles and congestion in both peaks, which can cause the model to enter a state of gridlock. In this model, gridlock typically occurred when queues extended far enough back to block turning movements from adjacent routes, which in turn queues back to block movements from the original route. The other cause of gridlock seen in these models was vehicles erroneously entering yellow-box zones of intersections and getting stuck queueing across other vehicle movements.

Under gridlock, vehicles cannot move for extended periods of time if at all, and it results in unrealistic results for the replication due to vehicles still being in the network at the end of the cooldown period. To allow for comparison of like outcomes between scenarios, only the model results for replications which successfully ran across all scenarios have been assessed. For the AM period, all replications ran consistently across all five scenarios and so the average of all replications was used. For the PM period, replication 1 (seed 560) entered gridlock conditions for scenarios 2a and 2b, so was excluded from the average calculation for all PM scenarios.

7.2 Performance Comparison

7.2.1 Network Performance Comparison

For ease of comparison of results, all the network results have been collated within Table 7.2 and Table 7.3. For further information on the road network performance in the Civic area calculated from this assessment, refer to Appendix C.

TABLE 7.2 COMPARISON OF NETWORK PERFORMANCE CRITERIA – AM PEAK

Performance Criteria	Base	Dev 1a	Dev 1b	Dev 2a	Dev 2b
Output Count (veh)	77,963	79,256	79,264	79,190	79,267
VKT (km)	315,978	321,907	321,736	321,366	321,827
VKT / Count (km)	4.05	4.06	4.06	4.06	4.06
VHT (h)	10,528	10,754	10,701	11,263	10,661
VHT / Count (min)	8.10	8.14	8.10	8.53	8.07
Avg. Travel Speed (km/h)	39.2	38.9	38.9	38.5	39
Avg. Travel Time (s/km)	147.6	149	149	154.8	147.9

It can be seen that for the AM peak period, network performance from the base scenario and the development scenarios typically don't change significantly. The distance travelled through the network can be seen to be proportionally very similar between all scenarios, with a difference of 0.01 km per vehicle. This suggests that no significant route diversions are occurring throughout the network to avoid congestion or select a more efficient route. The vehicle hours travelled can also be seen to remain proportionally very similar, with all development scenarios except 2a lying within 0.04 minutes per vehicle of the base scenario. The average travel speed and average travel time results also see limited change between the development scenario results and the base scenario results. Excepting Scenario 2a, development average speeds were within 0.3km/h of base results, while travel times were within 1.5s/km of base results. The outcome of these three results suggest that the development scenarios typically does not increase congestion by a significant margin, and does not result in significantly slower vehicle travel through the network. As such, it can be concluded that the network is not significantly impacted by the development of Block 40 Section 100 and intersection upgrades included with 1a, 1b, and 2b, and that all vehicles continue to move through the network in a manner equivalent to what is expected to occur in the base models.

Of the individual development scenarios tested, it can be seen that scenario 2b operates at slightly improved levels to the other scenarios, with minutes in the network and time required to travel a kilometre most closely resembling the base scenario results. Scenarios 1a and 1b mostly operate at similar levels to each other, and are only seen to operate at slightly worsened conditions from the base scenario.

Scenario 2a can be seen to be operating with the highest level of congestion of the development scenarios. These delays result in limited change to the distance travelled, but do increase the time to travel through the network by 0.43 minutes for each vehicle and on average by 6.8 seconds per kilometre. Travel speed through the network also can be seen to decrease by 0.7km/h on average through the network compared to the base scenario. Despite the increase in these parameters of Scenario 2a, adoption of this option is still viewed as acceptable for operation of the network in the AM peak.

TABLE 7.3 COMPARISON OF NETWORK PERFORMANCE CRITERIA – PM PEAK

Performance Criteria	Base	Dev 1a	Dev 1b	Dev 2a	Dev 2b
Output Count (veh)	78,982	80,363	80,404	80,370	80,402
VKT (km)	324,483	337,414	331,682	334,471	336,670
VKT / Count (km)	4.11	4.20	4.13	4.16	4.19
VHT (h)	8,060	9,045	8,673	9,147	8,935
VHT / Count (min)	6.12	6.75	6.47	6.83	6.67
Avg. Travel Speed (km/h)	39.3	38.0	38.6	37.9	38
Avg. Travel Time (s/km)	140.5	155.1	150.3	154.1	153.8

For the PM peak, the addition of the development can be seen to have a slightly larger impact on the operation of the surrounding road network. All development scenarios saw minor worsening of all assessed conditions, with increases of up to 0.09 km of additional travel distance, up to 40 seconds of additional travel time or 15 seconds per km, and decreases in average travel speed of up to 1.4 km. With the location of the site and expected direction of travel from the site in the PM peak, these worsening conditions are expected to be from vehicles along Knowles Place, and delays caused by exiting onto the congested roads of London Circuit, Edinburgh Avenue, and for some scenarios, Northbourne Avenue. It is also noted that the roads to the west of the development, notably Marcus Clarke Street and the local roads feeding the Australian National University, were more congested in the PM peak than the AM peak. This often led to delays for the development vehicles exiting towards London Circuit, and caused additional congestion in this area which impacted network results. The increase in delay for individual intersection has been assessed in greater detail within Section 7.2.2, however from a network perspective, the changes are minor, and the operation of the road network is considered to only worsen slightly under all the development options.

Of the individual development scenarios tested, it can be seen that Scenario 1b operates closest to the base conditions, with very minor difference between the average kilometres travelled for each vehicle, travel time increases just over 20 seconds overall and 10 seconds per kilometre, and an average speed difference of 0.6km/h. Dev 1a and 2a on the other hand, can be seen to have the highest increase in the performance metrics of the scenarios, suggesting slightly greater levels of delay in this scenario. For these scenarios, increases in the travel time reach 43 seconds over the base results or 15 seconds per kilometre, while average travel speed decreases by up to 1.4 km/h. The results for 2b fall between the rest of the other scenarios, showing minor increases to congestion for all parameters.

Despite the increase in congestion expected to be caused by the development traffic, the overall discrepancy to the base scenario results is low, and suggests that all the development scenarios operate to similarly suitable levels. As such, adoption of any of these scenarios is not expected to cause significant adverse effects on the network in the PM peak.

7.2.2 Local Area Performance Comparison - Delay

The operation of each of the intersections assessed can be seen in Table 7.4 and Table 7.5.

TABLE 7.4 COMPARISON OF INTERSECTION DELAYS (LOS) – AM PEAK

Intersection	Base	Dev 1a	Dev 1b	Dev 2a	Dev 2b
Northbourne Av / Knowles Pl	16 sec (A)	20 sec (C)	19 sec (B)	27 sec (B)	24 sec (B)
Northbourne Av / London Cct	47 sec (D)	50 sec (D)	49 sec (D)	50 sec (D)	49 sec (D)
London Cct / Knowles Pl	6 sec (A)	7 sec (A)	7 sec (A)	7 sec (A)	6 sec (A)
Knowles Place 4-way	2 sec (A)	3 sec (A)	4 sec (A)	3 sec (A)	3 sec (A)
Knowles Pl / Edinburgh Av	2 sec (A)	2 sec (A)	37 sec (C)	2 sec (A)	37 sec (C)
London Cct / Edinburgh Av	43 sec (D)	43 sec (D)	42 sec (C)	42 sec (C)	43 sec (D)
Edinburgh Av / Vernon Cir	18 sec (B)	18 sec (B)	11 sec (A)	18 sec (B)	9 sec (A)

From the above table, it can be seen that all of the key intersections are operating at levels where the intersections possess spare capacity in the AM peak. All reviewed intersections have average delays equal to or below 50 seconds (LOS D) across all scenarios, and none of the individual leg movements exceed 70 seconds (LOS E). As such, all intersections are considered to be operating within acceptable levels, so could be suitable for adoption in the AM peak.

In terms of changes in performance from the base scenario, typically the performance of the key intersections in the development scenarios are comparable to the base scenario outputs, with a few notable exceptions. Notably, increases to intersection delay times occur for the Northbourne Avenue / Knowles Place intersection under the LILO arrangement, and the Knowles Place / Edinburgh Avenue intersection when signalised.

For Northbourne Avenue / Knowles Place access, operation of the left-in arrangement in development scenarios (1a & 1b) only see minor (<5 sec) additional delays being added to the Northbourne Avenue vehicles through the increased use of this movement. With the left out included (2a & 2b), delays increased from 16 seconds (LOS B) to up to 27 seconds (LOS B) due to increased delays for vehicles exiting onto Northbourne Avenue. Despite this increase, LOS B is still viewed as acceptable for performance, and doesn't result in excessive queues back along Knowles Place.

For the intersection of Knowles Place / Edinburgh Avenue, the development scenarios which upgrade this site to signals do see a significant increase to the delay times compared to when it is operating as a LILO. This is not surprising, as the signals force delays on vehicles along all legs to provide time for conflicting legs to move. The operation of the signals in the peak period sees LOS C achieved in both instances, which suggests suitable movement and available capacity still at this location. The signalisation of this intersection also has the advantage of improving the performance of the Edinburgh Avenue /Vernon Circuit intersection, as vehicles out of Knowles Place aren't forced to turn right. This signalisation doesn't impact the London Circuit / Edinburgh Avenue intersection.

All other intersections only have minor increases to average delay times (<5 seconds) compared to the AM peak base model, and so are viewed as operating to much the same level as what is seen in the base scenario.

TABLE 7.5 COMPARISON OF INTERSECTION PERFORMANCE CRITERIA – PM PEAK

Intersection	Base	Dev 1a	Dev 1b	Dev 2a	Dev 2b
Northbourne Av / Knowles Pl	6 sec (A)	18 sec (B)	8 sec (A)	39 sec (C)	22 sec (B)
Northbourne Av / London Cct	46 sec (D)	52 sec (D)	45 sec (D)	50 sec (D)	46 sec (D)
London Cct / Knowles Pl	15 sec (B)	44 sec (C)	11 sec (A)	34 sec (C)	17 sec (B)
Knowles Place 4-way	3 sec (A)	89 sec (F)	20 sec (B)	35 sec (C)	19 sec (B)
Knowles Pl / Edinburgh Av	2 sec (A)	6 sec (A)	98 sec (F)	4 sec (A)	99 sec (F)
London Cct / Edinburgh Av	35 sec (C)	32 sec (C)	44 sec (D)	40 sec (C)	45 sec (D)
Edinburgh Av / Vernon Cir	15 sec (B)	19 sec (B)	19 sec (B)	17 sec (B)	20 sec (B)

In the PM peak, the operation of the key intersections are seen have increased delays compared to the base scenario, mostly due to the tidal nature of the development leading to greater trips along Knowles Place combined with the high congestion along London Circuit and other nearby streets slowing vehicles exiting from Knowles Place.

Most of the intersections are seen to be operating below 52 seconds (LOS D) in the base PM scenario, and so are viewed as operating with available capacity and acceptable delays. The two exceptions to this are the 4-way intersection along Knowles Place, which reaches 89 seconds (LOS F) under the 1a development arrangement, and the intersection of Knowles Place / Edinburgh Avenue, which has average delays around 100 seconds (LOS F) for both signalised arrangements (1b & 2b).

For the 4-way intersection at Knowles Place, average delays achieve levels of LOS F in the 1a development scenario. This large delay is attributed to the vehicles exiting from City Block 10 Section 100, which as per the report reviewed in Section 2.2 is to be upgraded to allow for additional office land use. With the increased volumes from the 60 London Circuit development along Knowles Place, there are very few breaks in traffic which would allow for vehicles from the carpark access (southeast leg) to exit their development. This occurs in the 1a arrangement due to several factors, namely the lack of a left-out movement onto Northbourne Avenue forces all traffic exiting our site through this intersection, while the lack of signals at Edinburgh Avenue allow vehicle movements to continue flowing without sufficient breaks for vehicles to exit Block 10. Due to these factors, delays along the southeast leg reach extreme values, and skew the average delay of the intersection. This issue also occurs to a lesser degree within scenario 2a, however not to the degree seen in scenario 1a due to lower volumes along Knowles Place. As these delays only occur along a driveway access to a building, the overall network impacts of this poor performance is minor.

For the Knowles Place / Edinburgh Avenue intersection, delays of just under 100 seconds are achieved in the PM peak hour for the signalised options (1b and 2b). With the increased traffic volumes along Knowles Place in the PM peak from developments along Knowles Place, not enough green time can be provided to Knowles Place movements to maintain appropriate delay times at this intersection. It is noted that these delays do cause queues along Knowles Place, but these queues typically clear quickly after the end of the peak, and don't adversely interrupt the operation of the other driveways along Knowles Place. It is also noted that while these delays are above the generally acceptable value for the operation of an intersection, they are limited to along

Knowles Place, so do not delay traffic on the wider City road network. Delays such as this may actually assist in incentivising alternate means of travel to and from the nearby sites, which could increase public transport and active travel usage in line with the buildings Green Star requirements.

While the other intersections do see significant increases to the delay time (>10 seconds) compared to the PM peak base model, none exceed acceptable delay requirements for intersections and so are viewed as suitable.

7.2.3 Local Area Performance Comparison - Queuing

Queuing impacts from the development have been assessed visually across the local road network directly surrounding the development. The models predominantly show queue lengths conditions in the network worsening up until the end, with queues building each signal phase as existing queues fail to clear. As such, queues were measured just before this point to view the worst-case queuing outcomes across the network, with AM peak queues being assessed at 8:50AM, while PM peak queues were assessed at 5:50pm. The visuals of these queues across the network can be found in Appendix C.

For the AM peak base scenario, majority of the roads surrounding the development were not seen to suffer from excessive queuing, with traffic signals able to clear all vehicles within one or two cycles, and sufficient gaps present at unsignalised intersections to prevent traffic buildups. The key areas which queues formed in the AM peak were from the eastbound movements along Parkes Way and the southbound movement along Northbourne Avenue. For the local area, the streets to the west of the development between the ANU and London Circuit are notably congested, with vehicles along Marcus Clarke Street not providing sufficient gaps for the side roads to clear. Beyond these locations, no significant queuing was observed.

For the four development scenarios, results were all seen to closely resemble the base conditions, with no additional areas of significant queueing observed despite the increase in vehicles. This is attributed to majority of vehicles entering the site in the AM peak, with the main access routes via Vernon Circle (northbound) or Northbourne Avenue (southbound), both of which are three lanes and are built to handle high-capacity traffic. Both the entries to the site off Northbourne Avenue and London Circuit are unopposed left-in movements, which do not typically result in the formation of queues. A typical example of the observed queuing can be seen in Figure 7.1, while further detail can be found in Appendix C.

FIGURE 7.1 QUEUING ACROSS THE NETWORK – AM PEAK DEV 1A SCENARIO

For the PM peak base scenario, queuing was more focussed within the Civic area, with queues along Vernon Circle, Constitution Avenue, London Circuit, and Marcus Clarke Street occurring relatively frequently. Vehicle movements westbound along Parkes Way also saw significant queuing, which occasionally flowed back along Edinburgh Avenue and Coranderrk Street. Generally however, queues for most of the areas cleared within several signal phases and generally didn't cause major impacts to the road network.

Under the development scenarios, slight worsening to the queuing could be observed to the west of the site, particularly along London Circuit and Marcus Clarke Street. This in turn led to observable worsening in the queues along the minor streets which feed onto Marcus Clarke Street. The main change in queuing within the network from the development however was along Knowles Place and within the basement carparks of City Block 40 Section 100 (this development) and City Block 10 Section 100.

With the single lane along Knowles Place available for vehicles exiting the site, queues form quickly back along this road when vehicles are required to give way at the exit onto London Circuit or Edinburgh Avenue. With the queues that form back along London Circuit from the Gordon Street intersection, the left out onto London Circuit is often blocked, which further exacerbates the formation of queues.

Queuing along Knowles Place is noted to not be as severe in the scenarios when the LILO is present onto Northbourne Avenue (scenario 2a and 2b), as not all development vehicles are forced along Knowles Place. While this does slightly worsen queues along Northbourne Avenue travelling north, these queues are expected to clear each cycle time and do not lead to any long-term impacts to the road network.

Alternatively, under the scenarios which see the Knowles Place / Edinburgh Avenue intersection signalised, queues along Knowles Place are seen to worsen. This is due to the signals not being able to provide enough time for Knowles Place traffic to clear each cycle, leading to vehicles backing up all the way to the Block 40 Section 100 carpark. An example of these queues can be seen in Figure 7.2, while further detail can be found in Appendix C.

FIGURE 7.2 QUEUING ACROSS THE NETWORK – PM PEAK DEV 2B SCENARIO

Although not suitable for comparison in the AM peak, the significance of queuing along Knowles Place can be measured through the comparison of virtual queues within the two basement carparks. These results are presented in Table 7.6.

TABLE 7.6 VIRTUAL QUEUES WITHIN THE BASEMENT CARPARKS – PM DEVELOPMENT SCENARIOS

Scenario	B40S100 Carpark	B10S100 Carpark
1a	67 vehicles	170 vehicles
1b	13 vehicles	175 vehicles
2a	137 vehicles	213 vehicles
2b	20 vehicles	98 vehicles

While actual queues are not expected to get this bad, as vehicles in reality change their route rapidly when delays arise, while these models only update route selection every 15 minutes due to the simulation step, this does give a good indication on how queue impacts are expected to differ. As can be seen, queues within the carparks tend to trend lower under the options where Edinburgh Avenue is signalised, as site vehicles queue along the full length of Knowles Place as opposed to turning right at the Knowles Place 4-way intersection to get to London Circuit. While this does lead to more vehicles queued along Knowles Place, less vehicles are present within the basements.

Scenario 2a can be seen to cause the worst queuing within the basements of the options. This is attributed to the increased queues along Northbourne Avenue as more site vehicles turn left onto Edinburgh Avenue and then onto Vernon Circle. These additional vehicles increase queues back past the left-out lane of Knowles Place, and prevent vehicles from exiting the carpark as queues along Knowles Place block right-turns.

8 PARKING CONSIDERATIONS

8.1 Public Car Parking

As per Section *A2.1.8* of the *Holding Lease and Deed Agreement* for City Block 40 Section 100, car parking within the site needs to match that which is being removed from the at-grade carpark through this development. This requires 280 publicly accessible parking spaces to be provided within the site. These spaces are proposed to be provided within the basement parking structures accessible under the south buildings.

In addition to these spaces, an additional three disability accessible parking spaces are required to be installed along Knowles Place near where the existing spaces are present. These are currently proposed to be located directly out the front of the Law Court. The location of these spaces shall be confirmed as part of a later stage of design.

Finally, the five vulnerable people parking spaces along the Knowles Place extension will also need to be included as part of this development. Currently, these spaces are proposed to be reinstated along the Knowles Place extension at street level. The side of the street and exact positioning of these spaces is pending further design and coordination with service providers and the Law Courts.

8.2 Site Car Parking

The development within City Block 40, Section 100 is proposed to be constructed to Green Star standards. As part of this standard, the reliance on private fossil fuel vehicles is to be reduced, with priority provided for active travel, public transport, and electric vehicle movements to the site instead. In the interest of achieving this, only 234 spaces have been provided for tenant use. These spaces are in addition to the 280 public parking spaces provided in this basement structure, meaning a total of 514 parking spaces are provided across the three levels of basement parking.

Parking spaces for the development buildings have been provided at rates below the 1.5 spaces per $100m^2$ GFA that is specified within the *Territory Plan Planning (Commercial Zones) Technical Specifications* document for the City Centre. This is viewed as acceptable for this location due to its good connectivity to the active travel network and public transport network present within the City Centre. As discussed in Section 3.5, there are a large number of high-quality cycle networks within close proximity or directly connected to the site, allowing commuting to the development via active travel from all the other major town centres within the ACT.

Public transport accessibility is also readily available within the area, with both the bus interchange and a light rail stop located within 300m of the site. The bus interchange services a number of the rapid routes which connect the other major town centres to the city. With the future Light Rail Stage 2 also proposed to be completed in the near future and extending down to Woden, connectivity to the site from both the north and south of Canberra will be available. Further details on the public transport connectivity of the site are provided in Section 3.6.

For these reasons, the limited availability of private parking within the site is deemed as beneficial to prioritising non-personal vehicle trips, including carpooling, use of public transport, active travel. This shift to these movement types would help limit congestion in the city, increase active travel usage, and reduce helps the development to achieve its Green Star requirements, and aligns with the goals of the ACT Government Active Travel Plan 2024 and the ACT's Climate Change Strategy 2019-2025.

8.3 Bicycle Parking and End of Trip Facility Allowance

As mentioned above, this development is being developed to meet Green Star requirements. These specifications include direction for the provision of secure bicycle parking, shower facilities, and lockers for use by active travel practitioners to the site. Space for these amenities has been allowed within the first level of the basement carpark.

The quantity and volume of each of these requirements will be determined once the design of the three buildings has progressed further, and will be completed by an Active Travel Specialist. These findings will be presented separately of this report.

9 ROAD SAFETY AUDIT

As per the advice received from TCCS on the 10th July 2024, CPG engaged SCT Consulting to complete and independent road safety audit (RSA) for the development area. From reviewing the existing conditions along with the site plans available at the time of their assessment, SCT undertook a safety analysis of the proposed development and prepared the RSA report to summarise these findings.

A closing meeting between Egis, SCT, and CPG was held on the 17th October 2024 to review these comments and prepare closeout statements for all 12 identified risks. It is noted that each of the risks raised have been addressed within the current design drawings, with the design of the LILO access onto Northbourne having changed in particular to address the safety concerns.

The RSA report along with the client responses can be found in Appendix B.

10 CONCLUSION

Egis was engaged by Capital Property Group to prepare a Traffic Impact Assessment report for the development of City Block 40 Section 100 into three commercial office buildings. Access to this site would be provided from the existing Knowles Place extension, with a second access being provided along Northbourne Avenue. Vehicle access to the site is well provided through the six arterial roads in close proximity. This site has also been identified as having a high level of connectivity to both active travel and public transport networks present within the Civic region, which would help reduce the sites reliance on personal vehicles and align with the Green Star design being pursued.

This development would consist of a total of 62,700 sqm GFA of office, 2,300 sqm GFA of restaurant and café, and replacement of the existing 280 public parking spaces currently present on the site within the basement carparks. Traffic generation for the development has been calculated based off standard generation rates agreed with TCCS prior to commencement of modelling. Through the application of these rates, it was determined that 647 vph would be generated in the AM peak period, while 720 vph would be generated for the PM peak period by the new development. In addition to these volumes, the current traffic generation for the existing 280 space public carpark is expected to still occur under the development scenario. From survey data collected, this is expected to be an additional 101 vph in the AM peak and 142 vph in the PM peak.

Distribution of the traffic from the site was calculated through review of Journey to Work data to the Civic region, and household travel survey data for the ACT and Victoria. Through assessment of this data and review of the microsimulation model extents, trips were defined as travelling to and from 14 centroids across the network, with the expected percentages of trave for each applied to the generated traffic for the site.

To determine the impact of the development on the surrounding road network, microsimulation modelling was undertaken, using the Parkes Way Southwest Corridor model provided by TCCS as the base. To allow for results to be more focussed on the impacts to the local network, a subnetwork which consisted of the Civic region, the length of Parkes Way between Morshead Drive and William Hovell Drive, and the Tuggeranong Parkway between Glenloch Interchange to Hindmarsh Drive. The model was only run for 2031 conditions, with calibration and validation having been assumed as completed as part of the PWSWC model preparation.

It is noted that the base model includes allowance for the Light Rail Stage 2A extension to the west around London Circuit, which changes intersection operation, priorities, and traffic performance across the network. The alignment selected for Light Rail has not been changed from the base model provided, and matches current designs and route alignments available at the preparation of this report.

To accurately reflect the expected base conditions within 2031, several updates to the base model were undertaken. These included:

- The inclusion of traffic for an office development located within City Block 19 Section 23, which added 337 vph in both peak periods.
- The adjustment of traffic volumes associated with the existing Block 40 Section 100 centroid to match survey data for vehicle movements in and out of the site.
- Review of the transit plans to ensure their effective operation in the microsimulation model scope.
- Development of path assignment files for the PM peak periods to improve vehicle path selection through the model.

In addition to the adoption of these changes and running of the base scenarios, four development scenarios were prepared for each peak period. These development scenarios included further changes to the models, including:

- Inclusion of OD matrices and traffic matrices for the Block 40 Section 100 development.
- Update of the Knowles Place road network to include access locations to the new basement carpark.
- Update of the geometry of the access along Northbourne Avenue to allow for a LILO movement (options 2a and 2b only)
- Update of the control plans to allow for the signalisation of the Knowles Place, Edinburgh Avenue intersection (options 1b and 2b only)

- Development of path assignment files for each of the PM peak scenarios to improve vehicle path selection through the model.

With the update of the models for the above changes, the scenarios were run for their relevant replications, and results were developed to compare performance. For the operation of the network, Vehicle Kilometres Travelled, Vehicle Hours Travelled, Average Travel Speed, and Average Travel Time were considered to identify performance of the network. For the operation of individual intersection, delay time and level of service of the six intersections listed below were compared.

1. Northbourne Avenue / Knowles Place access
2. Northbourne Avenue / London Circuit
3. London Circuit / Knowles Place (LILO intersection)
4. Knowles Place 4-way intersection
5. Knowles Place / Edinburgh Avenue
6. London Circuit / Edinburgh Avenue
7. Edinburgh Avenue / Vernon Circle

From review of the above parameters, it was found that performance of the road network and individual key intersections was relatively unchanged in the AM period, with none of the parameters dramatically increasing. Performance was however seen to increase within the PM period. The network performance parameters were all seen to be mostly consistent with the PM period base scenario, with all increases not expected to cause significant worsening of the operation of the road network. The operation of the individual intersections was however seen to worsen, particularly along Knowles Place. The intersection of Knowles Place with Edinburgh Avenue was seen to exceed acceptable delay levels (LOS F) when operating under a signalised arrangement. This is attributed to the large volume of traffic along Knowles Place being unable to clear the intersection in one cycle, thus leading to queues back along Knowles Place and increased delays. For the scenarios where the signals were not adopted at this intersection however, the traffic volumes along Knowles Place did not allow for suitable gaps in traffic for vehicles exiting from driveways to move, thus resulting in the increased delays at the 4-way intersection along Knowles Place.

Queuing within the network could be seen to follow a similar trend as delays, with minimal change within the AM peak, and noticeable worsening within the PM peak. The queuing impacts were mostly limited to along Knowles Place and within the carpark driveways present along Knowles Place. Typically, it was found that queues along Knowles Place worsened under the scenarios where Edinburgh Avenue intersection had been signalised (1b and 2b), while the internal queues within the carparks were worst under the 2a arrangement.

Ultimately, the performance of the intersections along Knowles Place are expected to worsen under addition of the Block 40 Section 100 development. These delays and queues are however limited to a local road and do not cause significant impacts to any of the major roads surrounding the site. As such, the higher delays at these locations are not viewed as detrimental to the operation of the Civic road network. Delays such as this may actually assist in incentivising alternate means of travel to and from the development, which could increase public transport and active travel usage in line with the buildings Green Star requirements.

APPENDIX A : TCCS CORRESPONDENCE