Prepared for
Major Projects Canberra
ABN: 66 676 633 401

Traffic and Transport Impact Assessment

29-Sep-2021
Raising London Circuit

aecom.com

Delivering a better world

Traffic and Transport Impact Assessment

Client: Major Projects Canberra

ABN: 66 676 633 401

Prepared by

AECOM Australia Pty Ltd
Civic Quarter, Level 4, 68 Northbourne Avenue, GPO Box 1942 ACT 2601, Canberra ACT 2601, Australia
T +61 2 6100 0551 www.aecom.com
ABN 20 093 846 925

29-Sep-2021

Job No.: 60656949

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 AS/NZS4801 and OHSAS18001.

Table of Contents

List of Figures

List of Tables

Abbreviations and glossary

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
ACT PALM Act	Australian Capital Territory (Planning and Land Management) Act 1988
ACTPLA	ACT Planning and Land Authority
Aimsun model	Aimsun mesoscopic modelling package
ANU	Australian National University
CBD	Central Business District
CLR1	Canberra Light Rail Stage 1
CRA	City Renewal Authority
CTMP	Construction traffic management plan
DA	Development Approval
Density	A measure of how many vehicles are occupying a length of road i.e. it can be described as a measure of congestion
DSI	Death and Serious Injury
EA	Environmental Assessment
EPA	Environmental Protection Agreement
EPSDD	Environment, Planning and Sustainable Development Directorate
HCM	Highways Capacity Manual
Level of Service	The average total vehicle delay of all movements through an intersection, expressed as a level representing a range of delay
MPC	Major Projects Canberra or The Territory
NCA	National Capital Authority
NCP	National Capital Plan
NSW	New South Wales
PBS	Performance Based Standards
PSP	Preliminary Sketch Plan
QT	A hotel located near the intersection of London Circuit and Commonwealth Avenue
RLC	Raising London Circuit
SCATs	Sydney Coordinated Adaptive Traffic System
Sidetrack	Temporary trafficable carriageway
SIDRA Intersection	Signalised and unsignalised Intersection Design and Research Aid – a micro-analytical traffic evaluation tool used to assess the performance of intersections
TCCS	Transport Canberra and City Services Directorate
Territory	ACT Government, specifically Major Projects Canberra
Travel time	A measure of the time taken to travel between two defined locations
WA	Works Approval

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) has been commissioned to undertake a traffic and transport assessment for the proposed works associated with the raising of London Circuit (RLC) (the Project).

Raising London Circuit to be an at-grade intersection with Commonwealth Avenue would align the road network with strategic transport and land use planning for the City, improve urban amenity and support the revitalisation of the City precinct.

This technical report provides a traffic and transport impact assessment of the Project and has been prepared to support the Environmental Assessment (EA).

1.1 Strategic need

The Project is proposed as one of a series of major projects being planned and delivered in a coordinated and holistic way to give effect to the strategic planning and development vision in the National Capital Plan (NCP) for Canberra City and its surrounds. In this context, the need for the Project is underpinned by several significant strategic roles:

1. **Direct facilitation of other major projects**, most notably:
    - The Project would directly facilitate the delivery of the Canberra Light Rail network extension to the south from its current terminus on Northbourne Avenue, near Alinga Street, along London Circuit and Commonwealth Avenue and southward to Woden. The Project would facilitate and provide an opportunity for the light rail network extension to connect onto Commonwealth Avenue without occupying surrounding developable land
    - The Project would directly facilitate the proposed development of Section 63 through timely release of land around the existing London Circuit - Commonwealth Avenue interchange, including within and around the cloverleaf ramp connections
2. **Indirect facilitation of other major projects** by delivering road infrastructure and facilitating public transport infrastructure, through integration of land use and transport planning and delivery, to meet Canberra's current and future needs
3. **Future-proofing the transport network** by providing infrastructure that responds to current needs and also provides strategic capacity for future growth development
4. **Well-timed and coordinated delivery of major projects** to allow orderly, economic and efficient development of land in Canberra City. Delivery of the Project in the short term would provide the combined benefits of freeing up land, particularly in and around the existing cloverleaf ramps connecting London Circuit, Commonwealth Avenue and Parkes Way for development in line with the NCP vision for Canberra City, as well as ensuring that such development doesn't preclude the cost-efficient and orderly implementation of the Project in the future
5. **Improved urban design and amenity outcomes**, consistent with the strategic planning and development vision presented in the NCP. The urban design and amenity outcomes of the existing London Circuit - Commonwealth Avenue interchange are suboptimal. The Project offers an opportunity to address this through improved urban design, a more connected and accessible contribution to the city's infrastructure, a more desirable appearance and local amenity, and inclusion of modern, well-design active transport infrastructure.

1.2 Project vision and objectives

A vision and objectives have been developed for the Project, considering the Project's role in responding to the planning and development vision in the NCP, and the other relevant strategies and plans discussed in Section 3.0.

The vision for the Project reflects the ACT Government's ambitions for Canberra:

> ***To improve connectivity and support city planning by integrating strategic transport and land use initiatives to shape future development and create attractive, design-led, people focused places.***

In pursuit of this vision, the design, development, and delivery of the Project would be guided by the five objectives shown in Figure 1.

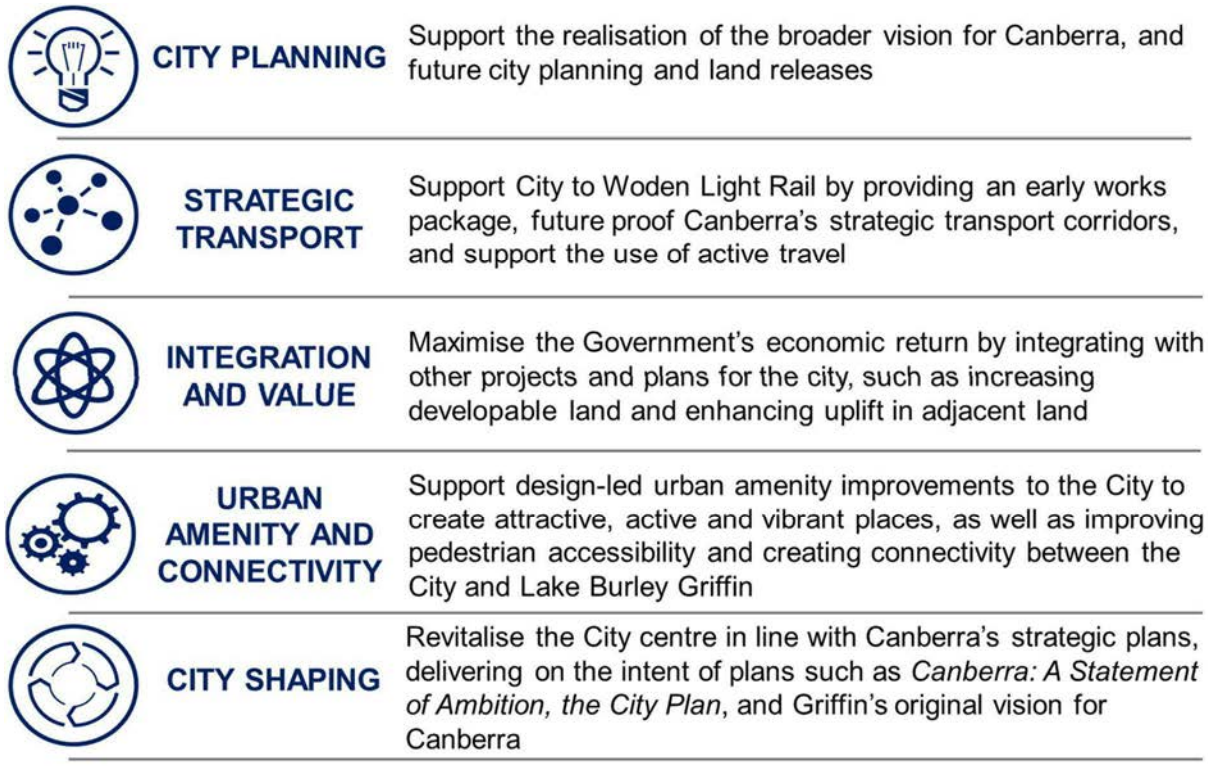


Figure 1 The Project objectives

1.3 Study area

The Project is located within Civic, in Canberra City. The study area is shown in Figure 2 and includes:

- London Circuit between Edinburgh Avenue and Constitution Avenue
- Commonwealth Avenue between Vernon Circle and Parkes Way
- The southern section of Vernon Circle where it transitions to/from Commonwealth Avenue
- Construction compounds on Marcus Clarke Street, Acton Park, and Section 116 (the at-grade car park northeast of the London Circuit and Commonwealth Avenue Intersection)
- Section 63, between the north-west cloverleaf and Edinburgh Avenue.

Figure 2 Project study area

1.4 Report structure

The structure of this report is outlined below:

- **Section 1**: Introduction - introduces the project and the report
- **Section 2**: Project description - provides details of the project including its design, operation and construction methodology
- **Section 3**: Legislation and strategic context - provides an appreciation for the strategic context for the project, including the legislative and policy setting, as well as the broader transport objectives and planning for Canberra
- **Section 4**: Methodology - documents the methodology for this assessment, including traffic modelling methodology and assumptions, the overarching approach adopted to assess the construction and operational impacts and the relevant guidelines which have been referenced
- **Section 5**: Existing transport environment - describes the existing conditions for all modes of transport in the study area, such as traffic and road network, public transport, pedestrians and cyclists including both infrastructure and operations or patterns for each of the modes
- **Section 6**: Construction impact assessment - documents the project's potential impacts upon the road and transport networks during construction and identifies management and mitigation measures, as well as residual impacts
- **Section 7**: Operation impact assessment - documents the project's potential impacts on the road and transport networks during operations and identifies management and mitigation measures, as well as residual impacts
- **Section 8**: Conclusion - outlines the overall conclusions for the project's construction and operational impact assessment.

2.0 Project description

The Project would involve raising London Circuit between Edinburgh Avenue and Constitution Avenue on a gradual filled embankment to meet the current height of Commonwealth Avenue, and provision of a new signalised intersection between London Circuit and Commonwealth Avenue.

The completed Project, including its main features and elements, is shown in Figure 3. Key elements of the Project are summarised in Table 1. Further details of the Project are provided in Chapter 3.0 of the Environmental Assessment.

Table 1 Key elements of the Project

Key element	Description
Main embankment	A main embankment with associated retaining walls and batters between Edinburgh Avenue in the west and Constitution Avenue in the east, rising in the centre to around the current height of Commonwealth Avenue. The main embankment would have a slope of up to 3.5 per cent, tapering off to around 2.0 per cent towards the new London Circuit-Commonwealth Avenue intersection.
London Circuit West	A modified and reconstructed London Circuit West between Edinburgh Avenue and Commonwealth Avenue: • London Circuit West would be generally one travel lane in each direction, widening to two lanes between the potential future intersection with the proposed West Road and the new Commonwealth Avenue intersection.
London Circuit East	A modified and reconstructed London Circuit East between Commonwealth Avenue and Constitution Avenue: • London Circuit East would be two travel lanes in each direction.
New and modified intersections	New and modified intersections would be delivered at Edinburgh Avenue (modified) and Commonwealth Avenue (new), as well as making provision for a future potential intersection to tie into the potential future West Road (which would run south from London Circuit West to the future New Acton Waterfront Precinct, but which does not form part of this project). ***Modified London Circuit-Edinburgh Avenue intersection*** The modified London Circuit-Edinburgh Avenue intersection would include some civil works and tie-in works with London Circuit to the west of the intersection. No changes to Edinburgh Avenue outside the intersection are proposed. The intersection would retain three travel lanes in each direction on the approach to Edinburgh Avenue, and one travel lane in each direction on London Circuit south of the intersection. ***New London Circuit-Commonwealth Avenue intersection*** The new London Circuit-Commonwealth Avenue intersection would be signalised and would include tie-in works on Commonwealth Avenue to the north and south of the intersection. The intersection would be designed to integrate into the local landscape and to minimise intrusion into the significant vista along the Commonwealth Avenue corridor between City Hill and Capital Hill. On Commonwealth Avenue, the southern approach would provide one left turn lane, two through lanes and a right turn lane into London Circuit East. On London Circuit there would be two travel lanes in each direction on both the eastern and western approaches. This intersection configuration would be integrated through tie-in works to the existing configuration of Commonwealth Avenue north and south of this intersection.

Key element	Description
	The new intersection would allow full vehicle movements in all directions between London Circuit and Commonwealth Avenue, except for: • No right turn from London Circuit westbound into Commonwealth Avenue northbound • No right turn from Commonwealth Avenue southbound into London Circuit westbound • No right turn from London Circuit eastbound into Commonwealth Avenue southbound.
Modification and removal of existing cloverleaf ramps	Modification and removal of existing cloverleaf ramp connections between Commonwealth Avenue, London Circuit and Parkes Way: • The cloverleaf ramp connections to the north west and to the south west of the existing London Circuit-Commonwealth Avenue interchange would be removed, with affected land stabilised and rehabilitated • The cloverleaf ramp connection to the south east of the existing London-Circuit-Commonwealth Avenue interchange would be modified. This would remove the connection from London Circuit (westbound) on to Commonwealth Avenue (southbound), but would retain the connection between Parkes Way (eastbound) and Commonwealth Avenue (southbound).
Bicycle infrastructure	Provision of bicycle facilities: • Dedicated, separated off-road bicycle paths would be provided on the verge on both sides of London Circuit West and London Circuit East, which would operate as one-way pairs in each direction • Dedicated, separated off-road bicycle paths bicycle paths would be provided along both sides of the tie-in works on Commonwealth Avenue to the north and to the south of the new London Circuit-Commonwealth Avenue intersection.
Pedestrian infrastructure	Provision of pedestrian facilities: • Dedicated, separated pedestrian paths would be provided on both sides of London Circuit West and London Circuit East, and along both sides of the tie-in works on Commonwealth Avenue around the new London Circuit-Commonwealth Avenue intersection.
Ancillary infrastructure	Ancillary infrastructure and works, including utility connections, lighting, street furniture, landscaping and drainage are included in the project.

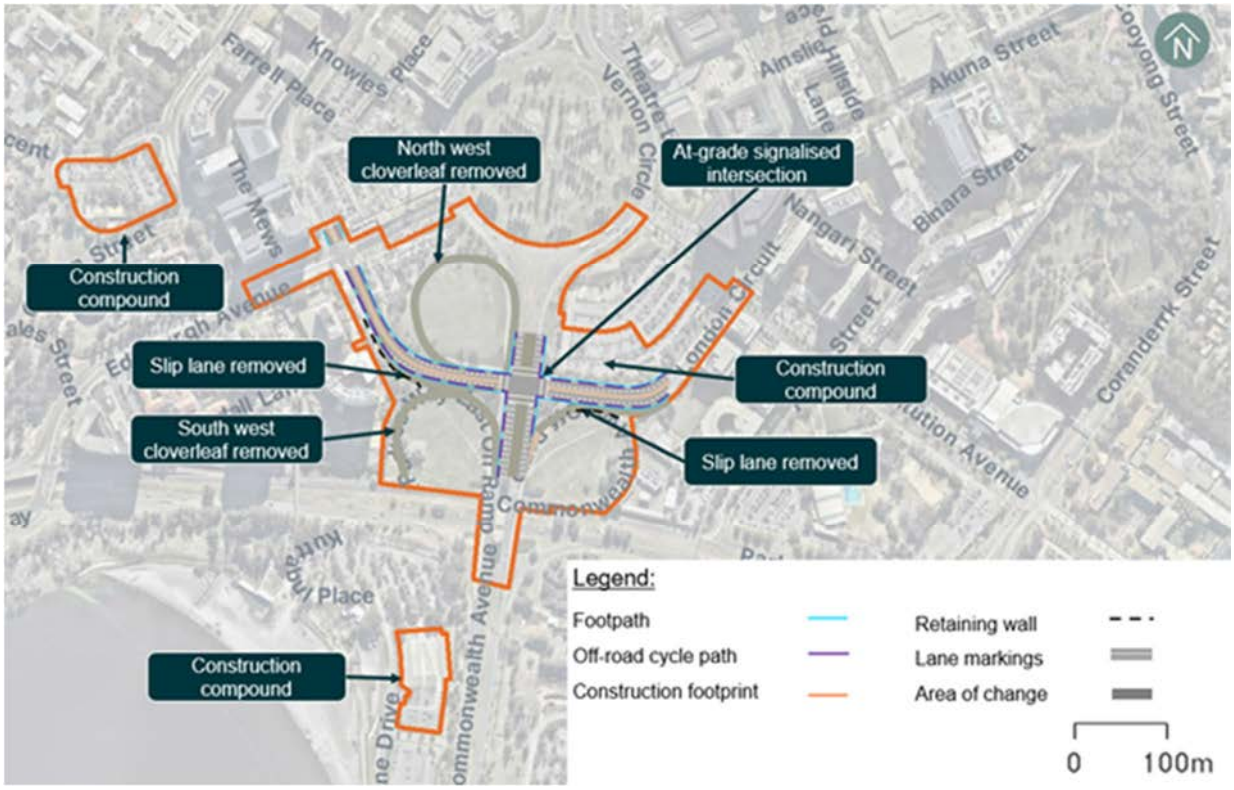


Figure 3 The Project and its main features and elements

Subject to securing and complying with the conditions of environmental and planning approvals, construction of the Project would commence around Q2 2022 and would take approximately two years to complete. The construction footprint for the Project, and the areas affected by separate early works are shown in Figure 4.

Construction of the Project would be preceded by a series of early works required to allow construction works to commence around Q2 2022. These early works are subject to separate assessment and approvals, and would include:

- Relocation of utilities currently located within the Project construction footprint
- Translocation of Golden Sun Moth (*Synemon plana*) larvae from areas affected by utility relocations
- Traffic management works at the London Circuit-Edinburgh Avenue intersection to allow closure of London Circuit during construction of the Project
- Traffic management works at the Commonwealth Avenue-Vernon Circle intersection, including signalisation, and at the London Circuit-Constitution Avenue intersection to allow closure of London Circuit and traffic management along Commonwealth Avenue during construction of the Project.

Further details of early works are provided in Chapter 4.0 of the Environmental Assessment.

Key construction activities for the Project are summarised in Table 2. Further details of the construction of the Project are provided in Chapter 4.0 of the Environmental Assessment.

Table 2 Key construction activities

Key construction activity	Description
Site establishment and preparation	Site establishment and preparatory works would involve: • Mobilisation and establishment of construction compound sites. Construction compounds approved for use as part of the utility relocation early works would continue to be used for construction of the Project (refer to Figure 4) • Translocation of Golden Sun Moth (*Synemon plana*) larvae from within the Project construction footprint • Implementation of temporary surface water and drainage management infrastructure, including temporary grass swales, along areas of London Circuit which would be filled and raised with bulk earthworks • Decommissioning and removal of utilities from within the Project construction footprint. Some decommissioning and removal works may also be carried out as part of construction works along London Circuit and around the new London Circuit-Commonwealth Avenue intersection • Implementation of traffic management measures, including reliance on early works carried out at the London Circuit-Edinburgh Avenue, Commonwealth Avenue-Vernon Circle and London Circuit-Constitution Avenue intersections, and closure of London Circuit to traffic between Edinburgh Avenue and Constitution Avenue.
Closure and raising of London Circuit	Closure and raising of London Circuit would involve: • Removal of existing street furniture, road pavement and vegetation along London Circuit and within the Project construction footprint • Removal of existing street furniture and road pavement along the north west and south west cloverleaf ramp connections between Commonwealth Avenue, London Circuit and Parkes Way, and stabilisation and rehabilitation of land in those areas • Removal of existing street furniture and road pavement for the connection between London Circuit East and the south east clover leaf ramp connection between London Circuit, Commonwealth Avenue. Only the connection with London Circuit would be affected, with the remainder of the ramp connection retained with potential minor modification to accommodate the embankment batter for London Circuit East. Land affected by removal of the London Circuit connection would be stabilised and rehabilitated • Construction of retaining walls and batters, and staged filling of the London Circuit road corridor between Edinburgh Avenue and Constitution Avenue. The infilling along London Circuit would continue concurrently and in coordination with demolition and infilling beneath the Commonwealth Avenue northbound and southbound bridges (refer below).
Demolition and infilling of Commonwealth Avenue bridges	Demolition and infilling of the Commonwealth Avenue bridges would be carried out in stages to allow continued passage of traffic during the works. Indicative staging would be as follows: • A temporary sidetrack would be constructed to the east of the existing Commonwealth Avenue southbound bridge and associated temporary pavement of the existing Commonwealth Avenue median to allow traffic diversion around the Commonwealth Avenue bridges during demolition works. The sidetrack would provide two traffic lanes as shown in Figure 5.

Key construction activity	Description
	• Implementation of traffic management measures, including reliance on early works carried out at the Commonwealth Avenue-Vernon Circle intersection, to divert traffic on Commonwealth Avenue so that: - Southbound traffic travels via the temporary sidetrack - Northbound traffic crosses onto the existing southbound carriageway - The Commonwealth Avenue northbound bridge is free of traffic • Demolition of the Commonwealth Avenue northbound bridge • Infilling and stabilisation of the area beneath the demolished Commonwealth Avenue northbound bridge as part of the staged program to infill along London Circuit • Construction of the western part of the new London Circuit-Commonwealth Avenue intersection, including a new northbound carriageway • Implementation of traffic management measures following completion of the demolition and infilling of the Commonwealth Avenue northbound bridge so that: - Southbound traffic continues to travel via the temporary sidetrack - Northbound traffic travels via the new northbound traffic lanes and western part of the London Circuit-Commonwealth Avenue intersection - The Commonwealth Avenue southbound bridge is free of traffic • Demolition of the Commonwealth Avenue southbound bridge • Infilling and stabilisation of the area beneath the demolished Commonwealth Avenue southbound bridge as part of the staged program to infill along London Circuit • Construction of the eastern part of the new London Circuit-Commonwealth Avenue intersection, including a new southbound carriageway • Implementation of traffic management measures to return southbound traffic on Commonwealth Avenue to the new southbound traffic lanes and eastern part of the London Circuit-Commonwealth Avenue intersection • Demolition of the temporary sidetrack and infilling the area beneath it as part of the staged program to infill along London Circuit.
Permanent road works	Permanent road pavement, median works and kerb and guttering would be constructed in coordination with the completion of infilling London Circuit to provide the permanent reconstructed London Circuit. Road works would include intersection works at Edinburgh Avenue and Commonwealth Avenue, and tie-in works at Constitution Avenue and around the modified and new intersections with Edinburgh and Commonwealth Avenues.
Ancillary infrastructure and finishing works	Ancillary infrastructure and finishing works would be completed prior to commissioning and opening London Circuit to traffic, including: • Construction of active transport infrastructure, permanent drainage and utilities works • Installation of lighting and street furniture, and road line marking • Landscaping • Demobilisation, and stabilisation and rehabilitation of disturbed areas, including construction compound sites.

Figure 4 The Project construction footprint and early works areas

Figure 5 Temporary Commonwealth Avenue sidetrack configuration

3.0 Legislation and strategic transport context

3.1 Legislative context

3.1.1 Overview

The ACT operates under a two-tier legislative planning framework. The RLC study area lies within the National Capital Authority (NCA) jurisdiction, requiring a Works Approval (WA).

The Australian Capital Territory (Planning and Land Management) Act 1988 (ACT PALM Act) established the NCA as a Commonwealth Government agency to prepare and administer the NCP. The NCP is the strategic plan for Canberra and The Territory and ensures that Canberra and the Territory is planned and developed in line with their national significance.

The ACT PALM Act also stipulates that the NCP may specify areas of land that have the special characteristics of the National Capital as a Designated Area. The study area lies within the City Hill or West Basin Precincts, as designated by the NCP. Therefore, the project must be consistent with the requirements of the NCP.

Land outside the areas designated by the NCP is Territory Land, requiring DA approval from the ACT Planning and Land Authority (ACTPLA) within the Environment, Planning and Sustainable Development Directorate (EPSDD). The legislation governing this process is the ACT Planning and Development Act 2007, and development in these areas is guided by the ACT Territory Plan 2008.

The Territory Plan provides the policy framework for the administration of planning in the ACT, it aims to achieve consistency across land use and development in a manner that is consistent with the Government objectives and the NCP. The Territory Plan includes land zoning, codes and strategic directions.

Relevant context and transport related directions set out in the NCP and The Territory Plan are summarised in Figure 6.

Figure 6 Legislative directions and context for the Project

3.1.2 Precincts

As discussed, most of the study area lies within the NCP's City Hill or West Basin Precincts. The NCP sets out the transport strategy for these precincts, including the key features discussed in the following sections.

3.1.2.1 City Hill Precinct transport strategy

Key requirements of the City Hill Precinct transport strategy, which includes London Circuit and Vernon Circle are:

- *London Circuit should operate as the main public transport circuit for Canberra City*
- *Promote pedestrian and cyclist amenity, safety and access*
- *Activated laneways are to be introduced to improve permeability*
- *Replace existing surface car parks and public car parking with new developments that include basement car parking*
- *Changes to the traffic network are dependent on implementation of bypass routes and removal of the Parkes Way cloverleaves*
- *Traffic demand for Vernon Circle via alternative routes should be considered to improve pedestrian access to City Hill*
- *London Circuit is to transition traffic from Avenues to the City's urban network, as demonstrated in* Figure 7
- *Access to the inner City Hill Precinct should predominantly be local traffic.*

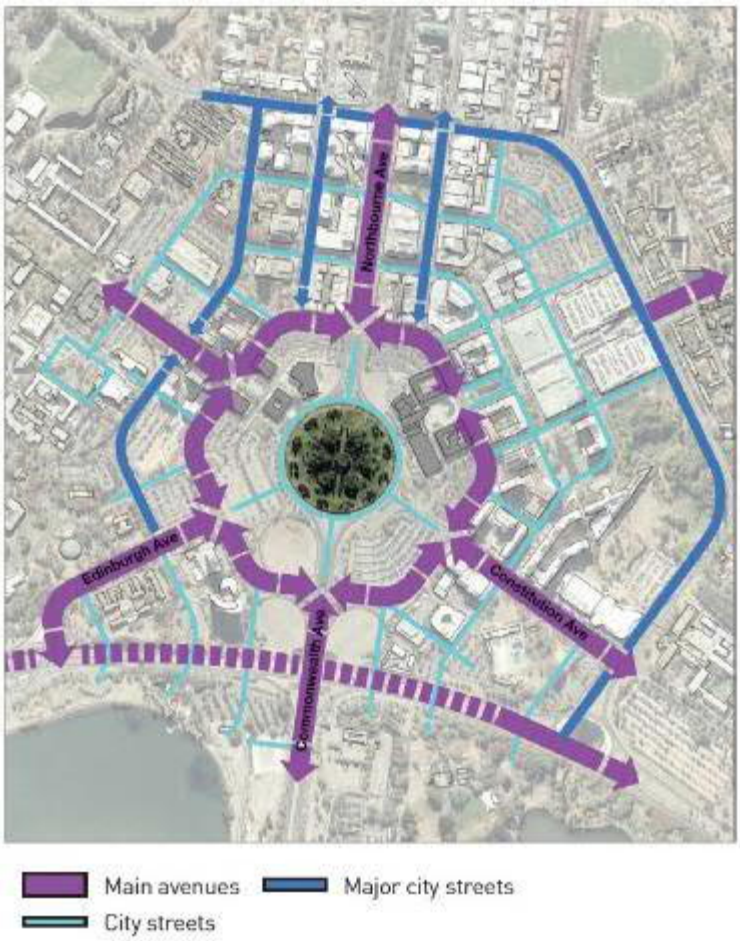


Figure 7 City Hill Precinct street network (Source: National Capital Plan)

3.1.2.2 West Basin Precinct transport strategy

Key requirements of the West Basin Precinct transport strategy include:

- *Create a legible network of paths and streets by extending the city grid of streets and paths to enhance connectivity and accessibility to the lake, as demonstrated in* Figure 8
- *Providing a vibrant, interesting, and lively centre with high levels of human activity*
- *Facilitating movement throughout the precinct especially active transport modes*
- *The avenues and urban areas to have a boulevard character*
- *Ensure that minor streets are low-speed urban streets which give priority to pedestrians*
- *Design traffic engineering devices to promote pedestrian amenity, safety, and access. Transitioning to more sustainable transport methods.*

Figure 8 West Basin Precinct street network and cycle path network (Source: West Basin Guidelines, NCA, 2014)

3.2 Policy and Strategic Planning Context

3.2.1 Territory

The ACT's integrated transport and land use planning vision and strategic directions are discussed in the following plans developed by the ACT Government:

- The City Plan, 2014 with a specific focus on the city centre
- ACT Planning Strategy, 2018
- ACT Infrastructure Plan, 2019
- ACT Transport Strategy, 2020
- ACT Climate Change Strategy, 2019-2025.

The relevant key themes from the Territory's strategic planning documents are summarised in Figure 9, with details discussed further below.

Figure 9 The Territory's strategic context for RLC

3.2.1.1 The City Plan, 2014

The City Plan sets a vision for development within Canberra's city centre to 2030. It is the overarching strategic framework that guides land use for future development in five-character areas including the City West Basin and the City Hill Precincts, within the Project's study area.

The Project supports the following objectives of the plan for the City West Basin and the City Hill Precincts:

- Within the City Hill Precinct, through traffic is to be redirected away from Vernon Circle – RLC aims to provide an urban intersection with greater public transport and active transport consideration and reduced priority for vehicles
- The City Hill Precinct is to be the transport and pedestrian hub for the whole city – RLC provides for wider footpaths and improved active transport provisions within its study area
- The City Centre is to be walkable and pedestrian friendly that is connected to urban areas and surrounds – RLC aims to improve pedestrian connectivity between the City West Precinct and the waterfront and surrounds
- West Basin Precinct is to be connected with the Lake, Australian National University (ANU) and the Lake – RLC would help to better connect future development in the West Basin Precinct with the city and the nearby ANU, particularly by walking and cycling, and enabling the future Light Rail to Woden.

3.2.1.2 ACT Planning Strategy, 2018

The ACT Planning Strategy, 2018 sets out the ACT's vision and directions particularly for housing, transport and climate change. The plan adopts five strategic directions:

1. Compact and Efficient - *deliver 70 per cent of new housing within our urban footprint*
2. Diverse - *maintain a diverse population and physical environment, and a variety of services and economic activity*
3. Sustainable and Resilient - *net zero emissions city that is resilient to the future impacts of climate change*
4. Liveable - *a quality-built environment, public spaces and streetscapes that improve sustainability and connectivity*
5. Accessible and Implementation - *As Canberra grows, we need to enhance and add services, transport options and opportunities for people to choose how they live, where they live, how they work and get around.*

Movement and place is a fundamental concept that underpins the future directions of an integrated transport and land use network for Canberra, as set out in the ACT Planning Strategy. The concept supports a 30-minute city by helping to create liveable and walkable places for mixed communities with amenities close by.

Figure 10 shows conceptually the different functions that streets play in terms of movement and place.

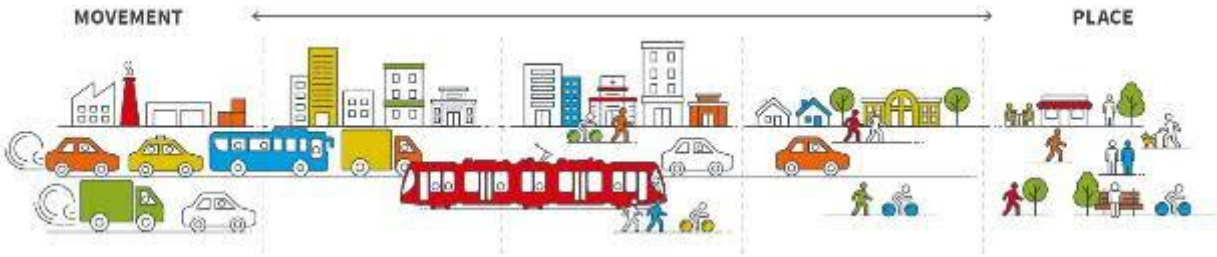


Figure 10 The Movement and Place framework conceptual overview (ACT Planning Strategy, 2018)

RLC would align with the ACT Planning Strategy by:

- Encouraging urban renewal and intensification by allowing for integrated transport and land-use outcomes
- Delivering improved walking and cycling outcomes
- Delivering urban streets and placemaking opportunities
- Enabling greater public transport connectivity for communities.

3.2.1.3 ACT Infrastructure Plan, 2019

The ACT Infrastructure Pan, 2019 outlines the ACT's planned infrastructure projects needed to support Canberra's planned growth for a population of 500,000 people by 2030.

The plan recognises that a community-wide shift to public transport as well as walking and cycling instead of private vehicles is required to achieve the ACT's target of net zero emissions by 2045.

RLC is identified as a priority project, to provide a new gateway to the city that enables the extension of light rail to the lake and improve city traffic flows.

3.2.1.4 ACT Transport Strategy, 2020

The ACT Transport Strategy, 2020 echoes many of the transport related themes identified in the strategic plans discussed above. In particular, the strategy supports the efficient movement of people and goods, prioritises modes that reduce carbon emissions and drive a compact urban form, considers ways to achieve more from the available road space and provide safe and attractive places for walking and cycling.

The strategy draws upon the movement and place concept to develop a future transport network that would be structured through:

- Local links – for shorter trips, highly integrated with place, connected into the public transport network and having high quality walking environments
- Central links – for the efficient movement between centres by public transport, walking and cycling
- Orbital links – support trips around and across the city for private vehicles and freight, while maintaining the current journey times
- Regional links – focus on connecting Canberra with surrounding regions and Sydney.

The relating modal priorities and associated place for these links are shown in Figure 11.

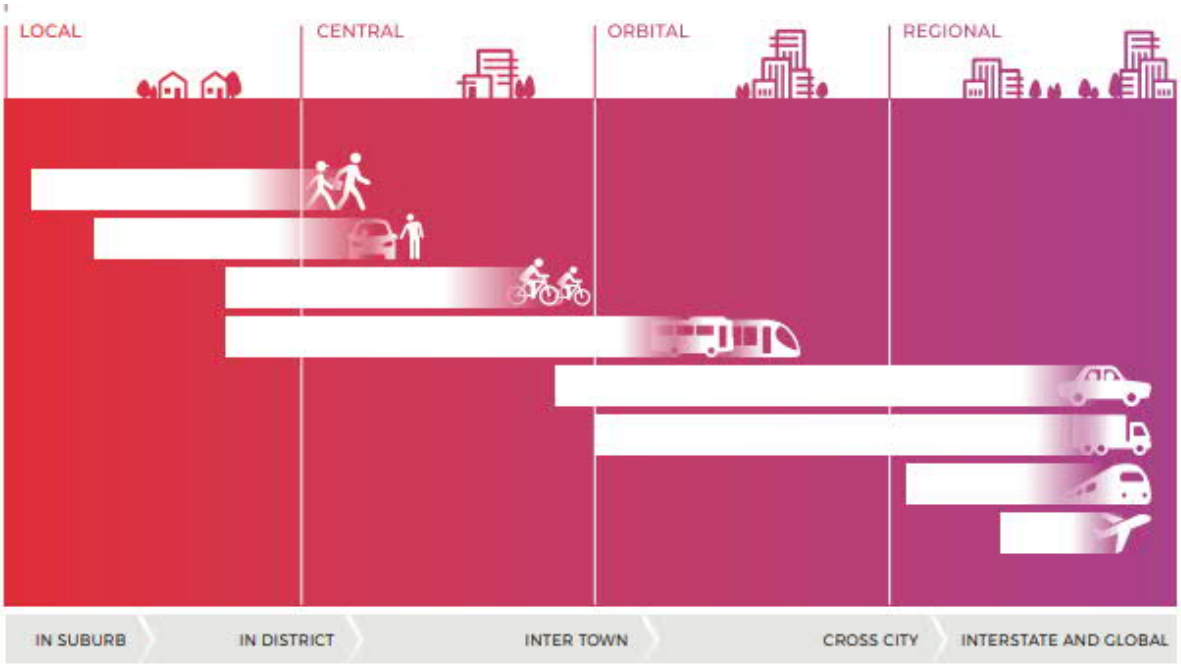


Figure 11 Future transport network structure (ACT Transport Strategy, 2020)

Figure 12 shows the Transport Strategy's conceptual transport network for 2045. Specifically, it highlights the following relevant to the study area:

- The Commonwealth Avenue, Vernon Circle and Northbourne Avenue corridor would be considered a key north-south Central Link and also a Local Link. Its role would be balanced between connecting walkable places and accommodating efficient public transport routes, such as light rail
- London Circuit is to transition into a central link prioritising public transport and walking and cycling
- Barry Drive, Coranderrk Street and Constitution Avenue would form part of a key central link between the north-west and the south-east
- Parkes Way would form part of an east-west key orbital link between Monaro Highway and Tuggeranong Parkway.

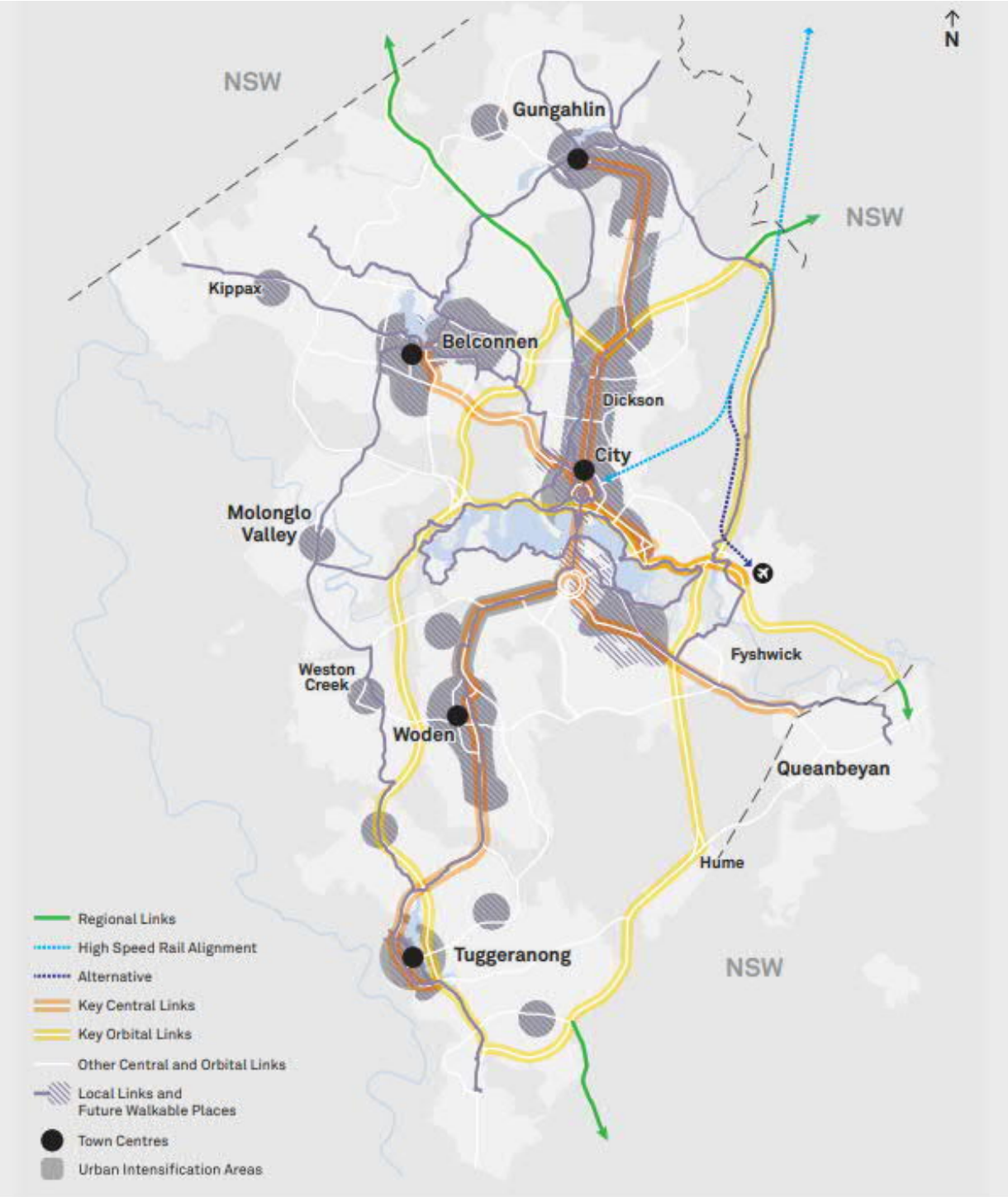


Figure 12 Future conceptual transport network in 2045 (ACT Transport Strategy, 2020)

3.2.1.5 ACT Climate Change Strategy, 2019-2025

The ACT Climate Change Strategy, 2019-2025 outlines the next steps Canberra will take to reduce their greenhouse gas emissions by 60 per cent by 2025 and eventually reaching the net zero emissions target by 2045. Prioritising improved public transport and encouraging walking and cycling is identified as a key priority to achieve a more sustainable transport system and reducing Canberran's reliance on private vehicles. RLC supports this objective by providing improved walking and cycling facilities, enabling new mixed-use developments that encourage walking and cycling and also enabling Light Rail to Woden.

3.3 Kings and Commonwealth Avenue Draft Design Strategy

NCA's Kings and Commonwealth Avenue Draft Design Strategy recognises the historical, current and future role of the Commonwealth Avenue corridor as part of the National Triangle. The National Triangle links City Hill, Capital Hill and the Russell Defence Precinct via Commonwealth Avenue, Kings Avenue and Constitution Avenue.

The Commonwealth Avenue strategy's key traffic and transport features aim to achieve a road design that contributes to the public realm including:

- Reducing peak hour and daily traffic volumes
- Reducing the speed limit from 70km/h to 60km/h
- Promoting active modes and by giving priority to cyclists and pedestrians and/or provide improved facilities at intersections
- Add new signalised intersections
- Replace on and off ramps with more conventional urban intersections
- Remove slip lanes and dedicated turn lanes and provide shared turn and through lanes
- Provide new public transport stops near intersections and provide strong pedestrian and cyclist connections between public transport and adjacent land uses.

The key traffic and transport features of the NCA's draft design strategy for Commonwealth Avenue could contribute to future placemaking along Commonwealth Avenue. However, some of these features may need to be balanced to achieve the ACT Transport Strategy's intent for Commonwealth Avenue as a key central link.

3.4 Nearby planned developments and infrastructure changes

The following major projects are planned in or near the study area:

- Light Rail to Woden
- Parkes Way Upgrade
- Commonwealth Avenue Bridge upgrade
- Section 100 development
- Section 63 Block 20 development
- West Basin Precinct
- City West Bus layover.

Figure 13 shows the location of these projects which are discussed further in following sections.

If any of the below projects or any others were to seek approval for construction a cumulative impact assessment would be required as part of the associated planning approvals.

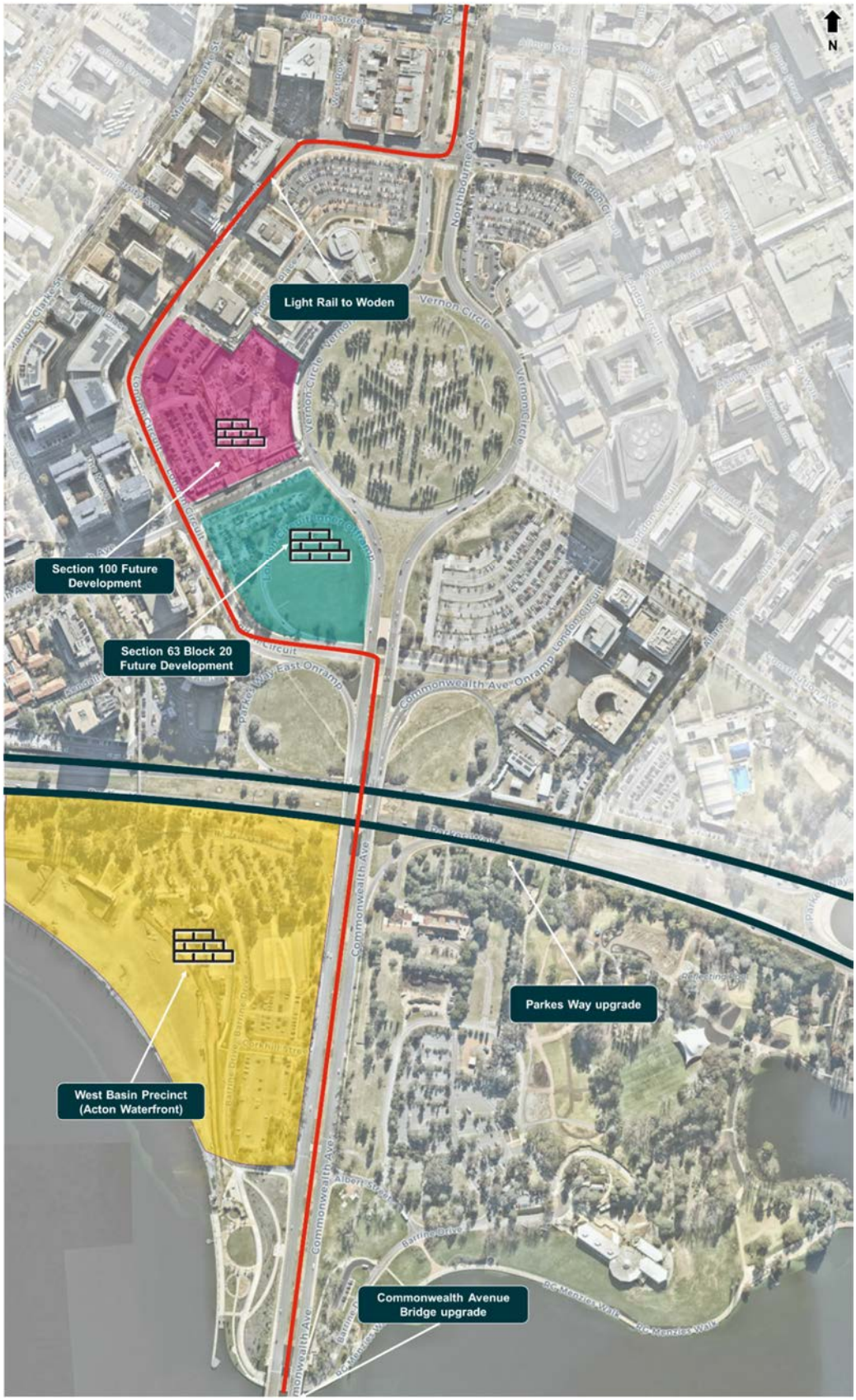


Figure 13 Location of nearby planned developments

3.4.1 Light Rail to Woden

Canberra's future public transport system is planned to include a high-capacity light rail network, including a north-south spine between Gungahlin and Woden and an east-west connection between Belconnen and Majura Parkway.

The first stage of the north-south light rail spine between City and Gungahlin is already operating. The planned extension would run from the existing stage 1 in the City to Woden in the southern suburbs of Canberra via the Parliamentary Triangle.

Light Rail to Woden has been split into the following two stages:

- 1.7km alignment between Civic and Commonwealth Park
- 9km alignment between Commonwealth Park and Woden crossing Lake Burley Griffin via the Commonwealth Avenue Bridge.

For the purposes of this assessment, construction of Light Rail to Woden is anticipated to occur from 2024, following completion of the Project.

3.4.2 Parkes Way Upgrade

The ACT Government is investigating future improvements to the Parkes Way corridor between Glenloch Interchange and Kings Avenue. The investigations will focus on improving accessibility, capacity, connectivity and safety for all road users.

The Parkes Way upgrade is not yet committed but could include the following nearby network changes:

- Signalisation of Parkes Way and Coranderrk roundabout
- Additional eastbound lane through Parkes Way and Anzac Parade roundabout
- Additional westbound bypass lane through Parkes Way and Anzac Parade roundabout
- Additional westbound lane on Parkes Way between Kings Avenue and Coranderrk Street.

3.4.3 Commonwealth Avenue Bridge upgrade

On 27 January 2021 the Australian Government announced a $137m investment to upgrade Commonwealth Avenue Bridge over Lake Burley Griffin, to extend its life by another 50 years.

The Commonwealth Avenue Bridge upgrade project is expected to include:

- Bridge strengthening to increase its load bearing capacity
- Bridge widening to accommodate wider active transport facilities for pedestrians and cyclists
- Safety barrier upgrades.

3.4.4 Section 100 mixed-use development

The Section 100 mixed-use development is proposed between London Circuit and Vernon Circle, to the north of Edinburgh Avenue. The development would include approximately 100,000m^2 of commercial (office) uses and approximately 3,500m^2 of retail uses.

The development is also proposed to include an extension of Knowles Place to the Edinburgh Avenue extension, which was completed in late 2020. The intersection would allow all movements in but right turns out of Knowles Place would not be permitted. The site would have access via the Knowles Place extension and Gordon Street.

Nearly 2,000 private parking spaces are proposed on the site and the existing public parking supply would also be replaced within the basement car park.

The City Section 100 Traffic Study Update report (SMEC, 2021) indicates that the site could generate 1,648 vehicles and 1,533 vehicles during the AM and PM peak hours, respectively, with limited impact on the surrounding road network. However, the conclusion of limited impact seems unlikely given that the site's forecast traffic generation would be higher than the capacity of the surrounding road network.

The Section 100 development is currently partially under construction. For the purpose of this assessment, it is assumed that 75 per cent of this development would be completed by 2026 and would be 100 per cent complete by 2036.

3.4.5 Section 63 Block 20 mixed-use development

The City Renewal Authority (CRA) is currently planning for the development of Section 63, Block 20. A mixed-use development site would replace the existing north-west cloverleaf. Therefore, the site would have frontages to London Circuit, Edinburgh Avenue, Commonwealth Avenue and Vernon Circle.

The development could include 500-600 residential dwellings across three buildings, as well as 1,000-2,000m^2 of commercial (office) uses, a hotel and some ground floor retail. Therefore, it is estimated that the site could generate up to 200 vehicles per hour during the weekday AM and PM peak hours.

The development would likely include a further extension of Knowles Place, with a new four leg intersection on Edinburgh Avenue. It is understood a left-in and left-out intersection may also be provided on Commonwealth Avenue to the north of London Circuit, subject to final design development.

For the purpose of this assessment, it is assumed that this development would be completed by 2036.

3.4.6 Acton Waterfront Renewal Land Release - West Basin Precinct

CRA are also currently planning for a potential future land release as part of the Acton Waterfront renewal, located within the NCP's West Basin Precinct, as discussed in Section 3.1.2.

The new neighbourhood is in early planning phases and is expected to include a mixture of shops, businesses, cafes, recreation, tourist activities and accommodation.

The Acton Waterfront development is expected to have an access road which intersects with London Circuit to the west of Commonwealth Avenue, referred to as West Road.

3.4.7 Other nearby projects

Several other developments are planned in the nearby area, as summarised in Table 3.

Table 3 Other nearby developments and projects

Project	Description	Anticipated timing
City Hill footpath	Construction of a new footpath between Edinburgh Avenue and Constitution Avenue on the inner verge of Vernon Circle.	2022
13 London Circuit hotel development	The demolition and redevelopment of existing hotel. New development will be a 16 storey hotel.	Commence in 2022
7 London Circuit development	The redevelopment of 7 London Circuit will involve the build-out of the existing building towards the verge, the pedestalisation of William Clement Street and landscaping	Commence in 2021
70 Allara Street development	Planned residential development	Unknown
Canberra Theatre	The Canberra Civic and Cultural District is undergoing redevelopment. Plans for the Canberra Theatre will progress to detailed design late 2024. The redevelopment of the Theatre would likely increase the capacity of the theatre and the public's experience of the place.	Commence in 2024
UNSW development (Stage 1/2)	Development of landmark university campus facility on Constitution Avenue near Parkes Way.	Post-RLC construction
Section 19 development	The demolition of the existing landscape and redevelopment of the area into a mixed use residential and commercial space.	Commence in 2024
Block 40 development	Development on the corner of Northbourne Avenue and London Circuit	Post-RLC construction

4.0 Methodology

4.1 Methodology overview

The multi-modal assessment methodology adopted in this transport impact assessment is summarised in Figure 14 and includes:

- Identify multi-modal assessment requirements
- Assess the baseline conditions for the study area
- Identify assessment criteria
- Predict the transport impacts of the Project during construction and operations (post-construction)
- Assess the transport impacts of the Project during construction and operations
- Identify mitigation measures that manage and minimise the risk of the identified impacts
- Assess the residual risk of the transport impacts.

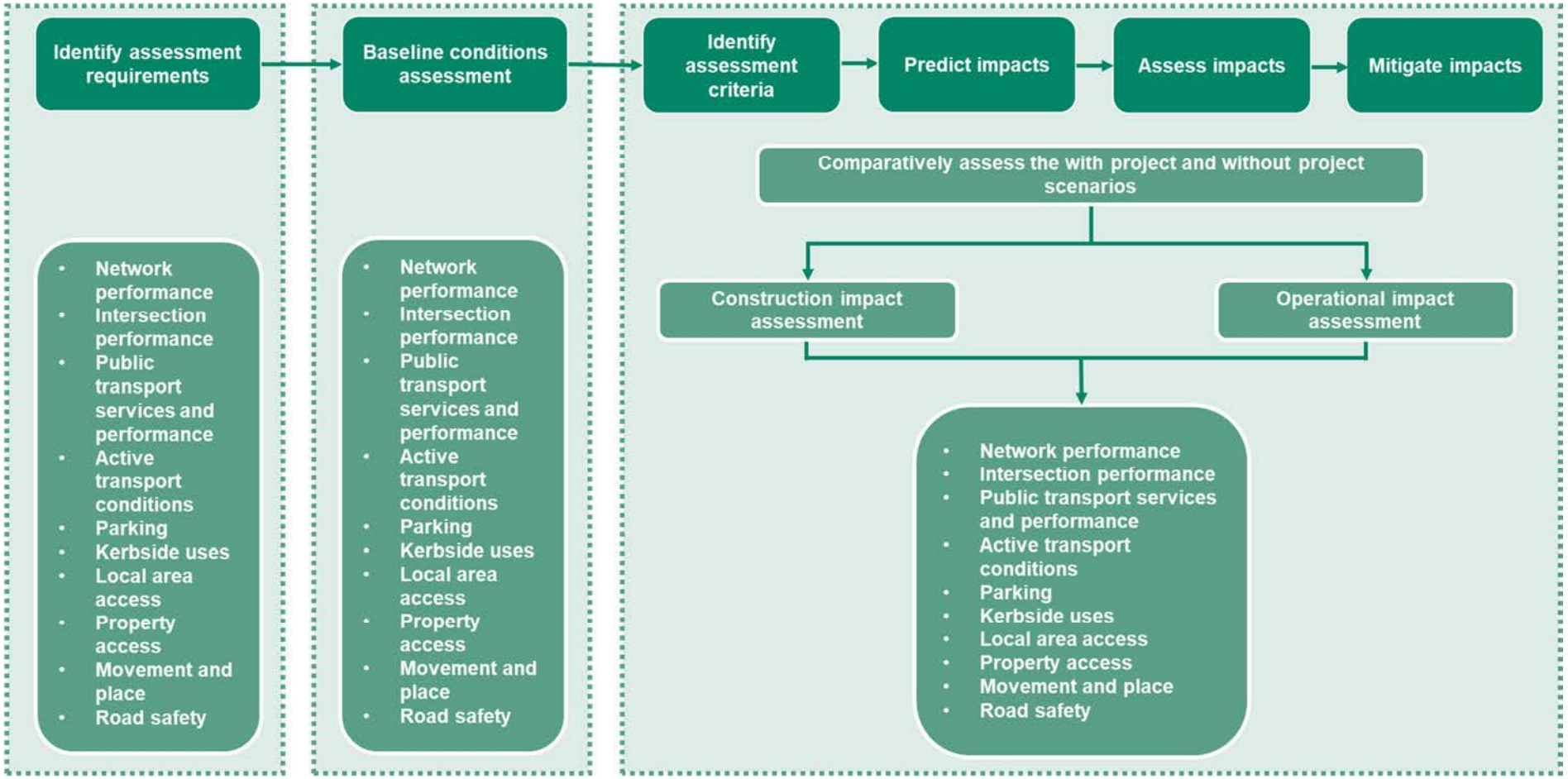


Figure 14 Transport impact assessment methodology overview

4.2 Risk assessment approach

An environmental risk-based assessment process has been adopted for the technical workstreams for the Project, as described below and summarised in Figure 15. Key steps include:

- Description of impacting process
- Description of environmental values affected
- Description of likelihood of impacting process occurring (assume no mitigation or controls applied) (Table 4)
- Description of consequence of impact on environmental value (assume no mitigation or controls applied) (Table 5)
- Calculate risk level (Table 6)
- Identify mitigation and management measures:
  - Apply industry standard management measures to relevant impacts (e.g. dust suppression) to impacts of all risk levels
  - Where risk level is medium or above, identify additional controls to reduce impacts
- Determine residual risk:
  - Likelihood and consequence of impact on environmental values with industry standard and additional controls applied.

The Project's traffic and transport impacts are likely to affect the community and road users. Therefore, the social consequence descriptors have been adopted for this assessment, as they were considered to be most aligned with the traffic and transport impacts of the Project. The social impacts of traffic need to be addressed in depth to understand impacts to individual road users as well as impacts at an aggregate level. Aggregate economic analysis of the Project's traffic and transport impacts are covered in the Business Case and therefore have not been evaluated in this report.

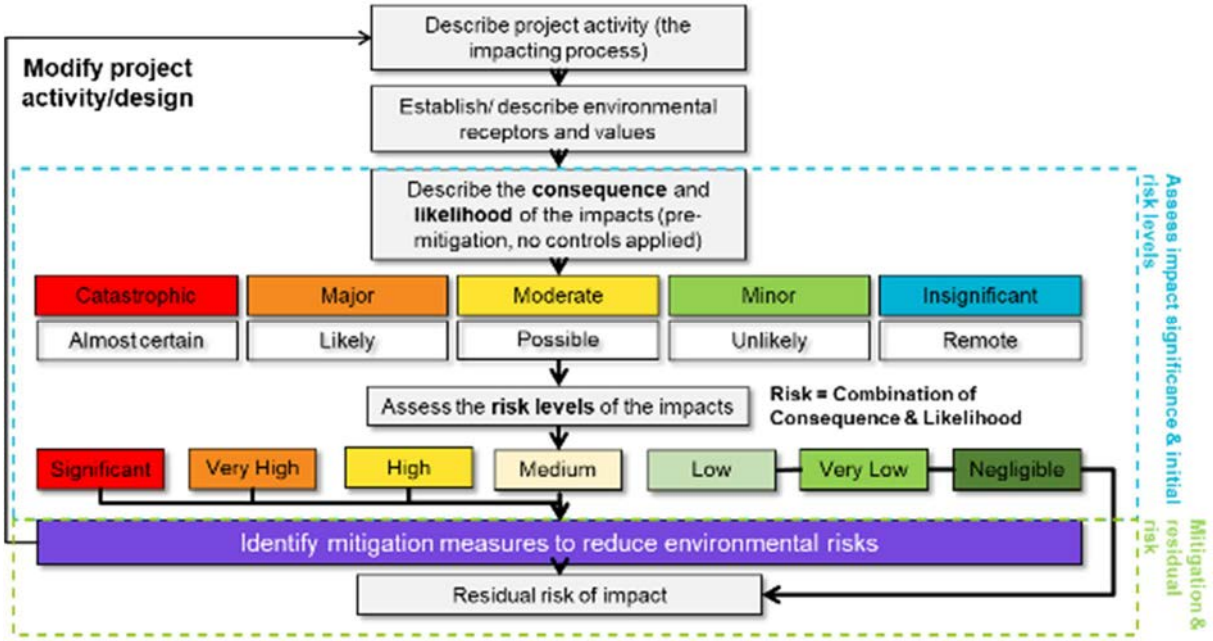


Figure 15 Risk assessment approach

Table 4 Quantitative likelihood descriptors

Item	Likelihood	Description
1	Remote	Extremely rare/unprecedented
2	Unlikely	Not expected to occur in most circumstances
3	Possible	Could occur
4	Likely	Probably would occur
5	Almost Certain	Expected to occur

Table 5 Consequence descriptors

Descriptor	Environment	Economic	Social
Insignificant	No environmental damage	Minimal losses	No noticeable change experienced by people in the locality
Minor	Minor instances of environmental damage that could be reversed. I.e. negative impact on specific species	Several thousand dollars lost revenue or remediation costs	Mild deterioration, for a reasonably short time, for a small number of people who are generally adaptable and not vulnerable
Moderate	Isolated but significant instances of environmental damage that could be reversed with intense efforts	Half million-dollar lost revenue or remediation costs	Noticeable deterioration to something that people value highly, either lasting for an extensive time, or affecting a group of people
Major	Severe loss of environmental amenities and danger of continuing	One million dollar lost revenue or remediation costs	Substantial deterioration to something that people value highly, either lasting for an indefinite time, or affecting many people in a widespread area
Catastrophic	Major widespread loss of environmental amenity and progressive irrecoverable environmental damage	Several million-dollar lost revenue or remediation costs	Substantial change experienced in community wellbeing, livelihood, amenity, infrastructure, services, health, and/or heritage values; permanent displacement or addition of at least 20% of a community

Table 6 Risk matrix

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Medium	High	Very High	Significant	Significant
Likely	Low	Medium	High	Very High	Significant
Possible	Very Low	Low	Medium	High	Very High
Unlikely	Negligible	Very Low	Low	Medium	High
Rare	Negligible	Negligible	Very Low	Low	Medium

4.3 Assumptions and limitations

The following overarching assumptions and limitations have been identified while preparing this traffic and transport impact assessment:

- The assessment is based on the RLC Preliminary Sketch Plan (PSP) design
- Limited information was available with regards to the construction methodology including anticipated worker numbers, provision of worker parking, number of trucks likely to be generated on a typical day or during a peak period. Therefore, a high-level assessment has been completed based on the information available at the time
- Limited quantitative data was available and/or obtainable in the rapid timeframe available for this report preparation, particularly for pedestrians and cyclists.

4.4 Road network assessment

4.4.1 Modelling approach

The modelling approach for the construction and operations assessments are summarised in the following sections of this report.

4.4.1.1 Construction assessment

As documented in Appendix A, the construction traffic assessment was undertaken using the Aimsun mesoscopic modelling package.

To assess the construction impacts of the Project on the surrounding road network, the following scenarios have been assessed:

- 2021 without RLC construction
- 2021 with RLC construction.

The outcomes of the RLC construction traffic assessment are included in Appendix A of this report and summarised in Section 6.3.1 of this report.

4.4.1.2 Operational assessment

To determine the impact of the Project on the operational performance of the road network within the study area, three traffic modelling tools have been used as follows:

- The Zenith Strategic model was used to generate traffic demand based upon employment, and population distribution and determine mode choice
- An Aimsun mesoscopic model was used to determine traffic assignment, network performance and turning movements
- SIDRA Intersection traffic models (a micro-analytical software package) was used to assess intersection Level of Service.

The manner in which these three models have been used is illustrated in Figure 16 and discussed below.

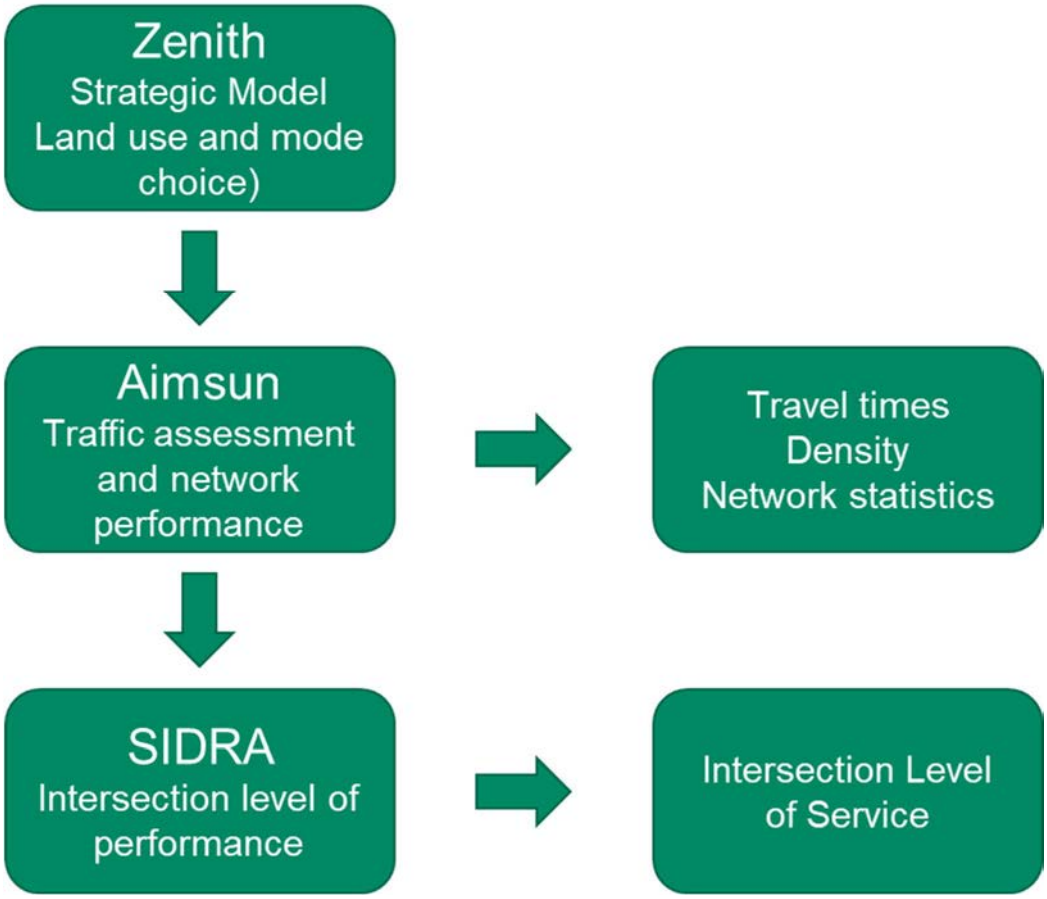


Figure 16 Traffic modelling framework

Zenith Strategic Transport Model

The Zenith Strategic Transport Model is a four-stage model based on trip generation, distribution, mode split and assignment. The model generates trip demand that considers demographic parameters of population, employment, educational status to synthesise travel demand that is distributed across the model extent based on household travel surveys. This travel demand is then split between alternative modes, including bus, light rail and private vehicle which is then assigned to public transport services or private vehicle routes across the road network across the morning, inter-peak and afternoon peak periods. Therefore, the Zenith model is linked to demographic changes from a 2017 base year to forecast travel demand in 2026, 2036 and 2046.

Aimsun mesoscopic model

The mesoscopic model was built in the industry standard traffic engineering and transport modelling software package Aimsun and has been used to assess the road network performance.

It was developed in the earlier phases of the Light Rail program with the purpose of supporting Light Rail program development through business case, route option and alignment feasibility, and high-level assessment of area wide impacts of the light rail project on the road network.

4.4.1.2.1 Assessment scenarios

To assess the impacts of the Project on the surrounding road network, the following scenarios have been assessed:

- 2017 base year (model was calibrated to 2017 traffic conditions and data)
- 2026 without Project
- 2026 with Project
- 2036 without Project
- 2036 with Project.

Further information relating to the land-use and road network assumptions for these scenarios is discussed in the following sections.

4.4.1.2.2 Traffic demand development

Road users experience and the operational performance of roads are both affected by the volume of traffic they carry relative to the road capacity, particularly during the peak hours. Therefore, base traffic models need to represent existing volumes and traffic behaviour. Future year scenarios are developed to understand how the traffic volumes, patterns of movement and user experience would be affected by infrastructure changes and forecast traffic demand growth. Future year traffic demand forecasts typically consider changes to population and employment, as well as planned infrastructure changes and associated transport mode choice changes.

Traffic demand for assessment of the network performance in 2026 was provided by MPC, originally derived from Zenith Strategic Transport Model and subsequently translated into trip matrices for the Aimsun mesoscopic model. The 2036 trip matrices were interpolated from the corresponding 2026 and 2046 matrices.

The total number of trips modelled in the Aimsun mesoscopic model for 2017, 2026 and 2036 is summarised in Table 7. The growth in the AM and PM peak hours in each forecast year is similar, with growth from 2017 to 2026 between 23 per cent and 26 per cent and 2017 to 2036 is 34 per cent to 35 per cent.

Table 7 Modelled AM and PM trips and growth percentage

Year	AM peak (0800-0900)		PM peak (1700-1800)	
	Number of trips	Growth from 2017	Number of trips	Growth from 2017
2017	86,349	N/A	77,747	N/A
2026 without Project	106,108	23%	98,315	26%
2036 Project	115,324	34%	104,692	35%

Two significant developments that are likely to affect traffic demand are planned within the study area. These are the Section 100 development and the Section 63, Block 20 development, which are discussed in Section 3.4.

For the purpose of this assessment, it is assumed that 75 per cent of the Section 100 development would be completed by 2026 and 100 per cent would be complete by 2036. Traffic growth from 2026 to 2036 were added into the corresponding travel zones of Section 100 in the Aimsun mesoscopic model. For the purpose of this assessment, the growth rates were interpolated from the corresponding 2026 to 2036 Zenith matrices and similar traffic distribution patterns were assumed from 2026 to 2036.

For the Section 63, Block 20 development, it is assumed that 100 per cent of the development would be completed by 2036, commencing after 2026 (post-removal of the north-west cloverleaf proposed as part of the Project). It is expected that the demand generated at this site is likely to transfer from other

locations in the vicinity and therefore the traffic demand generated for this development has been drawn from adjustments of other city centre demand zones within the Aimsun mesoscopic model.

4.4.1.2.3 Operational network assumptions and improvements

In addition to the Section 63 and Section 100 land use changes, a number of road network changes were also assumed as part of the Aimsun mesoscopic modelling. The network changes and their respective assessment scenario are included in Table 8.

Table 8 Road network assumptions

Planned network change	2026 without Project	2026 with Project	2036 without Project	2036 with Project
RLC	×	✓	×	✓
Light Rail to Woden	×	×	×	✓
Traffic signals at Albert Street and Commonwealth Avenue at the Commonwealth Park Stop	×	×	×	✓
Parkes Way upgrade	×	×	✓	✓

4.4.1.3 Operational modelling limitations

Traffic models are typically designed and developed for one or more specific purpose(s). The Zenith and Aimsun mesoscopic models used in this assessment were developed for earlier stages of Light Rail and this results in some limitations on their use. These limitations are described below.

The Light Rail program is moving into a more detailed design and project development phase. It has been determined that some model improvement to inform a more detailed understanding of network impacts through a re-calibration exercise would be beneficial. This work has commenced but the updated model was not yet available to inform the operational assessment presented in this report.

The Zenith Strategic Model does not recalculate mode shift from car to light rail as general traffic delay increases and as a consequence, traffic demand used across all scenarios is fixed, irrespective of the introduction of Light Rail to Woden. Car based traffic demand is therefore overestimated in the 2036 assessment scenarios that are assessed in this report. Demand adjustment to reflect mode shift will be incorporated in later iterations of the Aimsun mesoscopic model and could be captured as part of future transport assessments for Light Rail to Woden.

The road network performance is materially affected by the operation of traffic signal control. The traffic signals within Canberra benefit from the operation of the Sydney Coordinated Adaptive Traffic System (SCATs) which adjusts traffic signal settings in real time. The traffic signal operation within the Aimsun mesoscopic model includes a rough approximation of the SCATs signal settings. No adjustment to these settings has been made to reflect changes in traffic patterns arising from RLC and Light Rail to Woden. Therefore, the operational traffic assessment results presented in this report for the 2036 without Project, and with Project scenarios are sub-optimal and would improve with refinement to the traffic signal operation within the Aimsun mesoscopic model. Travel times, density and network statistics are all expected to improve with optimisation of signal timings in the Aimsun mesoscopic model.

Road users frequently adapt their behaviour by changing their departure time should journey times increase. This is typically known as peak spreading. No adjustments have been made to reflect peak spreading for the purpose of this assessment.

4.4.2 Assessment criteria

To compare the operational impact of the Project upon the performance of the road network, four metrics have been considered. These metrics comprise:

- Travel times
- Density
- Network statistics (total demand, total distance travelled, total travel time, average speed and unreleased vehicles)
- Intersection Level of Service.

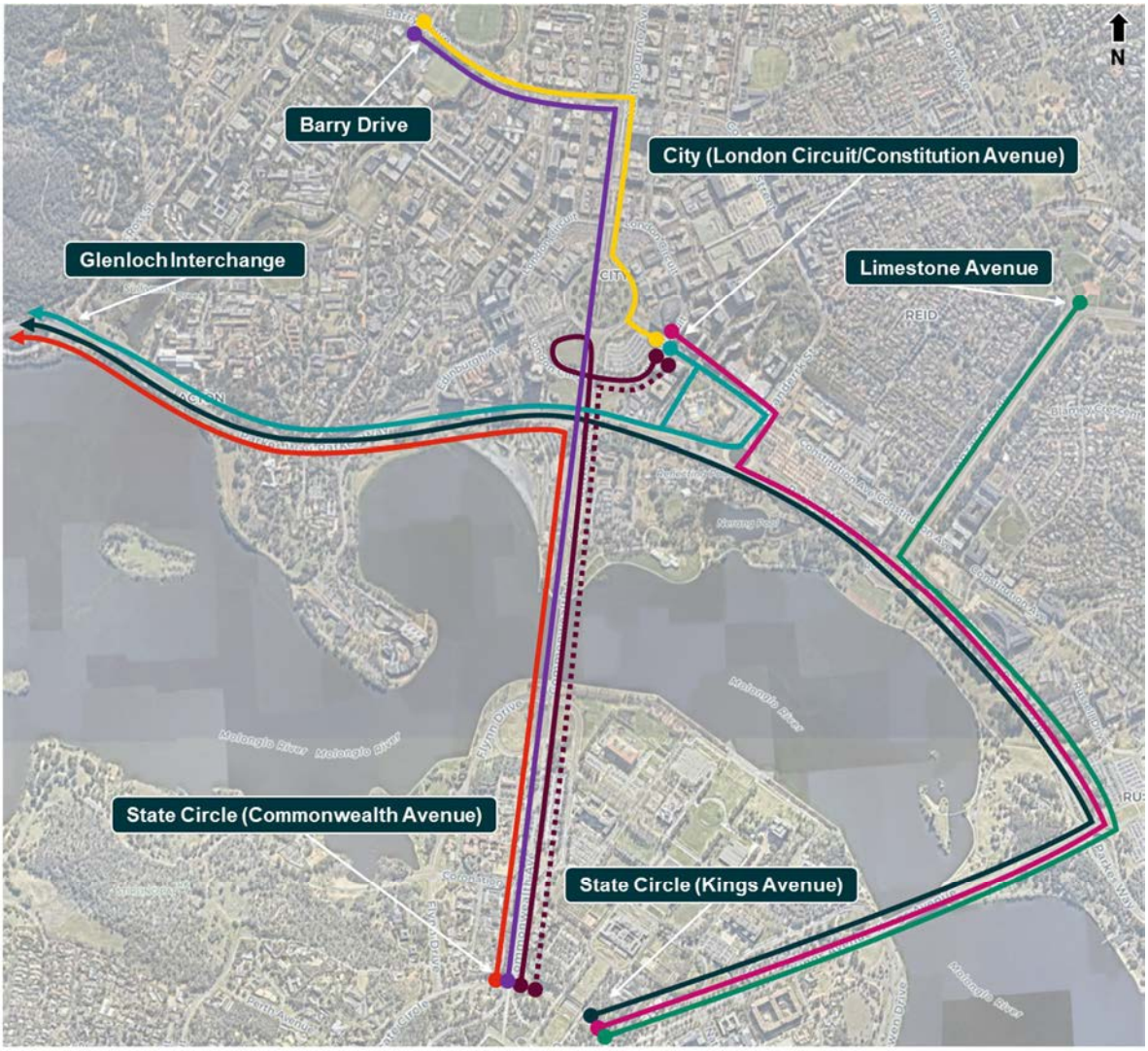
The construction assessment was completed based on travel times and delay, as discussed in Appendix A.

4.4.2.1 Travel times

Travel time is a measure of the time taken to travel between two defined locations. The following eight travel time routes were specified by MPC and have been adopted for the operational and construction assessment:

- Route 1 – State Circle to Barry Drive via Commonwealth Avenue
- Route 2 - State Circle to Glenloch Interchange via Commonwealth Avenue
- Route 3 - State Circle to Glenloch Interchange via Kings Avenue
- Route 4 - State Circle to Limestone Avenue via Kings Avenue
- Route 5 - State Circle to City via Commonwealth Avenue
- Route 6 - State Circle to City via Kings Avenue
- Route 7 - Glenloch Interchange to City
- Route 8 – Barry Drive to City via Northbourne Avenue

The travel time routes are illustrated in Figure 17.



Legend:

Route 1: State Circle - Barry Drive via Commonwealth Avenue

Route 2: State Circle - Glenloch Interchange via Commonwealth Avenue

Route 3: State Circle - Glenloch Interchange via Kings Avenue

Route 4: State Circle - Limestone Avenue via Kings Avenue

Route 5: State Circle - City via Commonwealth Avenue (without Project)

Route 5: State Circle - City via Commonwealth Avenue (with Project)

Route 6: State Circle - City via Kings Avenue

Route 7: Glenloch Interchange - City

Route 8: Barry Drive - City via Northbourne Avenue

Figure 17 Assessed general traffic travel time routes

4.4.2.2 Density

Density is a measure of how many vehicles are occupying a length of road i.e. it can be described as a measure of congestion. Its precise definition can vary slightly. The Highways Capacity Manual (HCM) describes density as the number of vehicles per kilometre per lane and is calculated by dividing vehicle flow by the speed of traffic.

For this assessment, the measure of density has been drawn directly from the Aimsun software which calculates density slightly differently to HCM. Aimsun calculates density by taking the difference in number of vehicles entering a model segment compared to those leaving the segment and dividing by the segment length.

4.4.2.3 Network performance statistics

Table 9 displays the network statistics that were adopted for this assessment and a description of each statistic.

Table 9 Network Statistics with descriptions

Network Statistics	Description
Total demand	The total number of vehicles making trips in the network during the evaluation hour
Total vehicle kilometres travelled through network	The total distance travelled by vehicles making trips in the network during the evaluation hour
Total vehicle travel time through the network	The total time taken by all vehicles making trips in the network during the evaluation hour
Average network speed	The average speed calculated by taking the total distance travelled and dividing by the total travel time
Unreleased trips	The number (or percentage of vehicles) that could not enter the model due to congestion within the network

4.4.2.4 Intersection performance

Intersection Level of Service is defined as the average total vehicle delay of all movements through an intersection. It is often expressed as a letter representing a range of delay. The Transport Canberra and City Services Guidelines for SIDRA Intersection analysis advises it has adopted the Transport for NSW Traffic Modelling Guidelines which categories the average intersection delay into six bands of delay per vehicle (seconds per vehicle), as set out in Table 10.

In addition, the TCCS guidelines indicates that a new intersection should meet a Level of Service E.

Table 10 Level of Service criteria for intersections

Level of service	Average delay per vehicle (seconds per vehicle)	Traffic signals, roundabout	Give way and stop sign
A	0 to 14.5	Good operation	Good operation
B	14.5 to 28.5	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	28.5 to 42.5	Satisfactory	Satisfactory, but accident study required
D	42.5 to 56.5	Near capacity	Near capacity, accident study required
E	56.5 to 70.5	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70.5	Extra capacity required	Extreme delay, major treatment required

For the operational assessment, the following intersections were assessed as they would be directly impacted by the Project:

- London Circuit and Edinburgh Avenue
- London Circuit and Commonwealth Avenue.

Turning movements for the intersection performance were derived from the Aimsun mesoscopic model for the assessment scenarios.

The assessed intersections are shown in Figure 18.

Figure 18 Assessed intersections for operational assessment

4.5 Public transport assessment

The public transport assessment includes assessing the operational impacts on public transport services due to the Project as well as its construction. The primary public transport modes identified for assessment were buses. The existing light rail network to the north of the study area is not affected by the Project.

Throughout the Project development and design, mitigation measures have been considered and assessed to avoid or minimise any potential impacts identified as well as to enhance the performance of the Project and the surrounding transport network. Any improvements that were identified during Project development, formed part of an iterative process between traffic modelling, construction staging and Project design process to confirm that the connectivity, safety and efficiency of the public transport network is maintained throughout all Project phases.

Based on this, the following public transport elements have been assessed:

- Temporary changes to current services during construction
- Changes in travel times along bus service routes during operations and construction.

The bus travel time routes assessed for the construction scenarios are shown in Figure 19.

4.6 Active transport assessment

Throughout the Project development, mitigation measures have been considered to avoid or minimise any potential impacts identified due to the Project as well as during its' construction. Where possible, enhancements and improvements to the pedestrian and cycle network have been considered for implementation as part of the Project.

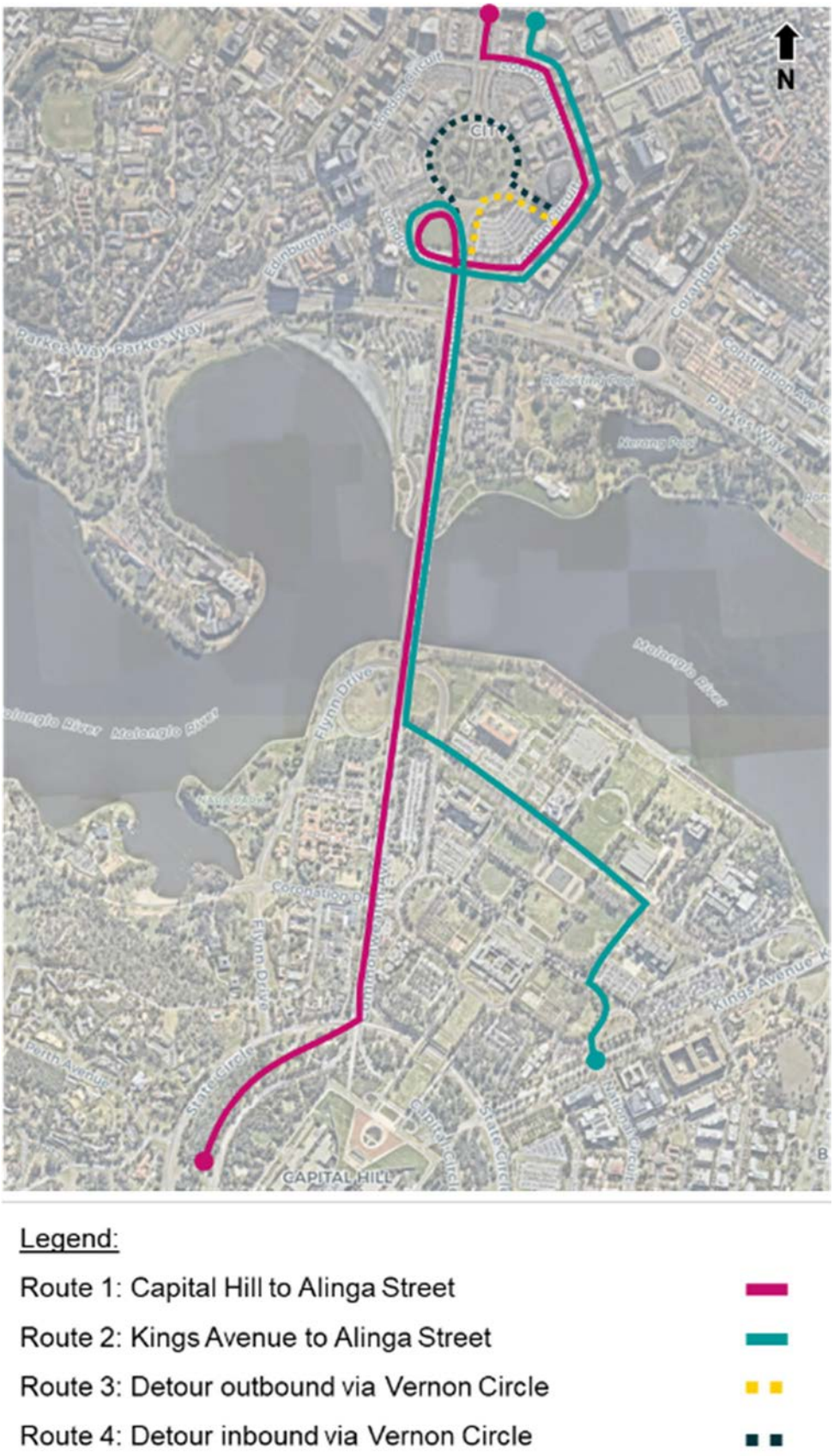
The Project's impacts and benefits to pedestrians and cyclists during construction and operations have been assessed including:

- Relocation or closure of existing footpaths or cycle paths and associated changes in walking and cycling distances
- Provision of new facilities and associated changes to accessibility and connectivity of the pedestrian and cycling network and changes in walking and cycling distances
- Quality, suitability and legibility of proposed pedestrian and cycling infrastructure
- Opportunities to improve current safety issues.

4.7 Parking and access assessment

The Project's impacts on car parking, local area access and property access during construction and operations have been assessed including:

- Changes to current parking including permanent and temporary changes
- Identification of any parking shortfall due to parking changes, with consideration for the available parking supply in the area
- Changes to any existing property access points, including identifying alternative routes and associated changes in travel time or distance
- Changes to any existing local area access arrangements, including identifying alternative routes and associated changes in travel time or distance.



Legend:

Route 1: Capital Hill to Alinga Street

Route 2: Kings Avenue to Alinga Street

Route 3: Detour outbound via Vernon Circle

Route 4: Detour inbound via Vernon Circle

Figure 19 Assessed bus travel time routes for construction assessment

4.8 Movement and Place

4.8.1 Background

The ACT Transport Strategy suggests that future ACT transport projects should consider the needs of all transport users both on their journey and as they complete it, by adopting the Movement and Place concept. This could help to achieve the following objectives:

- Achieve transport planning outcomes that balance the dual function of streets, which is moving people and goods and enhancing the places they connect and pass through
- Support a 30-minute city by helping to create liveable places for mixed communities with amenities close by on the one hand and identifying roads for efficient movement on the other
- Manage the road network in a way that enables people to easily travel to and from centres and move around within them
- Provide high quality roads, cycling paths and footpaths support attractive places for people, and strong local economies to develop and thrive
- Provide a future road network that is efficient and effective for the movement of freight is critical to support the economic development of the Canberra region.

4.8.2 Area of assessment

For the purpose of the Movement and Place assessment, the RLC study area can be divided into four relatively homogenous sections as shown in Figure 20 and including:

- London Circuit west between Edinburgh Avenue and Commonwealth Avenue
- London Circuit east between Constitution Avenue and Commonwealth Avenue
- Commonwealth Avenue between Vernon Circle and Parkes Way
- Vernon Circle between Edinburgh Avenue and Constitution Avenue.

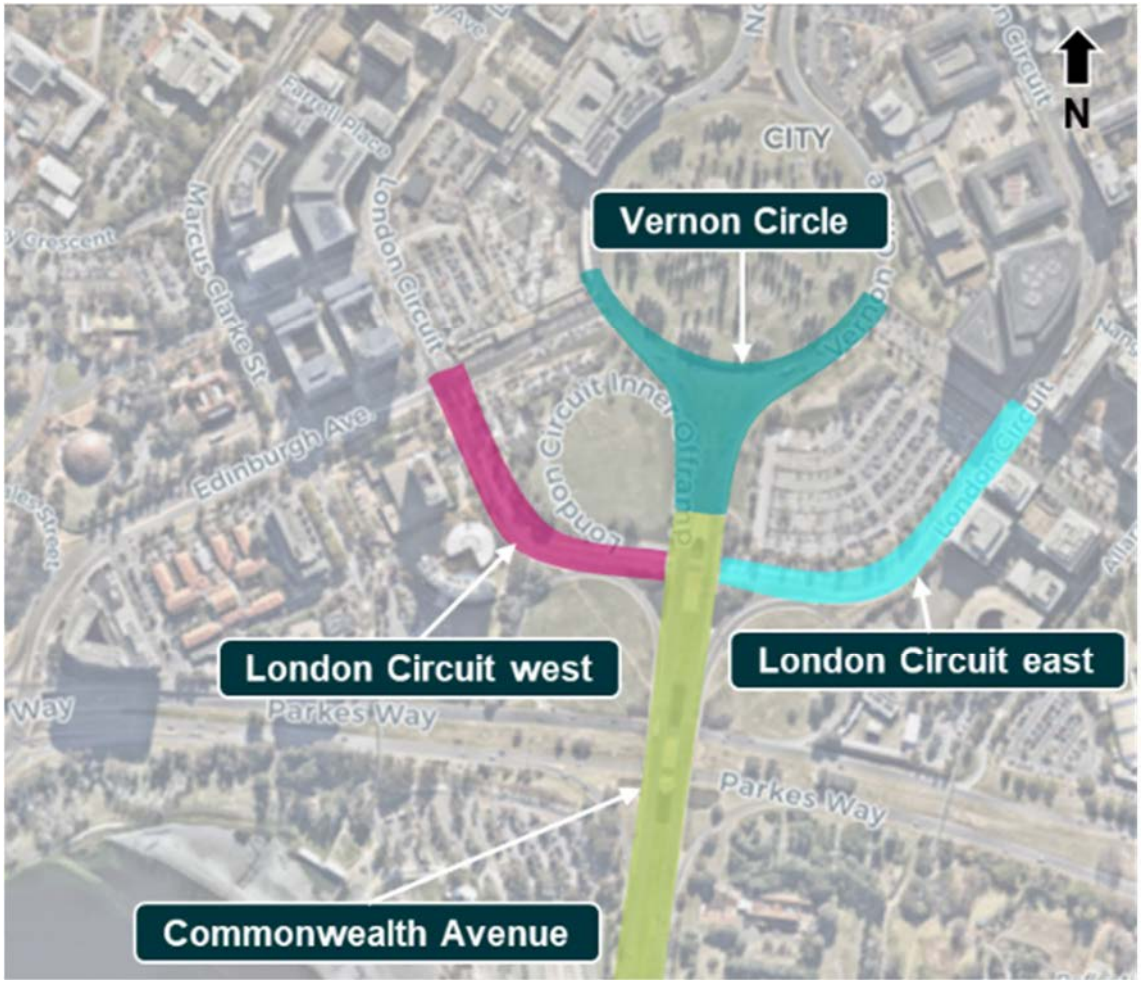


Figure 20 Movement and Place assessment areas

4.8.3 Criteria

At its core, a Movement and Place Framework defines the role a street plays in terms of 'Movement' and 'Place' which are associated with a set of priority rules, strategic performance measures and potential types of intervention measures.

The framework should therefore enable stakeholders to determine the existing function of each street/road/corridor as well as a visionary function where there is a disconnect between planned function and how it is currently used – i.e. a 'rat-run' route where a street's intended function as a local link maybe used as a commuter link or movement corridor.

To classify streets according to these functional types, the respective Movement and Place functions need to be measured against a set of criteria.

As Canberra's framework has yet to be finalised, it is proposed that best practise from elsewhere be employed for the Movement and Place assessment used in this report. Through engagement with TCCS, it was identified that the NSW[1] and Auckland Transport[2] Movement and Place frameworks could be referenced for guidance and the following core criteria should be measured:

- Movement and reliability

[1] https://www.transport.nsw.gov.au/industry/nsw-movement-and-place-framework

[2] https://at.govt.nz/media/1983549/roads-and-streets-framework-may-2020-web.pdf

- Economic and cultural
- Public realm
- Safety
- Access and connectivity.

These criteria were measured for the existing environment within the study area using the measurables in Table 11, where information was available. The existing and post-RLC scorings are summarised in this report using a simplified seven scale diagram, as indicatively shown in Figure 21.

Once the measurables were defined, each of the aspects shown in Figure 21 can be given a relative (subjective) score against the 7-point scale, to aid the functional classification to be established. For example, if high quality cycling infrastructure is provided and high numbers of cyclists have been observed, the "Cyclists" aspect would be given a high score.

Subsequently, RLC's impact on the criteria was assessed.

Table 11 Movement and Place measurables

Core criteria	Description	Measurables
Movement and Reliability	These are quantifiable metrics which enable the identification of the relative modal priority provided as well as the relative importance at a network level of the street/corridor in moving people or goods. This should measure both the relative level of service experienced by the respective modes as well as the total people and goods throughput capacity.	• Pedestrian, cyclists, private motors, buses activity • Public transport journey times and delays • Public transport frequencies • Levels of service – pedestrians, cyclists, private motors, buses, trucks (Austroads Guide to Traffic Management Part 4: Network Management) • Parking provisions - Number of on-street spaces provided as time limited, paid/free, mobility, loading zones. - Provides access to public off-street parking • Posted speed limit
Economic and Culture	Some of these metrics are more qualitative and therefore subjective. Baselining and measuring the growth in economic activity enables the quantification of the efficacy of current and proposed functions.	• Existing land use type – high level land use of the adjacent land; commercial, residential, recreational, green space, parking • Zoning – NCP and the Territory Plan • Primary and secondary industries • Planned developments • Number of commercial businesses (including Government/State) • What cultural/recreational facilities are located in the area • Who uses the space? Mostly residential population or mostly visiting population?
Public realm / space	Both quantitative and qualitative. Measuring user satisfaction is a good way or of how well the place function meets the needs of	• Dwellable street space – footpath width (per cent of total road reserve e.g. shared space being 100 percent). This excludes developed/developable area outside the road reserve.

Core criteria	Description	Measurables
	the various types of users of the facilities provided.	• Walking/cycling permeability – intersection density including walking and cycling thoroughfares to parallel streets • Number of people using the space – pedestrian counts along and across • Biodiversity coverage – low/medium/high (per cent of area covered by permeable green space) • Urban design - Streetscape design elements present or not? Yes/no and low/medium/high - Pavement type used – asphalt, concrete, paving or gravel
Safety	Crash history can be measured and reported. Safety is however a non-negotiable and irrespective of the current and desired function, improvements will have to made to achieve safety outcomes.	• Death and serious injury (DSI) crash rates – average of last five years • Operating speeds – average and maximum speeds recorded • Are modes separated for the entire length of the section? i.e. walking, cycling and general traffic do not use the same space • Are safe pedestrian crossing facilities provided on desire lines? • Street lighting and surveillance.
Access and connectivity		• Number of pedestrian/cycle priority crossings/km (i.e. pedestrians/cyclists have right of way over traffic or signalised) • Are there footpaths on both sides of the road? • Width of footpaths • Are pedestrian desire lines well served? • Are mobility car parks provided? • Is equitable access provided for people with disabilities or reduced mobility? • Are sheltered bus stops provided?

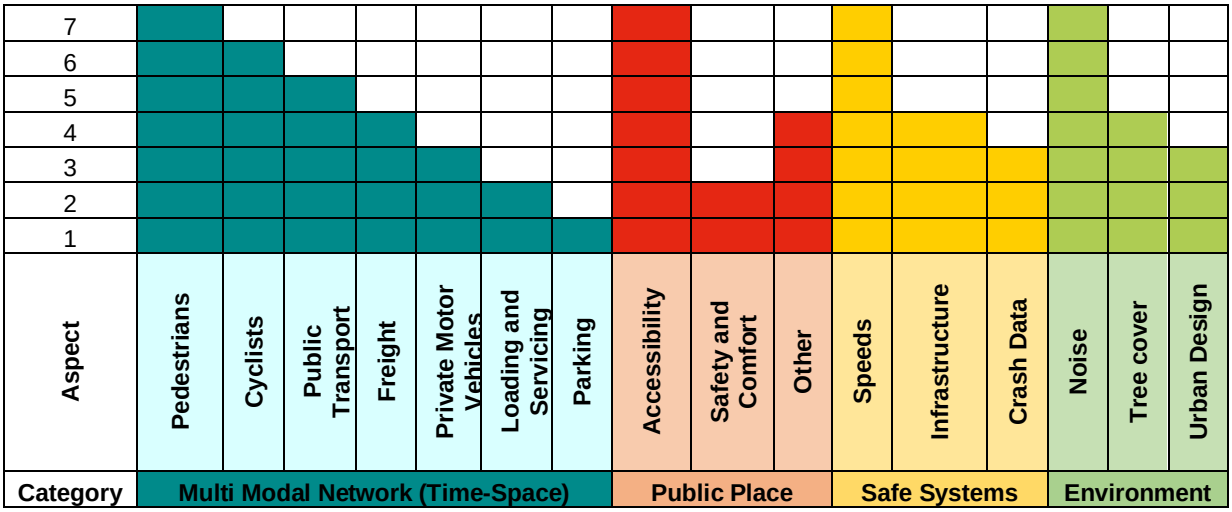


Figure 21 Indicative Movement and Place scoring assessment

4.8.4 Classification

As discussed in Section 3.2.1.4, Canberra's streets would be structured around a hierarchy of local, central, orbital, and regional links to reflect the changing role of transport according to location.

Figure 22 provides an overview of how Canberra's streets can be divided into functional classes based on their respective Movement and Place functions. The Movement and Place assessment documented in this report, classifies the study area's street network.

Once the scoring against the criteria is completed for the corridor section, an assessment can made as to where on the Movement and Place axes the street section is deemed to be and which of the broad groups of streets it is considered to belong to: movement corridors; vibrant streets; places for people; or local streets.

For example, for Vernon Circle, it may be concluded that this section currently serves a primary movement function (at a regional scale) and a local place function (with a predominantly local catchment of users).

Figure 22 ACT Movement and Place framework

4.9 Road safety assessment

Throughout the development phase of the project, mitigation measures and design standards have been considered to avoid or minimise any potential safety impacts identified.

The following data was analysed to identify existing road safety issues, as well as future impacts and benefits of the Project:

- Five years of historical crash data by crash type, location, and severity
- Current traffic volumes
- Forecast change in traffic volumes due to construction
- Forecast change in traffic volumes with and without the Project
- Construction staging plans
- The Project's road and intersection design.

By reviewing the above, a qualitative assessment of the Project's impacts and benefits was assessed for the following:

- Change in number of crashes
- Change in crash severity
- Change in crash type.

5.0 Existing transport environment

5.1 Overview of existing transport environment

The existing traffic and transport environment within the RLC study area and its surrounds is indicatively shown in Figure 23 and summarised below.

The RLC study area includes London Circuit between Edinburgh Avenue and Constitution Avenue, as well as Commonwealth Avenue between Vernon Circle and Parkes Way. The study area also includes the southern section of Vernon Circle where it transitions to/from commonwealth Avenue as well as a satellite site on Marcus Clarke Street and another in Acton Park that would be used temporarily as construction compounds. The Section 63 site and some of the Section 116 at-grade car park also fall within the RLC site boundary, with the Section 166 site also a construction compound.

The road network currently includes three cloverleaf ramps that facilitate vehicle access between Commonwealth Avenue and London Circuit and Parkes Way. These ramps are a significant barrier for pedestrian and cyclist accessibility between Commonwealth Avenue and London Circuit.

The study area is located within the Civic Statistical Area, which has a residential night-time population of 4,276 people and generates approximately 24,500 journey to work trips per day by its residents and employees per the Australian Bureau of Statistics (ABS) Census 2016 Journey to Work data. Residents of the area largely use active transport modes (45 per cent) or drive to work (40 per cent), whereas non-resident employees of the area mostly drive to work (66 per cent) with 21 per cent using public transport modes and 13 per cent using active transport modes.

The land uses within the study area and its surrounds generally include commercial office blocks with ground floor retail, at-grade car parking, hotels and large open space used for recreational activities. Several new developments are also planned in the area, including the Section 100 commercial development, the Section 63 mixed-use development and the Acton Waterfront Renewal developments, as discussed in Section 3.4.

The 2017 modelled traffic volumes indicate that Commonwealth Avenue carries nearly 5,000 vehicles in the AM peak hour and nearly 4,000 vehicles in the PM peak per hour. London Circuit carries approximately 1,100 vehicles and 900 vehicles in the AM and PM peak hours, respectively.

The City Interchange is located to the north of the study area and caters for most of the CBD's public transport activity. Transport Canberra bus services travelling to/from the south generally use Commonwealth Avenue (12 routes) or Constitution Avenue (six routes) and London Circuit east to access the City Interchange.

London Circuit is endorsed as a local cycle route, although cycle lanes are only provided in some sections along its length. Cyclist activity along London Circuit within the study area is currently lower than its surrounds (see Section 5.7.3), given the lack of facilities and connectivity provided.

Similarly, pedestrian activity along London Circuit within the study area is lower than other parts of London Circuit, due to the limited land use activity fronting the study area (see Section 5.7.3).

Commonwealth Avenue combined with Vernon Circle and Northbourne Avenue form a Principal cycle route. On-road cycle lanes are provided along Commonwealth Avenue and Vernon Circle. 250 and 155 cyclists were recorded on Commonwealth Avenue during a two-hour AM and PM peak period in 2019 (based on survey data provided by TCCS).

Parking within the study area is largely accommodated by off-street car parks.

In terms of Movement and Place, all of the streets within study area currently have higher movement functions and relatively low place value. They generally facilitate movement between places but have limited desirable dwellable area currently available.

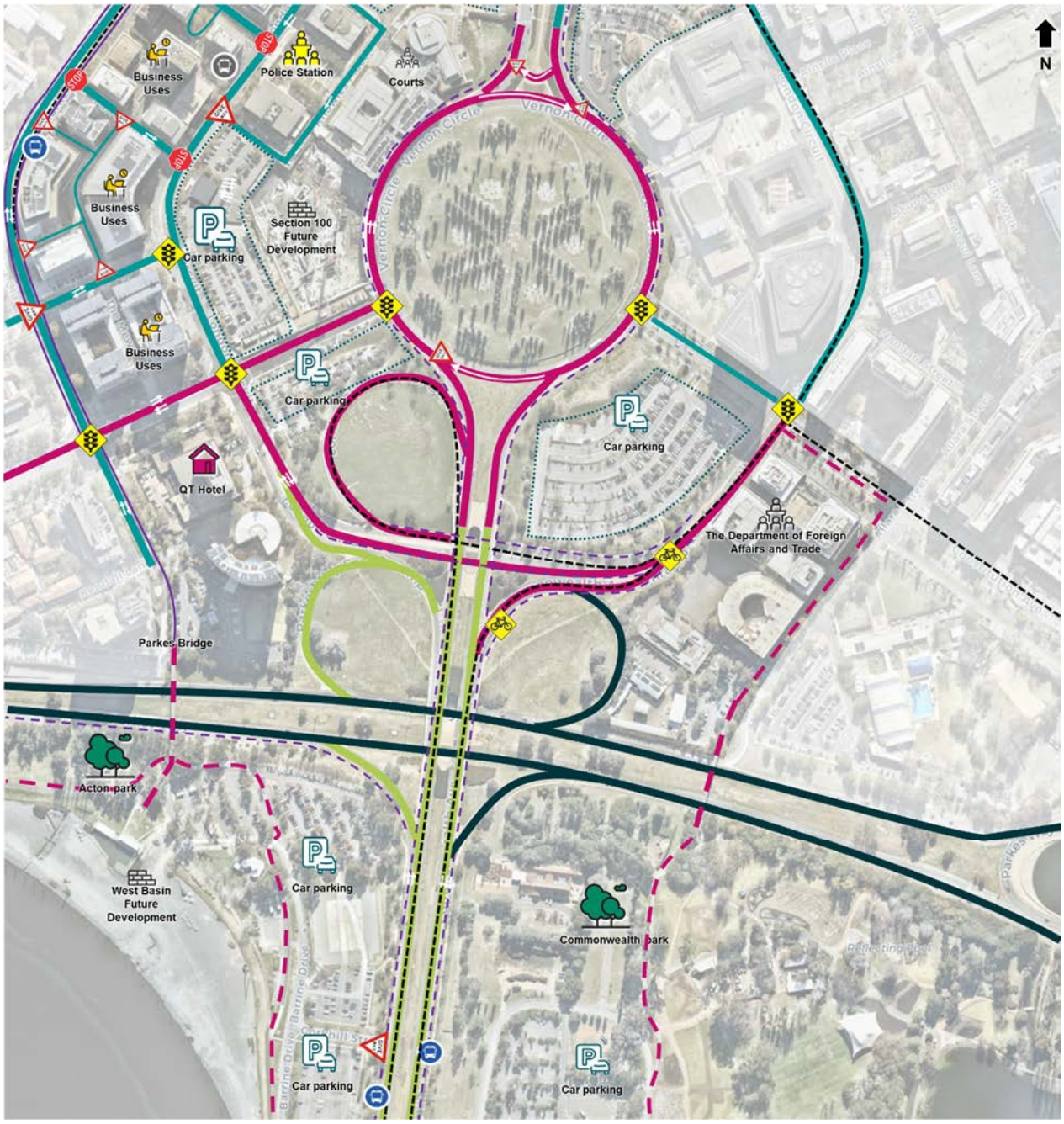


Figure 23 Existing transport conditions for the study area

5.2 Land use, population and employment

Population statistics have been obtained from the ABS Census 2016 data. The census data indicates that the Civic statistical area, which comprises the RLC study area has a residential night-time population of 4,276 people. This equates to about one per cent of Canberra's population. The labour force participation (15-85 years), representative of employment, for the Civic Statistical Area is 53.9%. This acknowledges the significance of the area as an employment and education hub within the CBD.

The study area is largely designated land per the NCP. Most of the study area forms part of the NCP's City Hill and the West Basin Precincts, as discussed in Section 3.1.2.

The key land uses within and surrounding the study area are shown in Figure 24 and include:

- Commercial buildings with some ground floor retail located along the western side of London Circuit west and along the eastern side of London Circuit east
- Canberra City Police Station, Reserve Bank of Australia, Supreme Court of Australia Capital Territory and the Magistrates Court are located to the north of the study area, on the eastern side of London Circuit
- The Department of Foreign Affairs and Trade is located at the eastern extent of the study area
- Australian National University is located further west of the study area in Acton
- City Hill is a significant public open space located in the centre of Vernon Circle, although, it is not heavily used for leisure and has poor pedestrian accessibility
- The Section 63 at-grade public car park is located to the east of London Circuit west and the Section 116 at-grade public car park is located to the west of London Circuit east
- The Section 100 residential development site is currently under construction to the east of London Circuit, fronting Vernon Circle
- Several hotels are located in the area bounded by London Circuit, Edinburgh Avenue and Parkes Way, referred to as the New Acton Precinct. This includes the QT hotel, which fronts London Circuit
- At the southern extent of the study area, along Commonwealth Avenue, key uses include:
    - Acton Park and Henry Rolland Park are located to the west, providing for leisure activities
    - Commonwealth Park and the National Capital Exhibition Centre are located to the east
    - Floriade Australia is held yearly in Commonwealth Park for a one-month period across September and October
    - Lake Burley Griffin is located to the south of the study area.

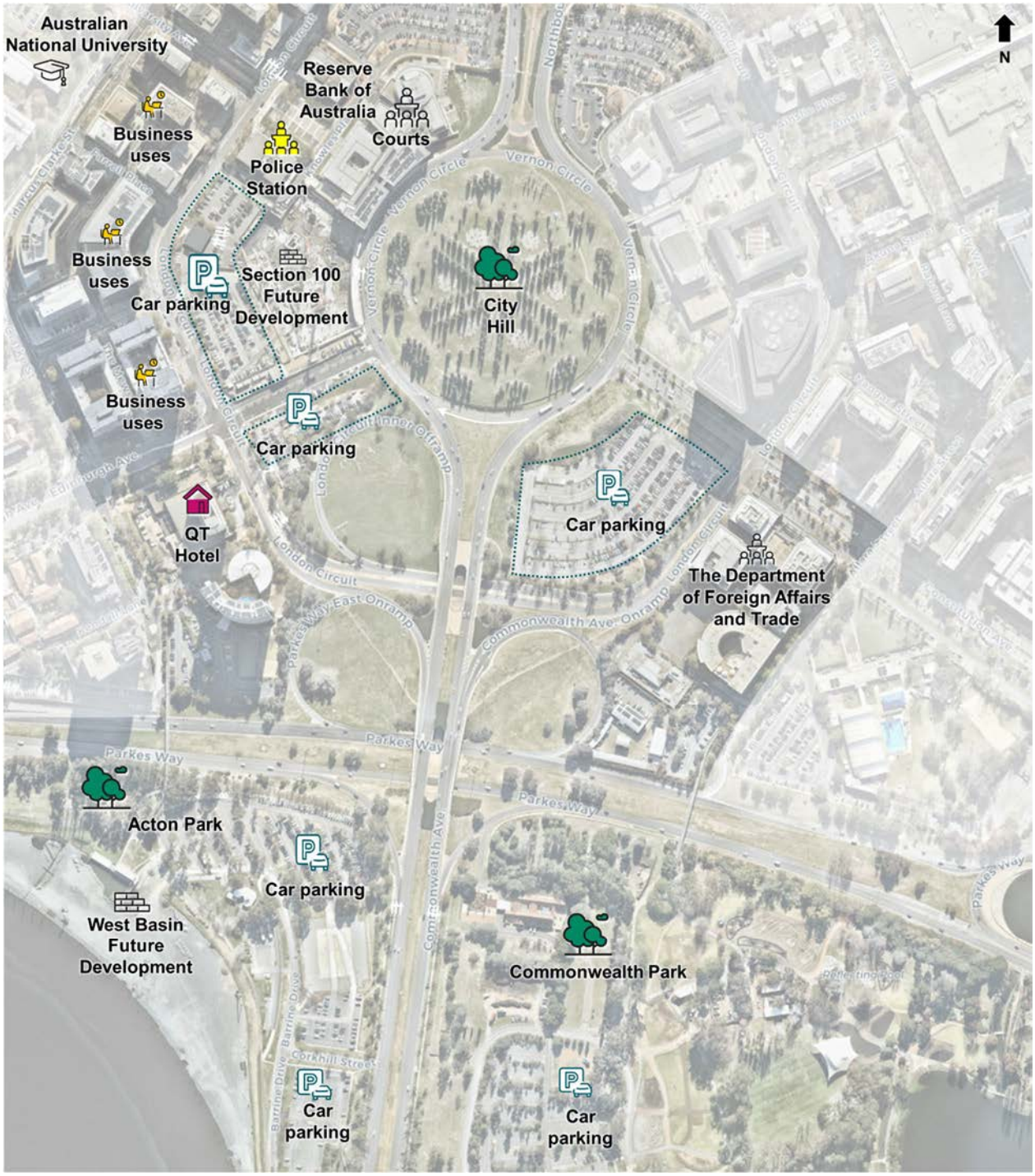


Figure 24 Key land uses within and surrounding the study area

5.3 Existing transport mode share

The ABS Census 2016 Journey to Work data indicates that approximately 2,000 and 24,500 journey to work trips were generated by residents and employees of Civic, respectively. The journey to work mode share data indicates the following about mode share in 2016:

- Non-resident employees mostly drive to work (66 per cent) with 21 per cent using public transport modes and 13 per cent using active transport modes, see Figure 25.
- Residents largely use active transport modes (45 per cent) or drive to work (40 per cent), see Figure 26.

It is anticipated that the public transport mode share for both residents and non-resident employees of Civic and Canberra would have significantly increased since Canberra Light Rail Stage (CLR1) between the City and Gungahlin commenced in April 2019, particularly for those who travel to/from the north. Accordingly, traffic survey data provided by TCCS, suggests that traffic volumes on Northbourne Avenue reduced by some 10-20 per cent in the AM peak hour between 2017 (pre CLR1) and 2019 (post-CLR1).

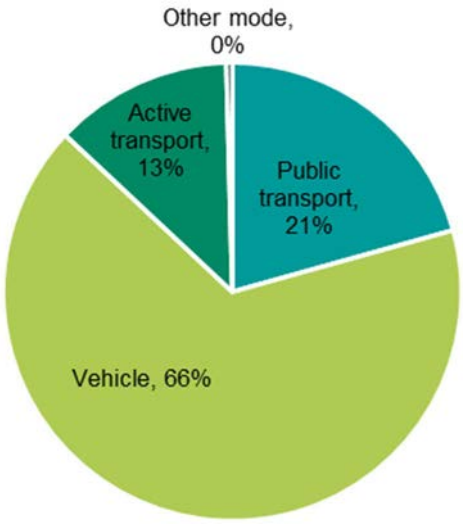


Figure 25 Journey to work mode share for non-resident employees

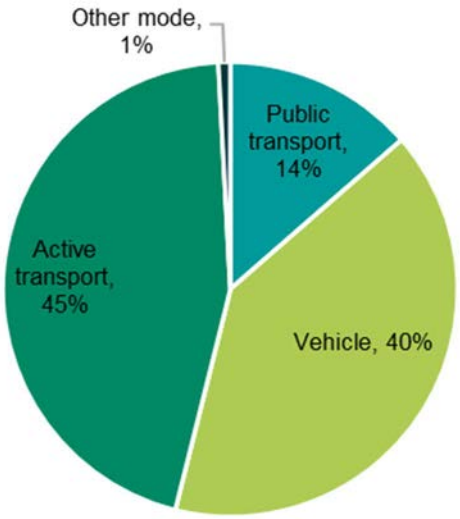


Figure 26 Journey to work mode share for residents

5.4 Crash History

Crash data for the ACT is publicly available for the five-year period between January 2016 and December 2020. A diagram of the road crashes within the study area is shown in Figure 27.

The road related crash data history for the study area indicates the following:

- Nearly 200 crashes occurred within the study area in the five-year period
- 95 per cent of these crashes resulted in property damage only, with 5 per cent resulting in personal injury and zero collisions resulting in a fatality (see Figure 28)
- Crashes were evenly spread across intersections and mid-block locations (see Figure 29)
- Nearly 20 per cent (34) of crashes occurred at night during dark or nearly dark conditions
- Nearly 20 per cent (34) of crashes occurred at the eastbound merge from Commonwealth Avenue to Parkes Way
- 15 per cent (30) of crashes occurred at the southbound merge from London Circuit to Commonwealth Avenue.

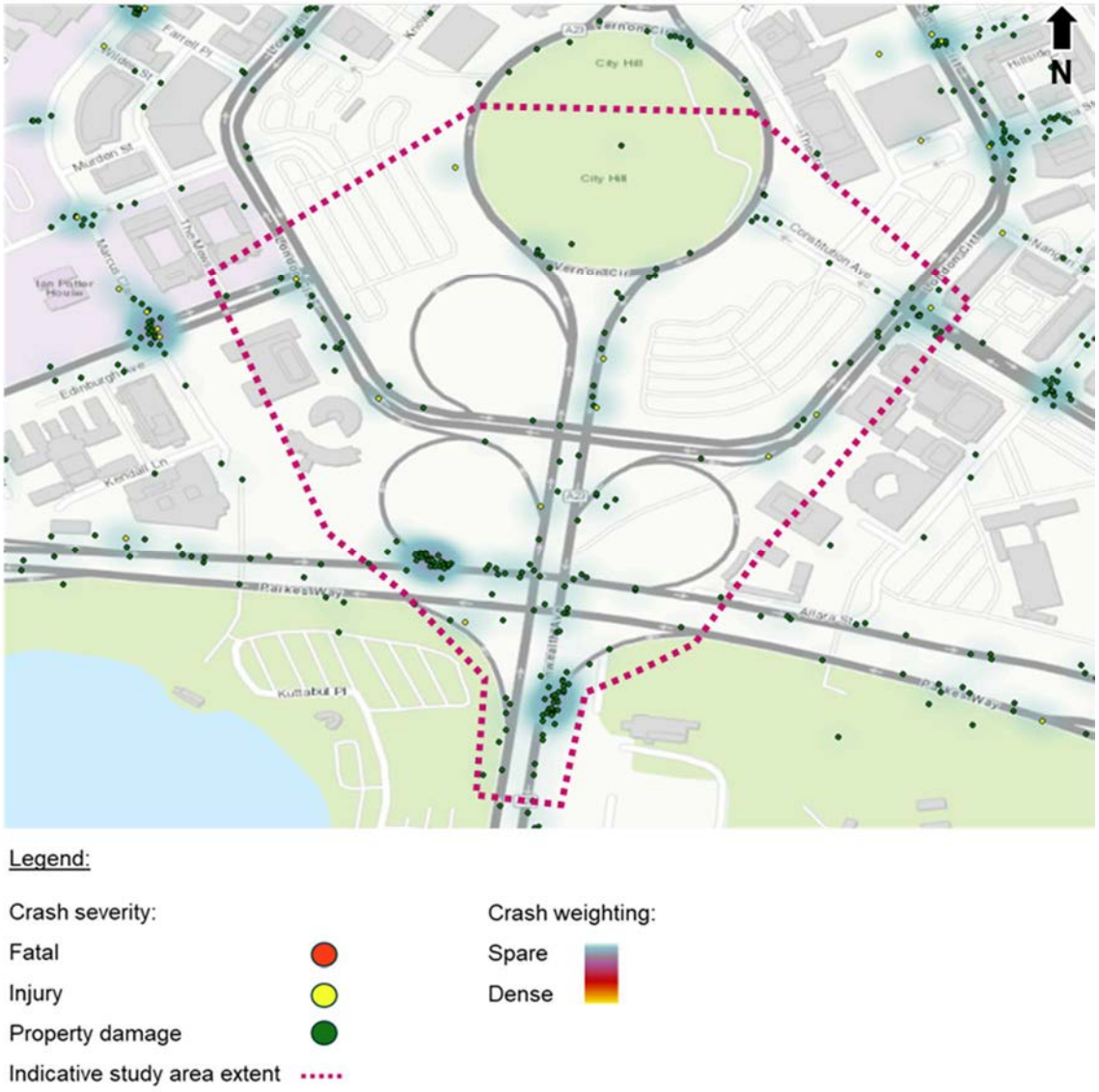


Figure 27 ACT crash data 2016-2020 (ACT Open Data Portal, 2021)

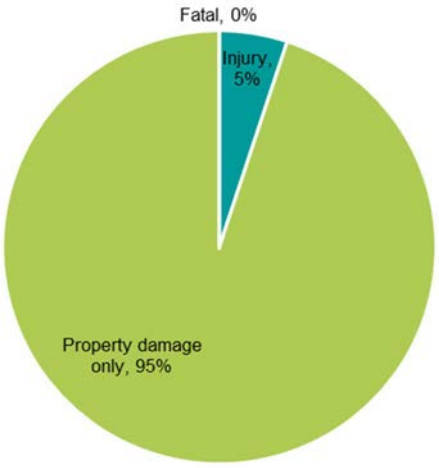


Figure 28 Crash type (ACT Open Data Portal, 2021)

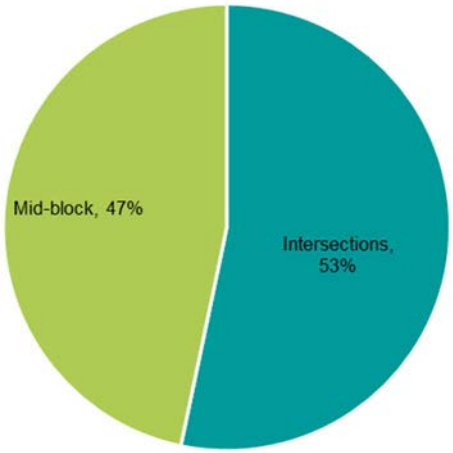


Figure 29 Crash locations (ACT Open Data Portal, 2021)

In the ACT, pedestrian and cyclist crashes are reported separately from the road related crashes. The pedestrian and cyclist crash data for the five-year period between January 2016 and December 2020 indicates:

- One pedestrian crash was recorded in the study area, at the intersection of London Circuit and Edinburgh Avenue
- 13 cyclist crashes were recorded in the study area including:
  - Five crashes mid-block on London Circuit between Edinburgh Avenue and Commonwealth Avenue
  - One crash occurred on the south-west cloverleaf ramp
  - One crash occurred at the intersection of London Circuit and Constitution Avenue
  - One crash occurred mid-block on London Circuit mid-block between Commonwealth Avenue and Constitution Avenue
  - Five crashes occurred at the northern end of Commonwealth Avenue, immediately south of Parkes Way.
- Approximately 60 per cent of the cyclist's crashes resulted in an injury and about 40 per cent of crashes resulted in property damage only.

5.5 Road network

The road network within and surrounding the study area transitions from a low speed (40-60km/h) urban road network within the city centre to a high-speed arterial road network (70-80km/h) along Commonwealth Avenue.

Key features of the existing road network include the following:

- Northbourne Avenue, Vernon Circle and Commonwealth Avenue, form part of a north-south arterial traffic route that runs through the centre of Canberra CBD and provides a link between north and south Canberra.
- Commonwealth Avenue, which is considered the gateway to the CBD from the south and similarly Northbourne Avenue is a gateway to/from the north.
- Parkes Way, which is an east-west arterial traffic route that traverses the northern side of Lake Burley Griffin.
- London Circuit, which is a radial major collector road providing access between adjoining properties in Civic with the following surrounding arterial corridors:
    - Northbourne Avenue and Commonwealth Avenue to/from the north and south
    - Edinburgh Avenue and Parkes Way corridor to/from the south-west
    - Constitution Avenue, Parkes Way and Kings Avenue corridor to/from the south-east
    - Constitution Avenue, Coranderrk Street and Ainslie Avenue or Barry Drive to/from the north-east and north-west respectively.
- London Circuit and Commonwealth Avenue, as well as Commonwealth Avenue and Parkes Way are currently grade separated, with three cloverleaf ramps facilitating some vehicle movements between the separated corridors facilitated.
- Northbourne Avenue and Vernon Circle are approved B-double routes and approved Performance Based Standards (PBS) Level 1 vehicle routes, meaning they can be used by truck-and-dogs. London Circuit, Constitution Avenue and Edinburgh Avenue are also PBS Level 1 vehicle routes.
- A combination of signalised intersections, unsignalised intersections and high-speed merge points are present within the study area, with the location of key intersections and their type shown in Figure 30.

A summary of the key roads within the study area and its immediate surrounds are summarised in Table 12.

Table 12 Overview of roads relevant to study area

Classification	Road	Direction	Configuration	Speed limit
Arterial	Northbourne Avenue	Two-way	Three lanes in each direction	40km/h
	Vernon Circle	One-way clockwise	Three lanes	60km/h
	Edinburgh Avenue	Two-way	Two lanes in each direction	40km/h
	Commonwealth Avenue	Two-way	Three lanes northbound and 2-3 lanes southbound	70km/h
	Parkes Way	Two-way	Two lanes in each direction	80km/h
Major collector	London Circuit	Two-way	Two lanes in each direction	40km/h
	Marcus Clarke Street	Two-way	One/two lanes in each direction	40km/h
	Constitution Avenue	Two-ways	One/two lanes in each direction	40km/h

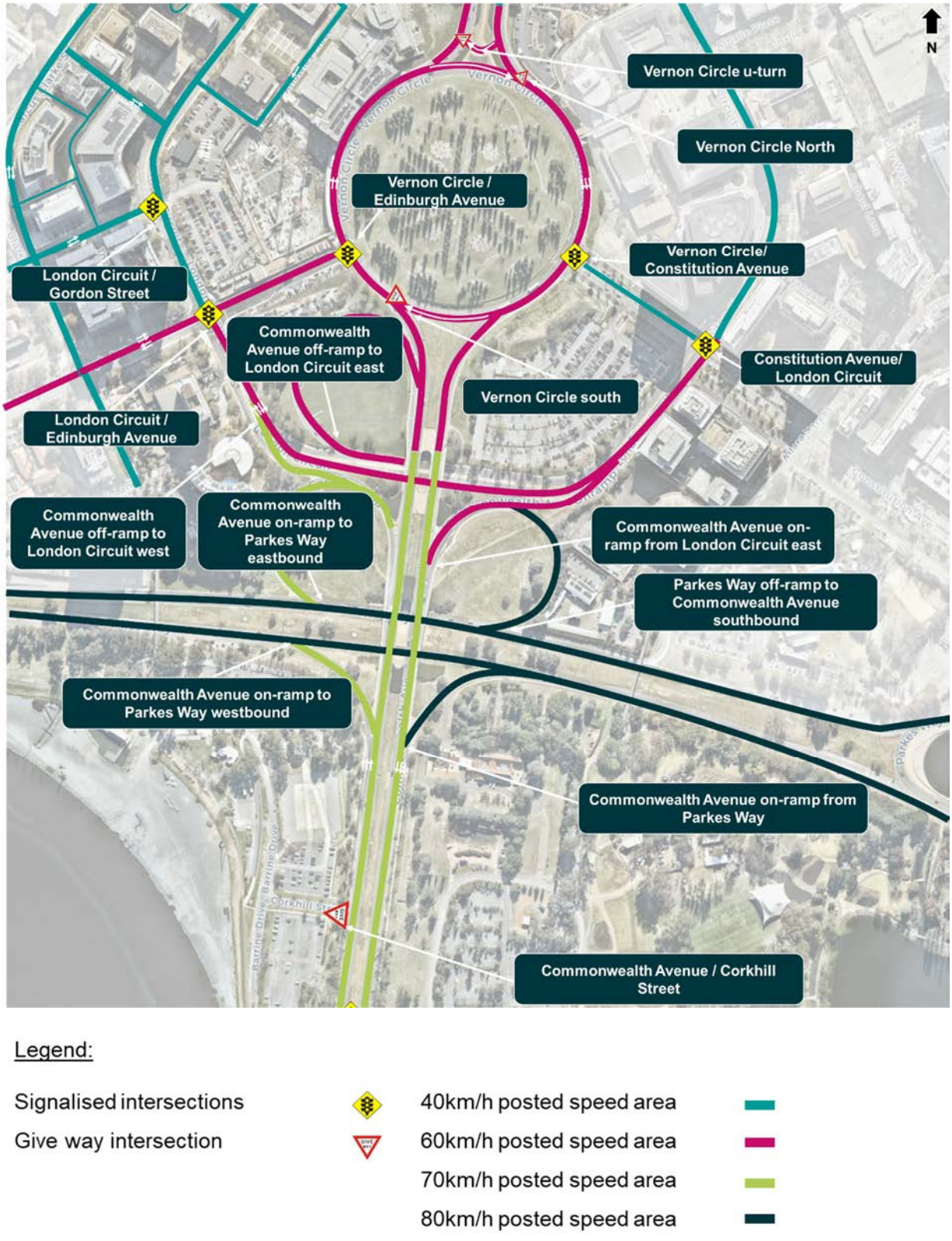


Figure 30 Key intersections within the study area

5.5.1 Traffic volumes

2017 traffic volumes at key locations were sourced from the Aimsun mesoscopic model for a weekday AM and PM peak hour, as shown in Figure 31. The traffic volumes highlight the high demand for Commonwealth Avenue, with nearly 5,000 vehicles using Commonwealth Avenue in the AM peak hour. Traffic volumes along this corridor are less in the PM peak hour, with nearly 4,000 vehicles along Commonwealth Avenue in the PM peak per hour.

More than 1,000 vehicles use London Circuit west, during the AM peak hour and 900 vehicles during the PM peak hour. A large portion of the London Circuit traffic volumes uses Edinburgh Avenue and Commonwealth Avenue to access London Circuit.

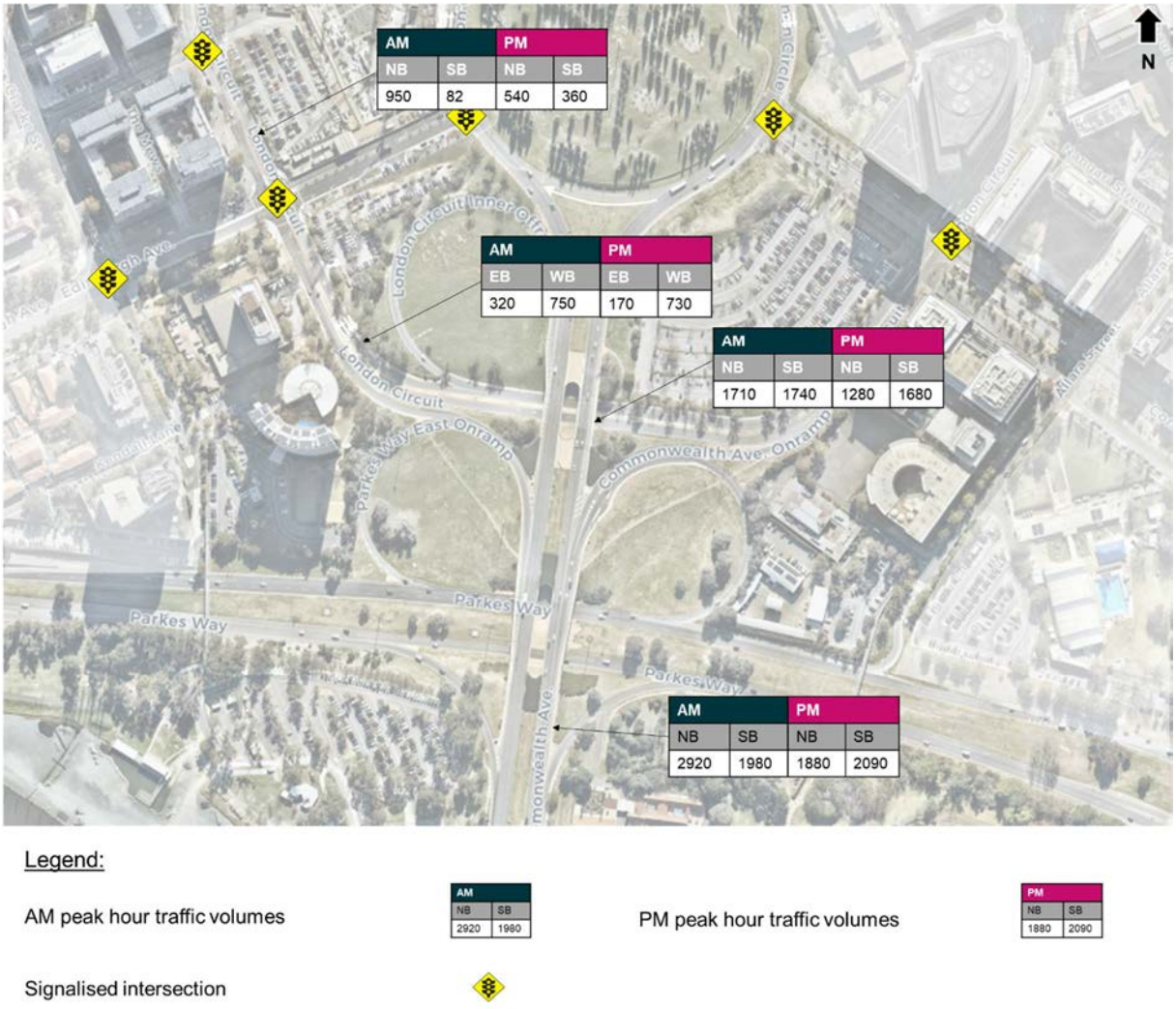


Figure 31 2017 two-way modelled AM and PM peak hour traffic volumes (AIMSUN model, 2021)

TCCS provided the project team with 7-day, 24-hour tube count data from key roads within and surrounding the study area. The data was collected from various dates and years.

The average weekday traffic volume profile for the following roads is shown in Figure 32:

- Constitution Avenue between Allara Street and Coranderrk Street
- Edinburgh Avenue between Phillip Law Street and Marcus Clarke Street
- London Circuit between Farrell Place and Knowles Place
- Parkes Way between Clunies Ross Street and Glenloch Interchange
- Commonwealth Avenue between Parkes Way and Vernon Circle.

Figure 32 shows that the roads surrounding the study area all experience a similar weekday daily profile with the AM peak hour occurring between 8:00am and 9:00am the PM peak hour occurring 5:00pm and 6:00pm. In addition, the off-peak traffic volumes are significantly lower than the peak hour traffic volumes.

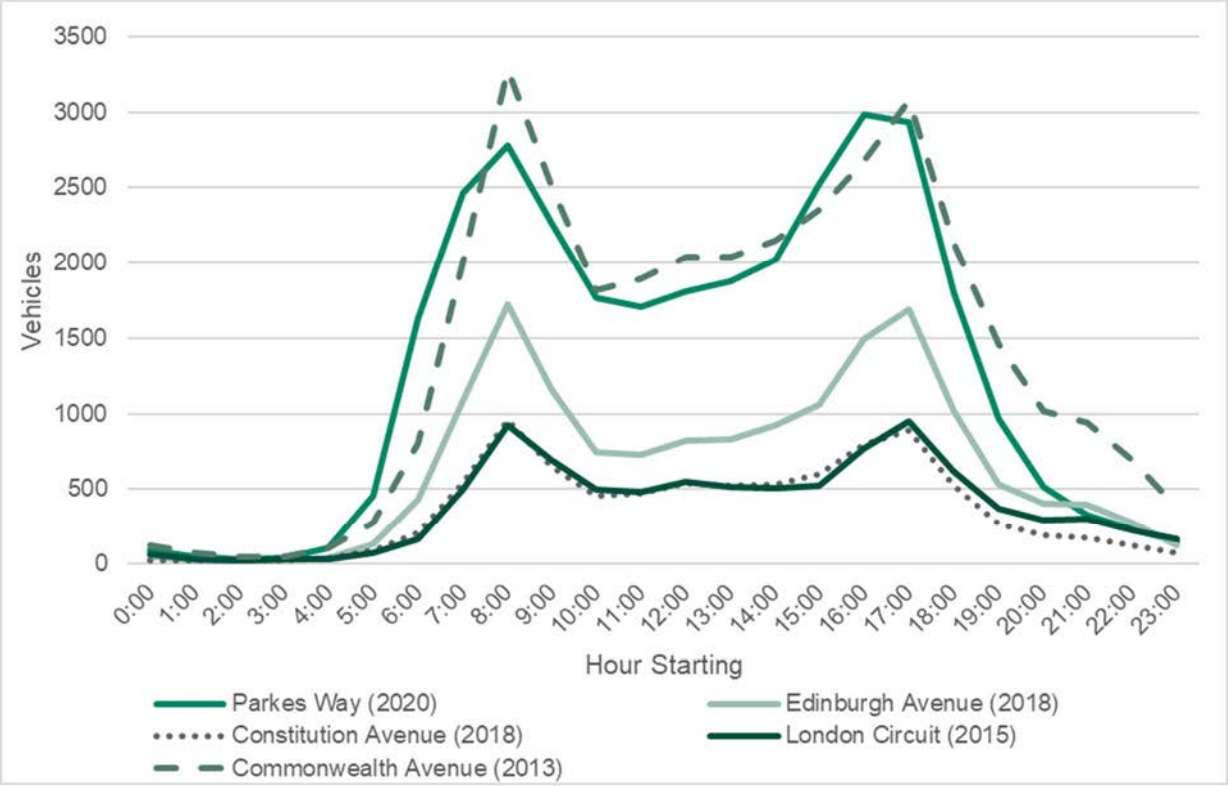


Figure 32 Weekday average daily traffic volume profiles on key roads surrounding the study area

5.5.2 Road network performance

The operation of the Edinburgh Avenue and London Circuit intersection has been assessed, adopting 2017 traffic movement volumes extracted from the Aimsun mesoscopic model. The modelling assumptions and methodology are discussed in Chapter 4.0 of this document.

The assessed intersection's performance in 2017 is detailed in Table 13 for the AM and PM peak hours.

Table 13 Edinburgh Avenue and London Circuit intersection operation - 2017

Peak hour	Average delay (seconds)	Level of Service
AM	31	C
PM	32	C

Table 13 indicates that the assessed intersection operated satisfactorily in 2017, with a level of service C or better.

5.6 Public transport

The City Interchange is located to the north of the study area and caters for most of the CBD's public transport activity. The interchange includes the bus stops located on Alinga Street, adjacent to Northbourne Avenue, as well as the Alinga Street light rail station located on Northbourne Avenue to the north of Alinga Street.

The Alinga Street light rail station is currently the southern terminus of the existing City to Gungahlin light rail service. The light rail alignment extends north along Northbourne Avenue towards Canberra's north.

Transport Canberra bus services travelling to/from the south generally use Commonwealth Avenue (12 routes) or Constitution Avenue (6 routes) and London Circuit east to access the City Interchange, as shown in Figure 33. More information on these routes is included in Table 14.

The Commonwealth Avenue bus routes currently use the north-west cloverleaf to access London Circuit east from Commonwealth Avenue south.

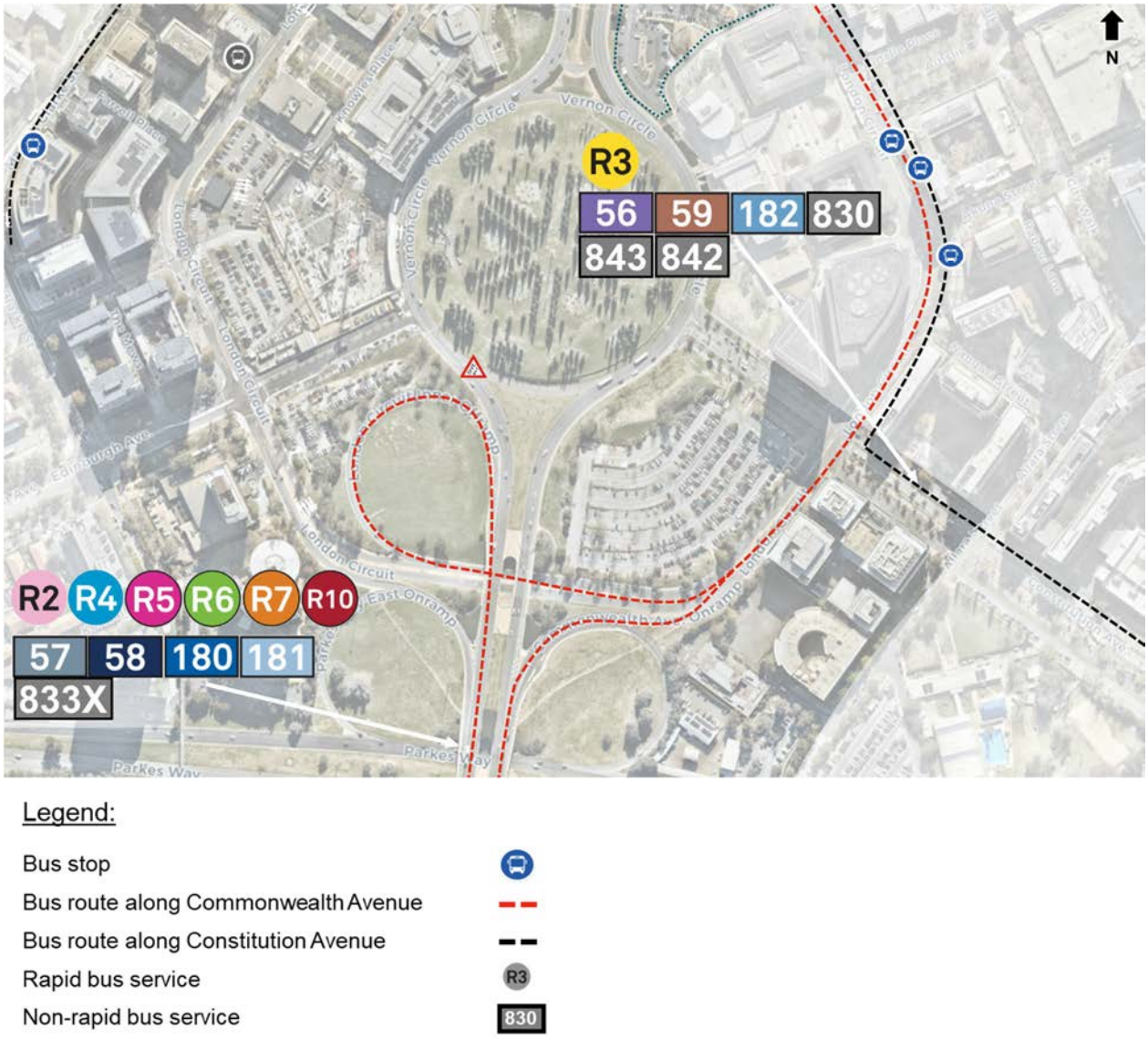


Figure 33 Bus services in the study area

Table 14 Weekday bus services within the study area

Bus route	Description	AM peak hour		PM peak hour		Off peak period
		Inbound services	Average frequency (minutes)	Outbound services	Average frequency (minutes)	Average frequency (minutes)
R2	Fraser West to Fyshwick	8	5-10	7	5-10	15
R3	Spence to Airport	4	15	4	15	15
R4	Belconnen to Tuggeranong	10	5-10	12	5	10
R5	Lanyon to City	6	10	6	10	10
R6	Wooden to City West	5	10-15	4	10-15	15
R7	Weston Creek to City	4	15	4	15	15
R10	Denman Prospect to City	4	15	4	15	30
56	Fyshwick to city	3	20-25	3	20-25	30
57	Woden to City	3	20-25	3	20-25	30
58	Woden to City	3	15-20	4	20	30
59	Woden to City	4	15	4	15	15
180	Lanyon Valley to City	2	20	2	25	Peak period only services
181	Lanyon Valley to City	2	20	2	30	
182	Lanyon Valley to City	2	30	3	20-3	
830	Queanbeyan to Canberra City	3	25-30	2	10-20	30min-hourly
833X	Queanbeyan to Canberra City (Express)	1	Only 1 service	1	Only 1 service	No off-peak services
842	Yass to City	1	2 services in the AM period	3	20	No off-peak services
843	Yass to City	0	1 service in the AM peak period	0	1 service in the PM peak period	No off-peak services

5.7 Active transport

5.7.1 Strategic cycling network and routes

The C8 City Loop bike route is a key bike route that surrounds the study area via Marcus Clarke Street, Rudd Street, Bunda Street and Allara Street. The C8 City Loop is designated as a Principal bike route, as it connects key employment areas and also links the CBD with other surrounding Principal bike routes and Local bike routes. The C8 City Loop comprises mostly off-road cycle facilities with some short lengths of on-road cycle routes, and includes two active travel bridges across Parkes Way and connecting with the Lake Burley Griffin Circuit to the south of the study area, as shown in Figure 34.

On-road cycle lanes are provided along Commonwealth Avenue, Vernon Circle and Northbourne Avenue to facilitate the key north-south Principal cycle route to/from and through Canberra CBD.

London Circuit is endorsed as a local cycle route, providing for short trips within the local area and offering a lower order alternative to the more heavily used Principal routes.

The London Circuit local route and the adjacent Principal routes are connected by Edinburgh Avenue and Constitution Avenue. Although, no dedicated cycle facilities are provided along these corridors.

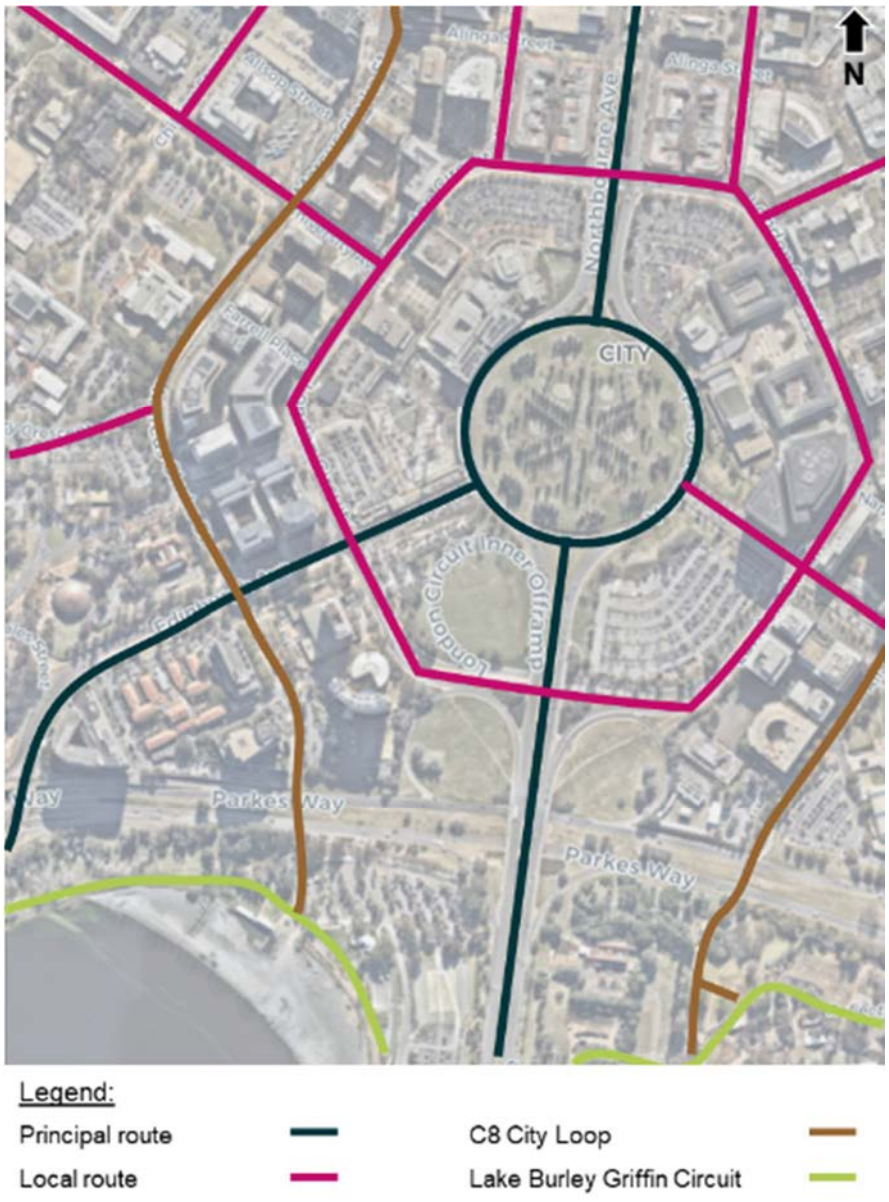


Figure 34 Strategic active travel routes

5.7.2 Facilities and infrastructure

Within the Project study area, active transport provisions are typically narrow, poorly connected and illegible. Provided facilities are generally limited to footpaths along key roads and narrow on-road cycle lanes along Commonwealth Avenue and parts of London Circuit. No footpath is provided along the south side of London Circuit beneath Commonwealth Avenue despite an evident desire line.

The cloverleaf ramps are a significant barrier for pedestrian and cyclist accessibility between Commonwealth Avenue and London Circuit. Pedestrians need to cross the cloverleaf ramps and slip lanes at designated points that are unsignalised, as shown in Figure 35. A more direct pedestrian desire line through the cloverleaf ramps is evident by the dirt tracks that have been formed.

No cycle paths are provided along the cloverleaf ramps. Therefore, cyclists travelling between Commonwealth Avenue and London Circuit are required to either use the high-speed cloverleaf ramps in mixed traffic conditions or to use the on-road cycle paths on Commonwealth Avenue and Vernon Circle, to access London Circuit via Edinburgh Avenue or Constitution Avenue.

Similar to pedestrians, cyclists travelling southbound along Commonwealth Avenue or joining Commonwealth Avenue from London Circuit east, also need to cross the cloverleaf ramps via the dedicated unsignalised ramps.

The existing active transport provisions are shown in Figure 35, including:

- North-south on-road cycle lanes provided on Vernon Circle and Commonwealth Avenue and connecting to facilities in the north on Northbourne Avenue
- An eastbound on-road cycle lane is provided along London Circuit between the north-west cloverleaf merge with London Circuit about 80m south of Constitution Avenue.
- A westbound on-road cycle lane is provided along London Circuit between the London Circuit westbound to Commonwealth Avenue southbound left turn slip lane diverge and the Commonwealth Avenue northbound to London Circuit westbound left turn slip lane merge.
- Signalised pedestrian crossings on all legs of the intersections of London Circuit and Edinburgh Avenue and London Circuit and Constitution Avenue.

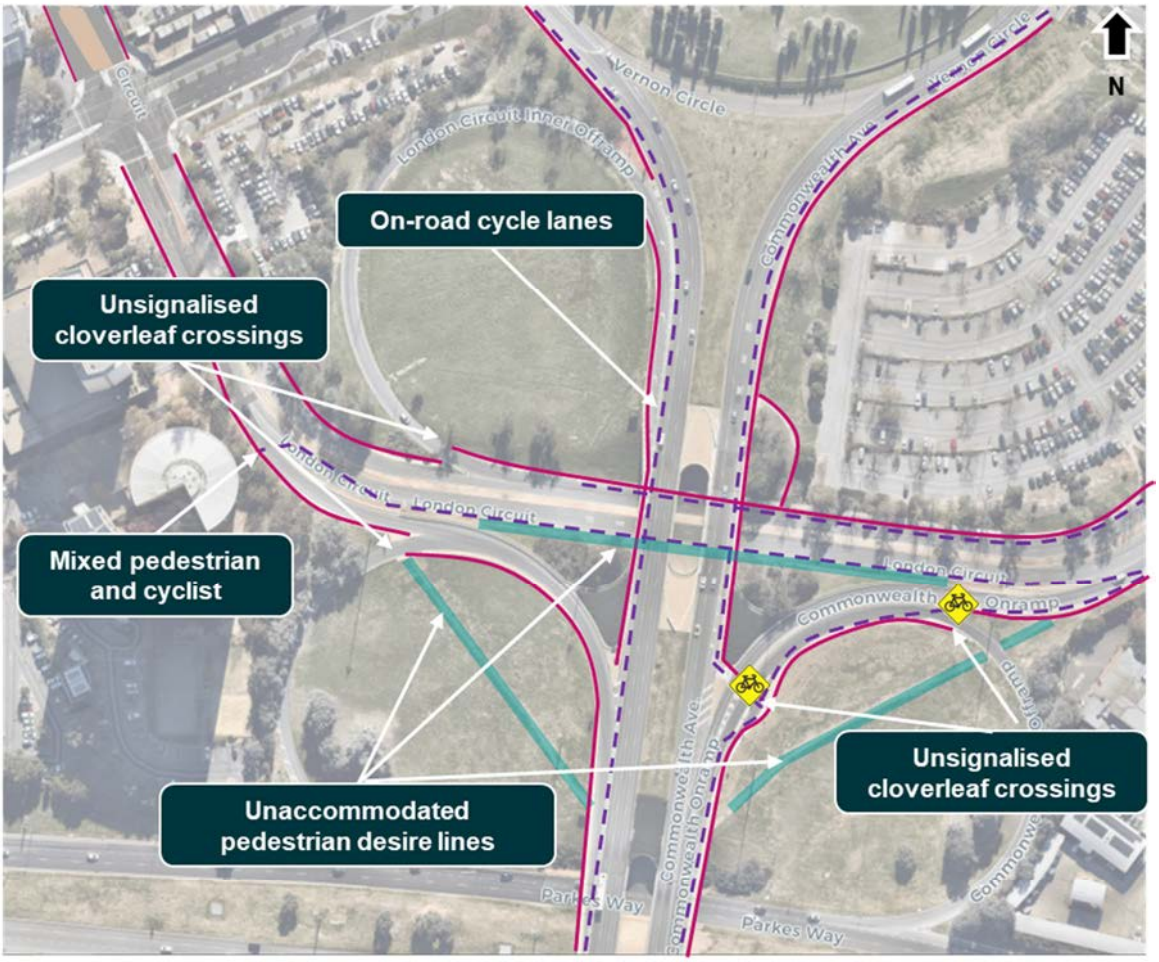


Figure 35 Existing active transport infrastructure provisions

5.7.3 Demands and activity

Pedestrian and cyclist count data from December 2019 was provided by TCCS. The two-hour AM and PM peak counts at key locations within the study area are summarised in Figure 36.

Overall, pedestrian volumes are significantly lower in the southern section of London Circuit (within the study area) than the northern section of London Circuit. 110 and 130 pedestrians were recorded crossing at the intersection of London Circuit and Edinburgh Avenue during AM and PM peak periods. Whereas 510 and 480 pedestrians were recorded crossing at the London Circuit and Gordon Street intersection during the AM and PM peak periods, respectively.

A small number of cyclists were recorded at the London Circuit and Edinburgh Avenue intersection, 25 and 10 during AM and PM peak periods, respectively. Cyclist activity was higher along Commonwealth Avenue, Vernon Circle and Northbourne Avenue, with 250 and 155 cyclists recorded on Commonwealth Avenue during the AM and PM peak periods. The cyclist activity is reflective of the type and consistency of facilities provided, recognising that cycle lanes are only provided along some sections of London Circuit.

Pedestrian crossing activity across Commonwealth Avenue is typically low. However, the pedestrian crossing demands increase around September/October when the Floriade event is held in Commonwealth Park, particularly at the available signalised crossing to the south of the study area.

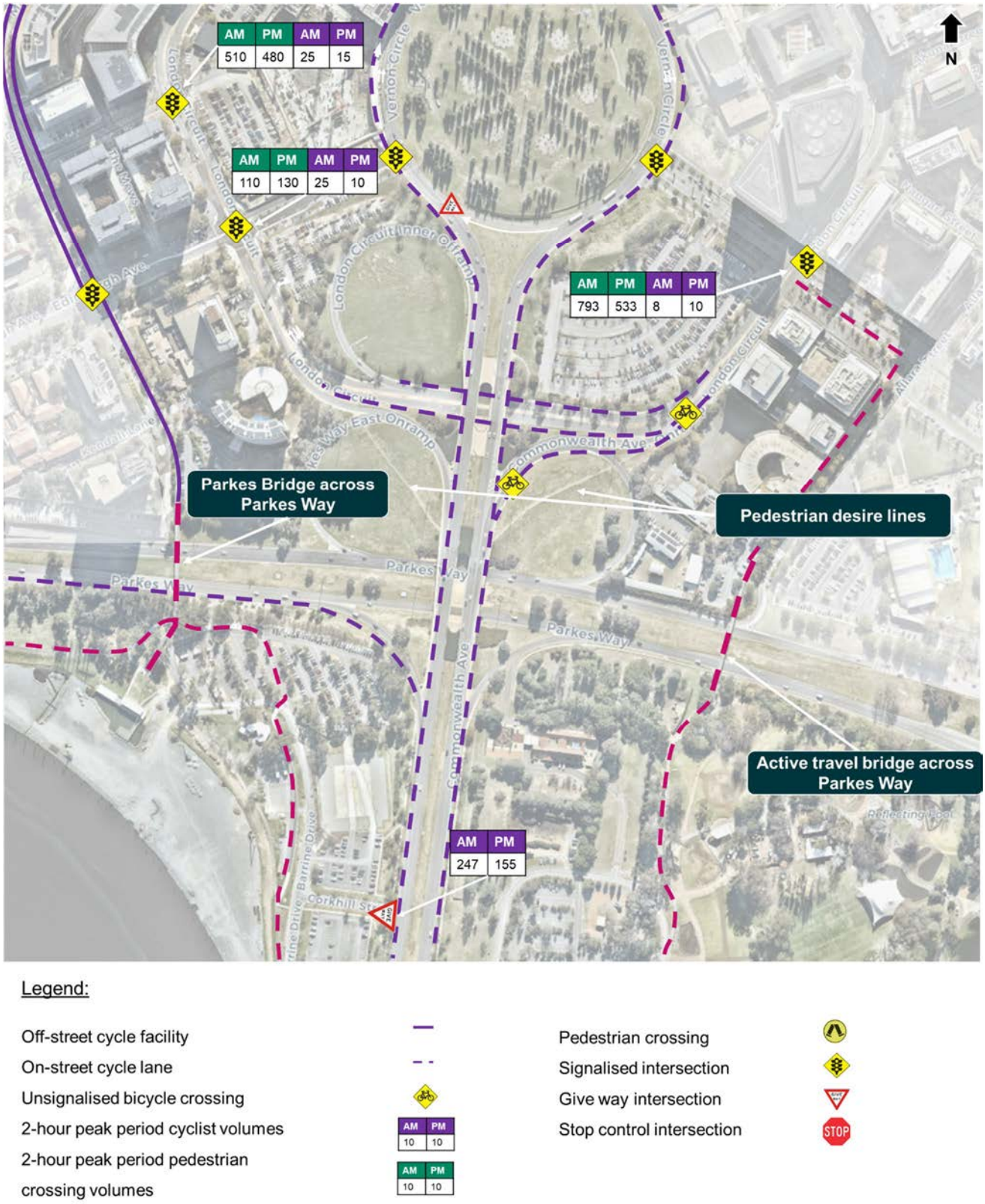


Figure 36 Existing active transport facilities and demand

Strava is a software that is used by some pedestrians and cyclists to track their activity. The data can be used to understand key active transport desire lines within the study area.

Strava data for the cyclist activity in the study area, included in Figure 37, shows the following:

- The Marcus Clarke Street cycleway is most frequently used by Strava users.
- Vernon Circle is also a key desire line for cyclists.
- Cycle activity along London Circuit is much less than along Marcus Clarke Street and there is low demand for cyclists moving between London Circuit and Commonwealth Avenue This could be reflective of the gaps in the cycling facilities provided along London Circuit and also the north-south barriers created by the grade separation of London Circuit and Commonwealth Avenue.

Figure 37 STRAVA cycling in the study area (MPC, 2021)

5.8 Car parking, kerbside uses and access

5.8.1 Kerbside uses

An on-street parking space is located on the eastern part of London Circuit outside the Department of Foreign Affairs and Trade building. This space is the only kerbside parking space within the study area and it is typically used by priority visitors to the adjacent building, see Figure 38.

On-street parking is generally available on adjacent streets included Edinburgh Avenue and Constitution Avenue, as well as London Circuit to the north of study area.

Figure 38 Kerbside uses within the study area

5.8.2 Off-street parking

Most buildings surrounding the study area have dedicated basement car parking, which are generally accessed via roads adjoining London Circuit and the connecting access road network. In addition, there are several public car parks located within and surrounding the study area, catering for a mix of short-term and all-day parking options with a total supply of approximately 2,300 spaces, see Figure 39.

Based on parking count data from 2019 and provided by TCCS, many of the car parks within the study area typically reach capacity on weekdays. Some spare capacity is typically experienced on a weekday in the Section 116 car park, the Allara Street car park and the Acton Park south car park. Based on aerial imagery, it appears that the nearby Commonwealth Park car parks also typically have some spare capacity on a weekday. The Section 116 car park is also frequently used by visitors to the adjacent Canberra Theatre, typically on weekends and weekday evenings.

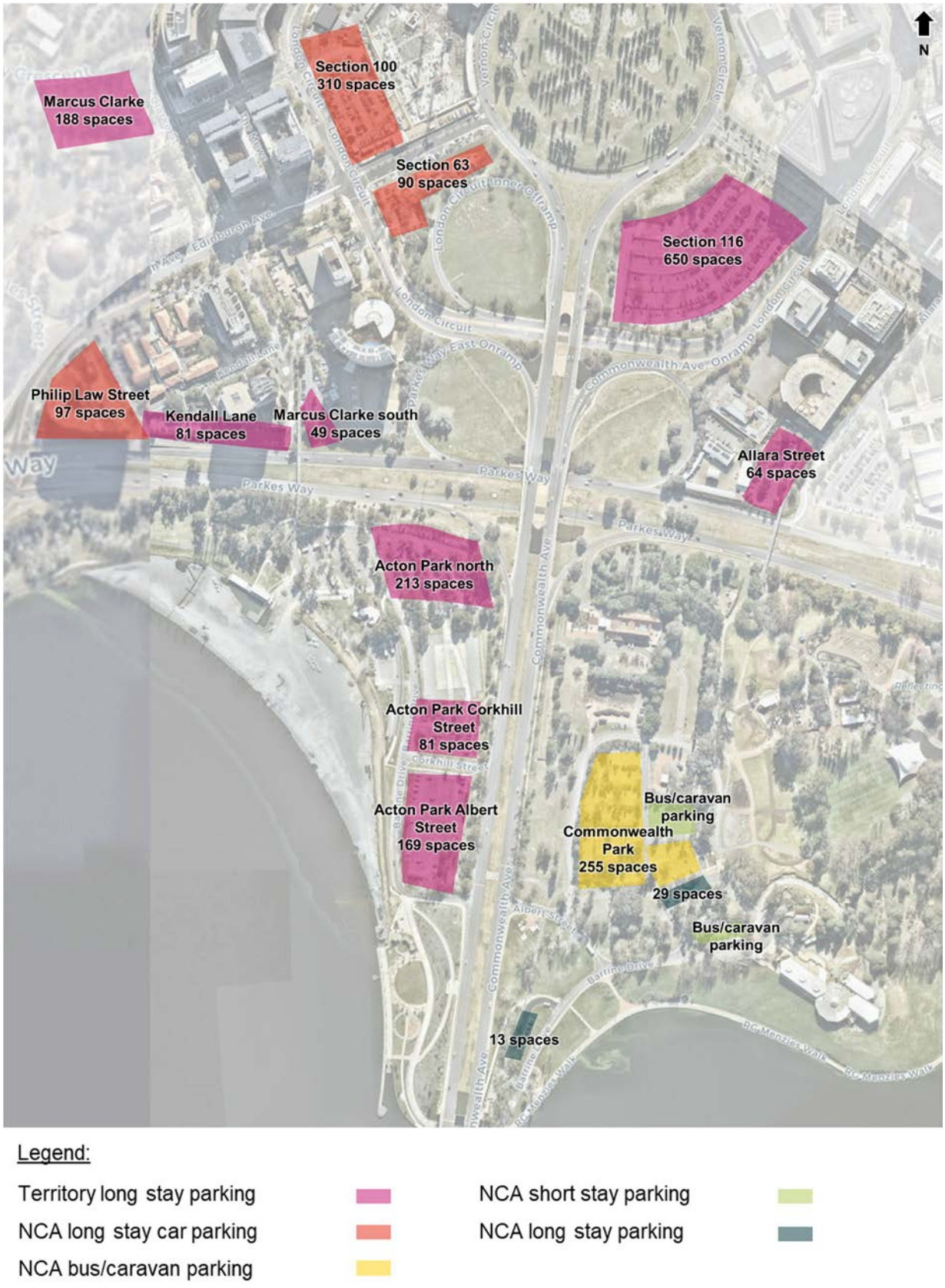


Figure 39 Off-street car parking locations and approximate parking supply

5.8.3 Property access

The following two properties have a vehicle access off London Circuit within the RLC study area:

- QT Hotel porte-cochere access on the south-west corner of London Circuit and Edinburgh Avenue
- The car park located on the Section 63 site, adjacent to Edinburgh Avenue.

These property accesses accommodate all vehicle movement and are indicatively shown in Figure 40.

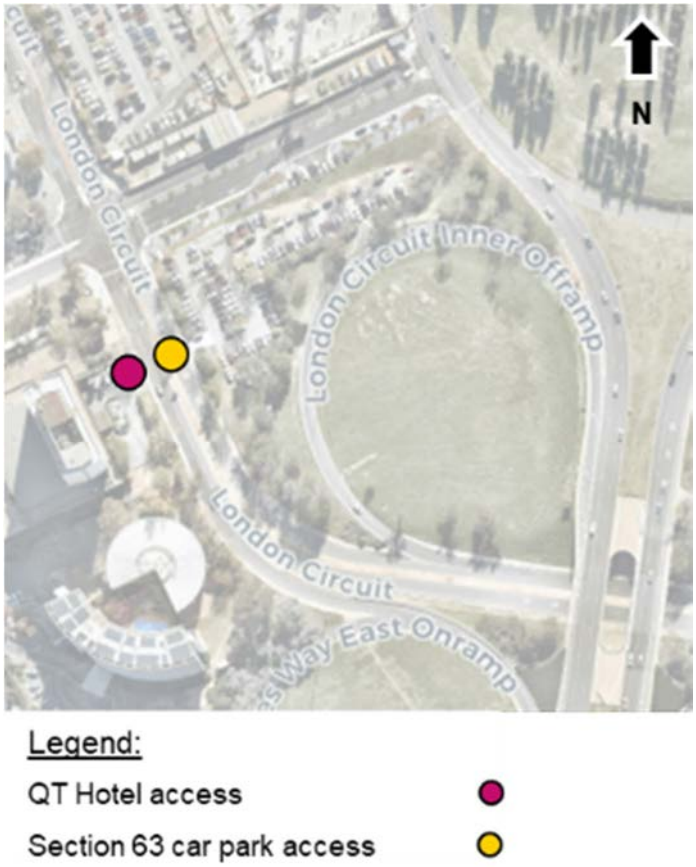


Figure 40 Existing property access within the study area

5.8.4 Emergency service access

The closest emergency service facilities that service Canberra CBD and their likely access routes to/from the study area are summarised in Table 15.

Table 15 Emergency Service and access routes

Emergency Service facility	Location	Main access route	Typical travel time (minutes)
Ambulance	Morphett Street, Dickson	Northbourne Avenue to/from the north	8
State Emergency Services	Majura Unit- Holtze Close	Northbourne Avenue to/from the north	12
Fire Services	Ainslie Fire station- Wakefield Avenue	Northbourne Avenue to/from the north	7
Police Station	London Circuit	London Circuit in the study area	0

5.9 Movement and Place assessment

Overall, all of the streets within study area currently have higher movement functions and relatively low place value. They generally facilitate movement between places but have limited dwellable area available.

The RLC study area is zoned as a 'Designated Area' in terms of the NCP and the predominant land uses currently are commercial business and government related activities.

The Project area is also adjacent to significant tourist land uses such as Lake Burley Griffin and Foreshores, Commonwealth Park and Acton Park, and forms a key link between these as well as between them and the City.

Adopting the functional class matrix in Figure 22 on page 43,the study area streets have been classified in terms of their existing Movement and Place functions. A summary of the Movement and Place assessment, and classifications for the study area streets are provided below and include:

- London Circuit east - **M2** and **P2** (Vibrant Street)
- London Circuit west – **M2** and **P2** (Vibrant Street)
- Commonwealth Avenue – **M3** and **P1** (Movement Corridor)
- Vernon Circle – **M3** and **P1** (Movement Corridor)**.**

5.9.1 London Circuit east

London Circuit east between Commonwealth Avenue and Constitution Avenue has been classified as an **M2** on the Movement scale and a **P2** on the Place scale (albeit at the lower end of **P2**). The scoring for the Movement and Place assessment for London Circuit east is shown in Figure 41 and some key features are discussed below.

London Circuit is considered important from a movement perspective and is significant at a regional level, given it carries bus services. However, the movement function currently favours motorised traffic (including buses) but does not provide a good user experience for active modes.

The footpaths along London Circuit east are generally quite narrow and safe crossing opportunities are only provided at the Constitution Avenue intersection. Austroads Part 4[3] sets out a range of Level of Service measures that can be considered for all modes including pedestrians and cyclists. Assessed against these measures, walking is considered to currently have a Level of Service C, along London Circuit east.

Cycling facilities are not well provided for with dedicated cycle lanes only provided at the westernmost part of this section of London Circuit. These facilities are narrow, about 1.3m wide, which is narrower than the minimum required by the ACT active travel design standards[4] (1.5m wide). The transition from on-road cycle lanes to off-road shared path facilities, and the converse, present speed differential conflicts between cyclists and pedestrians as well as cyclists and motorists.

Assessed against Austroads Part 4, overall, cycling has been considered to have a Level of Service D. However, in terms of the safety and suitability criteria, cycling is considered to have a Level of Service E/F.

In the last five years, a total of 11 crashes occurred mid-block on London Circuit east including two casualty and nine property damage crashes.

While there are several trees along London Circuit providing shade to pedestrians, the dwellable area provided is considered very low, with approximately 14 per cent of the width of the road dedicated to pedestrians. This is largely to provide the narrow footpaths.

[3] Austroads Guide to Traffic Management Part 4: Network Management
[4] ACT Government (2019) Active Travel – Municipal Infrastructure Standards

The pedestrian areas on the corners of the intersection of London Circuit and Constitution Avenue are widened somewhat (±5m) but these areas are rather barren, don't offer shelter or shade and lack quality streetscape design elements or aesthetically pleasing elements.

In terms of land-use, inactivated at-grade car parks and commercial buildings generally align London Circuit east. However, there are several hotels in the area, with one being directly adjacent to the intersection of London Circuit and Constitution Avenue. Hotels typically provide activated frontages and have increased demand for people dwelling in the adjacent space.

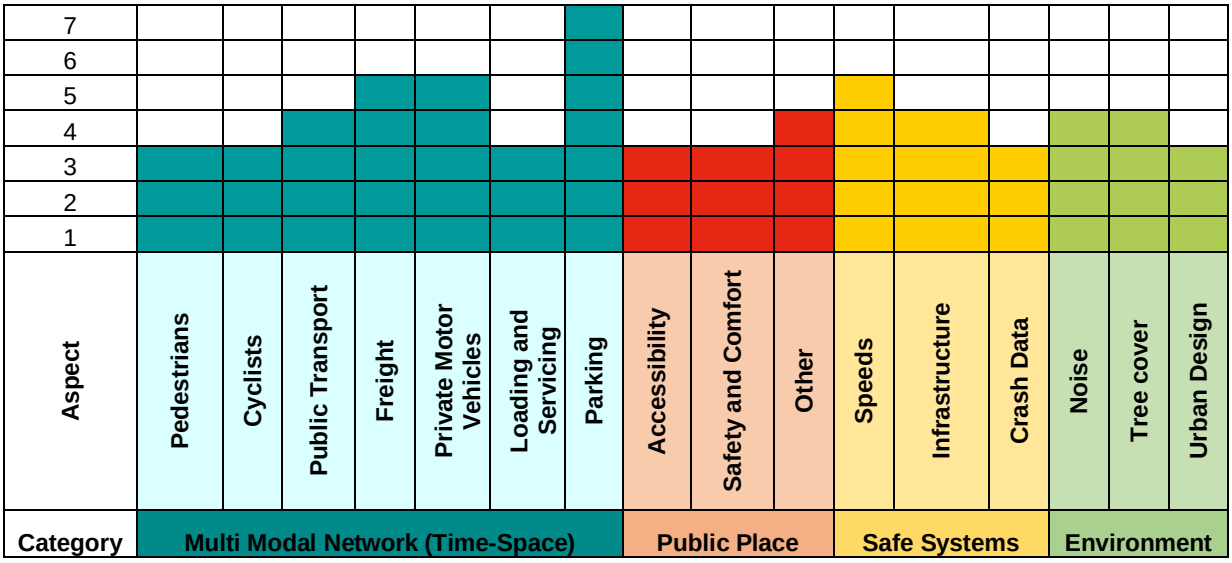


Figure 41 London Circuit east existing Movement and Place scoring

5.9.2 London Circuit west

London Circuit west is similar to London Circuit east in geometry and traffic environment, except no buses travel through this section of the network. Therefore, it is also classified as an **M2** on the Movement scale. Similarly, it is considered a **P2** – albeit at the lower end of **P2**.

The scoring for the Movement and Place assessment for London Circuit west is shown in Figure 42 and some key features are discussed below.

Private car traffic volumes on London Circuit west are slightly lower than the east. Similarly, London Circuit west provides a similar Level of Service for each mode as the London Circuit east section.

The footpath widths in the southernmost area of London Circuit west are generally inadequate and there is no dedicated cycling facilities for a significant proportion of London Circuit west's length. The gaps in the cycling provisions on both sides force cyclists to merge into traffic moving at higher speeds or to mount the kerb onto the narrow footpath to share the space with pedestrians. Neither of these arrangements are ideal from a cycling safety or comfort perspective nor when cycles mount the footway, from a pedestrian perspective.

The pedestrian areas on the corners of the intersection of London Circuit and Edinburgh Avenue are widened somewhat (±5m), but these areas are rather barren, don't offer shelter or shade and lack quality streetscape design elements or aesthetically pleasing elements.

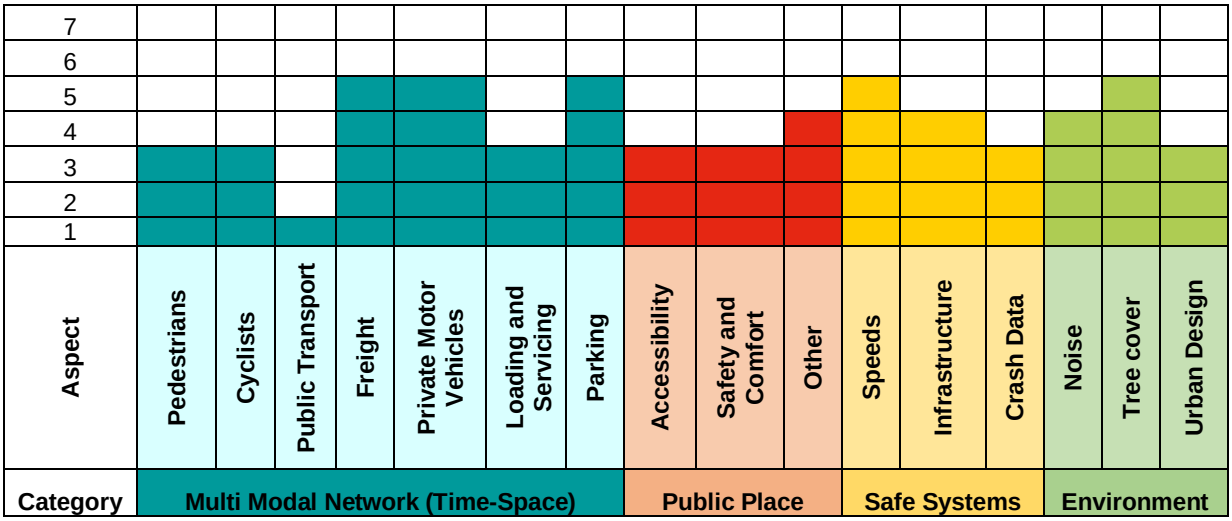


Figure 42 London Circuit west existing Movement and Place scoring

5.9.3 Commonwealth Avenue

Commonwealth Avenue functions more as a movement corridor than a place and is the main conduit of people and goods between southern and northern Canberra over Lake Burley Griffin. It has been classified as an **M3** on the Movement scale, given the high strategic people movement importance at a regional level.

From a place perspective, Commonwealth Avenue is considered a **P1,** as the corridor does not serve a major place function itself but rather provides access to adjacent areas including London Circuit.

The scoring for the Movement and Place assessment for Commonwealth Avenue is discussed below and shown in Figure 43.

Commonwealth Avenue carries a high number of cars, buses, cyclists and pedestrians.

As with London Circuit, the Commonwealth Avenue road environment caters well for cars, trucks and buses but the facilities provided for walking and cycling are narrow and unprotected in areas. Where cycle facilities transition to on carriageway facilities from shared walk/cycle facilities the on-carriageway cycles lanes are frequently narrow. There are also several uncontrolled intersections which present potential conflict points between 70km/h traffic and cyclists.

While potentially a high-risk environment for cyclists, the crash history for the last five years suggests five cyclist crashes have been recorded at the northern end of Commonwealth Avenue around Parkes Way. Of these crashes, one resulted in property damage only and four resulted in injury. No fatalities were recorded.

Commonwealth Avenue does provide access to cultural and recreational activities but this corridor (between the Lake and Vernon Circle) itself does not serve a significant place function.

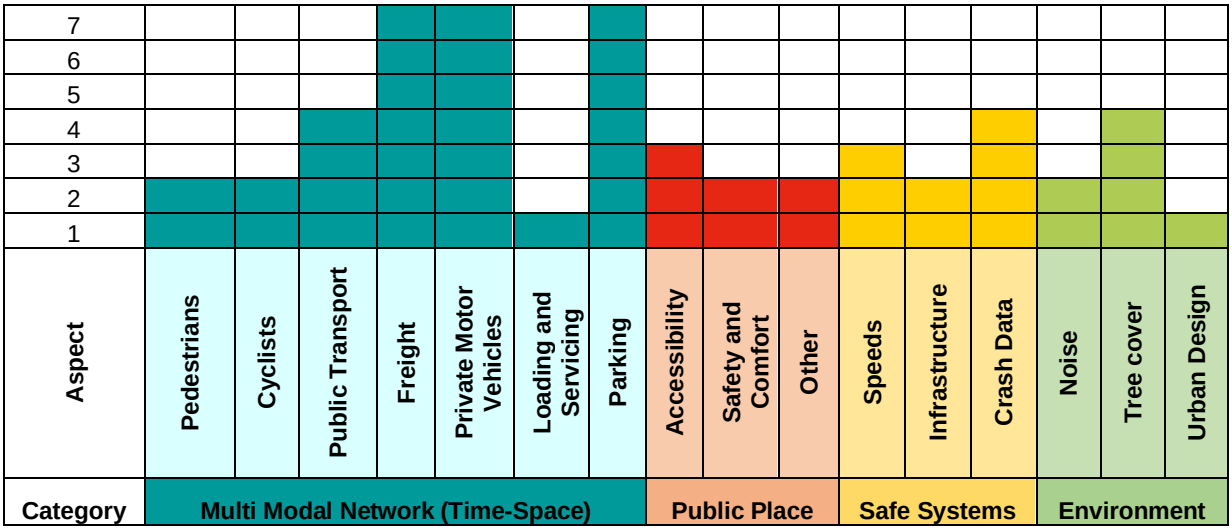


Figure 43 Commonwealth Avenue existing Movement and Place scoring

5.9.4 Vernon Circle

Vernon circle is also classified as an **M3** on the Movement scale and **P1** on the Place scale as the corridor does not serve a major place function itself but rather provides access to adjacent areas including London Circuit.

Vernon Circle is essentially a continuation of Commonwealth Avenue that deviates around City Hill. The traffic volumes are high and pedestrian and cyclist volumes are lower than Commonwealth Avenue, as they are more likely to use the C8 City Loop instead of Vernon Circle (see Section 5.7.3).

Vernon Circle serves a similar amount of people to Commonwealth Avenue, albeit mainly motor traffic drivers or passengers.

The scoring for the Movement and Place assessment for Vernon Circle is shown in Figure 44.

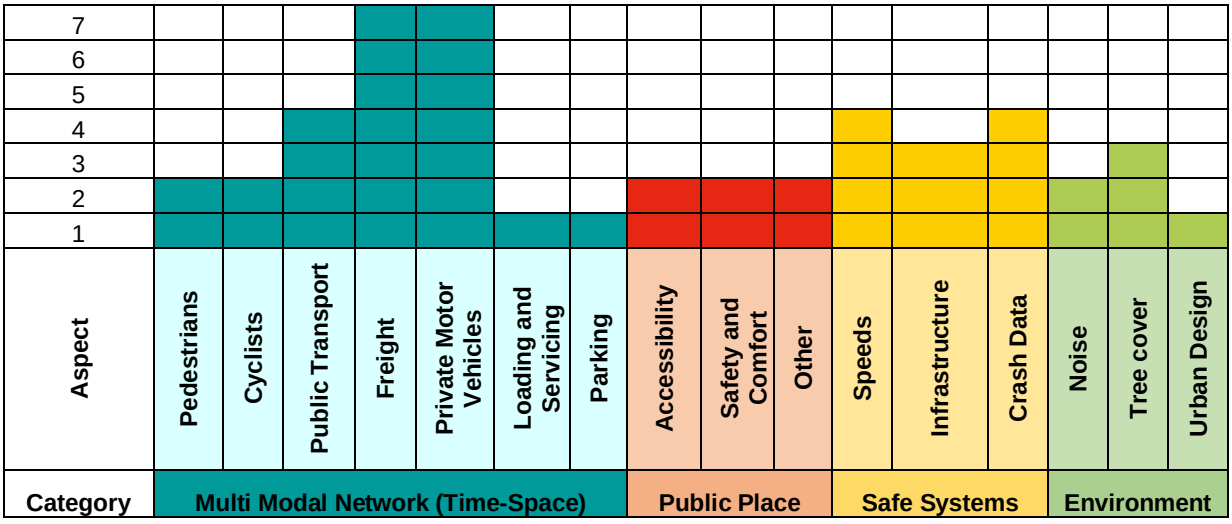


Figure 44 Vernon Circle existing Movement and Place scoring

6.0 Construction impact assessment

6.1 Summary of impacts

A summary of the construction related transport impacts are included in Table 16 and discussed in the following sections of this report.

Table 16 Summary of unmitigated construction related impacts of RLC

Category	Construction transport impact	Likelihood	Consequence	Rating
Road network	Increased traffic delays of around one and a half minutes and one minute at the Parkes Way and Edinburgh Avenue interchange during the AM and PM peak hours, respectively	Likely	Minor	Medium
	Increased delays of around 50 seconds on the westbound approach to the Edinburgh Avenue and Marcus Clarke Street intersection in the AM peak hour.	Likely	Minor	Medium
	Travel time increases of around one minute along Commonwealth Avenue in each direction in the AM and PM peak hours.	Likely	Minor	Medium
	Travel time increases of around one and a half minutes eastbound along and Parkes Way in the AM peak hour.	Likely	Minor	Medium
	Increased delays of around five minutes on the westbound approach to the Constitution Avenue and Blamey Crescent intersection in the PM peak hour.	Likely	Minor (very small number of vehicles impacted)	Medium
	Increased delays of almost one minute on the westbound approach to the Northbourne Avenue and London Circuit intersection in the PM peak hour.	Likely	Minor	Medium
	Additional construction related heavy vehicles using the local road network.	Likely	Minor	Medium
	Additional construction worker traffic using the local road network.	Likely	Minor	Medium
Public transport	Bus travel time increases of around two minutes for bus routes on Commonwealth Avenue in the AM and PM peak hours.	Likely	Moderate	High
	Bus travel times increases of an additional one minute due to delay experienced by inbound buses on London Circuit in the PM peak hour.	Likely	Moderate	High
Pedestrians	London Circuit footpaths closed between Edinburgh Avenue and Constitution Avenue requiring use of alternative routes with increased travel times of up to four minutes (from an existing walk time of approximately eight minutes).	Likely	Minor (small number of people impacted)	Medium
	Removal of pedestrian facilities between London Circuit and Commonwealth Avenue requiring use of alternative routes	Likely	Minor (small number	Medium

Category	Construction transport impact	Likelihood	Consequence	Rating
	with increased travel times of up to two minutes.		of people impacted)	
Cyclists	Loss of cyclist connection between London Circuit east and Commonwealth Avenue, requiring use of alternative routes with increased travel times of up to three minutes.	Likely	Minor (small number of people impacted)	Medium
	London Circuit closure between Constitution Avenue and Edinburgh Avenue requiring use of alternative routes with increased travel times of up to three minutes.	Likely	Minor (small number of people impacted)	Medium
Kerbside uses	The on-street parking space located on the eastern part of London Circuit outside the Department of Foreign Affairs and Trade building would be temporarily lost during construction.	Likely	Minor	Medium
Local area traffic access	Road closures would require use of alternative local area traffic routes via Vernon Circle, Edinburgh Avenue and Constitution Avenue with limited to no increase to travel distances.	Likely	Insignificant	Low
Property access	Access to the QT Hotel would be maintained but only to/from the north via the London Circuit/Edinburgh Avenue intersection. Some vehicles would need to use alternative routes and/or use the main QT Hotel access via Edinburgh Avenue.	Likely	Insignificant	Low
Parking	Temporary loss of approximately 640 long-stay parking spaces in the study area.	Likely	Moderate	High
Road safety	Additional heavy vehicles within the area, conflicting with pedestrians and cyclists.	Possible	Moderate	Medium

6.2 Construction strategy

Chapter 4 of the Environmental Assessment report describes an indicative approach to the RLC construction. It outlines the proposed construction activities, working hours, construction compound locations and traffic management staging. A summary of the Project's construction works are also discussed in the Project description included in Section 2.0.

Reference has been made to Chapter 4 of the Environmental Assessment in preparing the following sections.

6.2.1 Construction hours

Works would be generally undertaken between 7:00am and 6:00pm for weekdays and 7:00am and 1:00pm Saturdays (normal working hours). From time to time works would need to be undertaken outside of these hours. Any such works outside of these hours would be the subject of a specific application to the Territory, detailing the need for such works and any additional or work specific mitigation measures. Activity specific communications and engagement activities would be undertaken in advance of the commencement of such works outside of normal work hours.

6.2.2 Indicative traffic arrangements

A temporary sidetrack (refer to Glossary) would be constructed to the east of the existing Commonwealth Avenue. The sidetrack and parts of the Commonwealth Avenue median would be paved to provide two traffic lanes, with connections to allow cross-over of traffic between the northbound and southbound traffic lanes and the sidetrack, as set out in Table 17. A minimum two northbound and two southbound lanes would be provided on Commonwealth Avenue throughout the construction. Therefore, one of the existing three northbound traffic lanes on Commonwealth Avenue would likely be temporarily lost during construction.

The sidetrack would include temporary bicycle and pedestrian paths to allow for safe diversion of pedestrians and cyclists during the works.

The north-west and south-west cloverleaf ramps and London Circuit between Edinburgh Avenue and Constitution Avenue would be closed for the duration of the works.

The posted speed limit on Commonwealth Avenue between Vernon Circle and Parkes Way would be reduced from 60-70km/h to 40km/h for the duration of the works.

Table 17 Traffic arrangements during constructions

Commonwealth Avenue works	Commonwealth Avenue northbound traffic	Commonwealth Avenue southbound traffic	Status of the temporary sidetrack
Stage 1 – Construction of temporary sidetrack	Northbound traffic would use the existing carriageway	Southbound traffic would use the existing carriageway	Under construction
Stage 1 - Demolition and infilling southbound bridge	Northbound traffic would use the existing carriageway	Southbound traffic would use the temporary sidetrack	Carrying southbound traffic
Stage 2 – Demolition and infilling northbound bridge	Northbound traffic would use the newly constructed southbound carriageway		
Stage 3 – Demolition complete	Northbound traffic would use the newly constructed northbound carriageway	Southbound traffic would use the newly constructed southbound carriageway	Incorporated into the permanent eastern embankment works

6.2.3 Construction compound and access

Three construction compounds are proposed to support the RLC construction activities:

- Marcus Clarke compound - an existing at-grade car park located on the corner of Marcus Clarke Street and Gordon Street, with vehicle access via Gordon Street.
- Section 116 compound – part of an existing at-grade car park located on the corner of Constitution Avenue and London Circuit, with access via the main car park access on Edinburgh Avenue.
- Acton compound – an existing at-grade car park and unused site located within Acton Park, with access via Albert Street and Corkhill Street. This compound would be accessed via workers and light vehicles only.

The compounds would largely be used for worker/contractor parking, worker facilities and materials stockpiling and storage handling.

6.2.4 Haulage and construction vehicle access routes

As shown in Figure 45, construction vehicle access to/from the construction compounds and the RLC construction site would be largely facilitated by the existing arterial road network including:

- To/from the north - Vernon Circle and Northbourne Avenue
- To/from east –Constitution Avenue or Edinburgh Avenue to access Parkes Way
- To/from south – Vernon Circle and Commonwealth Avenue
- To/from west - Edinburgh Avenue to access Parkes Way.

It is recommended that the number of construction vehicles using Northbourne Avenue be minimised as much as practical to avoid unnecessary interaction with pedestrians, cyclists and public transport services to the north of the site.

Access to/from the Acton compound would be limited to light vehicles only.

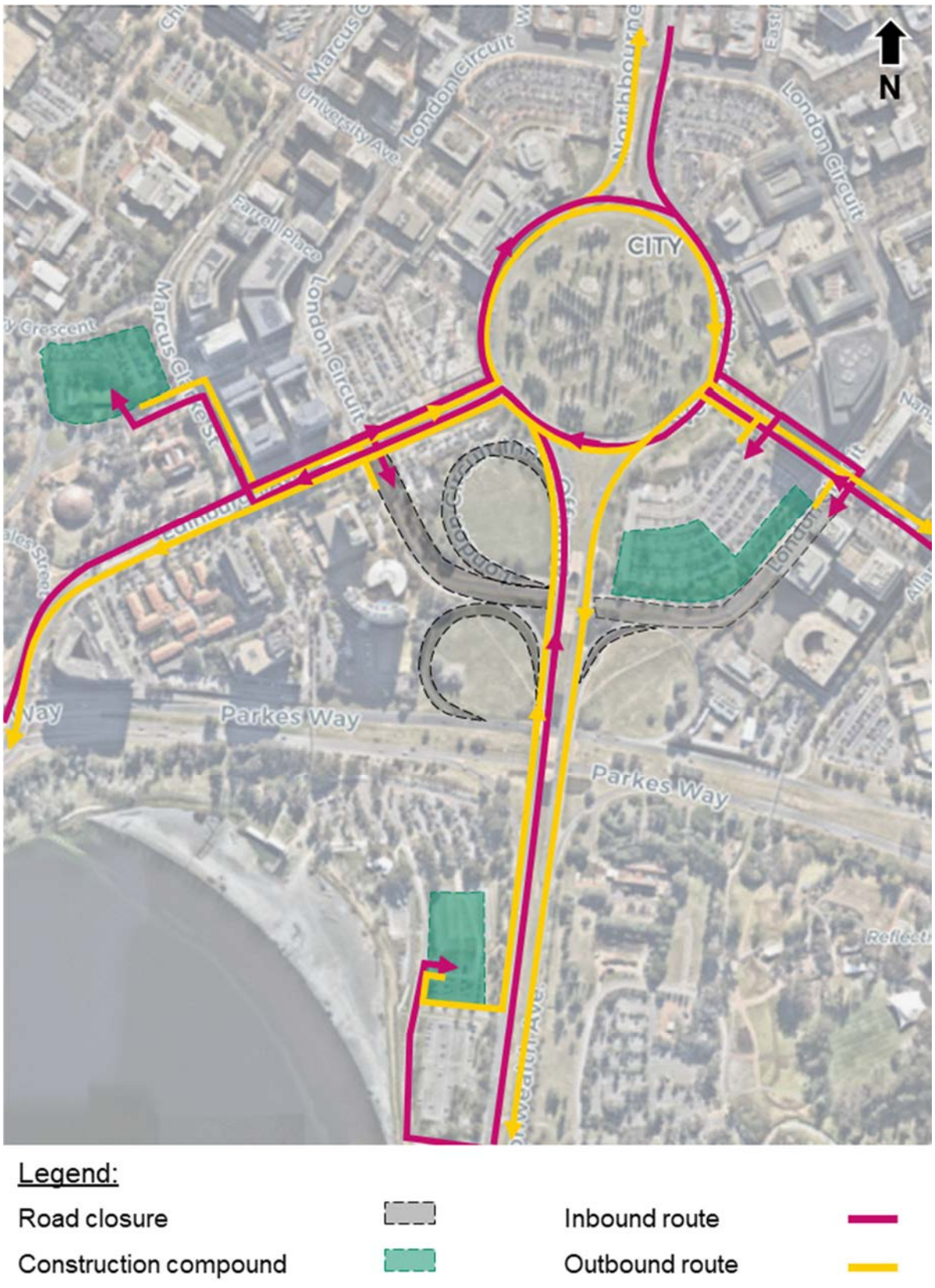


Figure 45 Construction compound and worksite access routes

6.3 Impact assessment

6.3.1 Road network

6.3.1.1 Traffic volumes

6.3.1.1.1 Heavy vehicles

The bulk earthworks activities are expected to be the largest traffic generating activity associated with the construction works. As advised in Chapter 4 of the Environmental Assessment, approximately 60,000m^3 of fill material is estimated to be transferred to the site for the main embankment.

It is estimated that up to around 5,200 24-tonne truck-and-dog deliveries of material would be required during construction of the main embankment. Imported materials are anticipated to be delivered to, stockpiled and managed within the closed London Circuit corridor during construction works.

Assuming that up to four truck deliveries could occur in a single hour, it is estimated that the embankment works could generate up to 32 deliveries per day or up to 70 two-way truck movements per day. Considering other smaller deliveries could coincide with the importation of fill, the construction activities could be expected to generate up to 80 two-way truck movements per day. Assuming the heavy vehicle movements would be largely evenly distributed amongst the key haulage routes (excluding Northbourne Avenue), the RLC construction works could result in an additional 15-20 two-way trucks movements per day along Edinburgh Avenue, Constitution Avenue and Commonwealth Avenue. Therefore, the works are expected to generate up to six two-way truck movements per hour on each of these corridors, during construction hours. Based on these estimates, the additional heavy vehicle volumes would be manageable, given the existing traffic volumes and road network conditions.

It is noted that the construction vehicle estimates discussed above are indicatively only and are subject to change once a contractor methodology is established.

Nevertheless, it is recommended that construction vehicle activity be minimised as much as practical during the weekday AM and PM peak hours to minimise impact to the surrounding transport network. As discussed in Section 5.5.1, the local road network weekday peak hours occur between 8:00am and 9:00am and 5:00pm-6:00pm. Traffic volumes are significantly lower during the off-peak periods, as demonstrated in Figure 32.

6.3.1.1.2 Light vehicles

Construction workers would be the main generator of light vehicles for the works. While the anticipated construction workforce is not currently known, it is understood that workers would typically arrive to site earlier than the weekday AM peak hour at 8:00am and would largely leave the site before the weekday PM peak hour at 5:00pm. Given that off-peak traffic volumes on the surrounding road network are significantly lower than during the weekday peak hours, the additional construction worker traffic and any additional light vehicle activity generated during the off-peak periods would be manageable within the existing road network.

Nevertheless, it is recommended that the appointed contractor develop a worker parking strategy that includes measures to minimise the number of worker vehicles generated by the works. This could include the following:

- measures to encourage workers to use alternative transport arrangements, such as public transport
- measures to encourage workers to car-pool, minimising the number of single person private vehicles generated by the works
- use of shuttle buses to transport workers to/from site and also between compounds and work areas.

6.3.1.2 Road network changes

The construction modelling for the Project assessed the cumulative impacts of the following RLC construction related network changes:

- Reduce Commonwealth Avenue northbound from three traffic lanes to two traffic lanes across London Circuit (thought the RLC construction zone)
- Closure of London Circuit between Edinburgh Avenue and Constitution Avenue
- Closure of ramp connections between London Circuit and Commonwealth Avenue
- Closure of the north-west cloverleaf ramp and the associated left turn slip lane between Commonwealth Avenue northbound and London Circuit westbound
- Closure of the south-west cloverleaf ramp
- Closure of the left-turn slip lane from London Circuit westbound to Commonwealth Avenue southbound
- Changes to traffic signal operations at the London Circuit intersections with Edinburgh Avenue and Constitution Avenue to account for reduced traffic movements (i.e. only construction related traffic) to and from the closed section of London Circuit
- Reduced posted traffic speed limit on Commonwealth Avenue between Parkes Way and Vernon Circle to 40km/h
- Bus diversion via Vernon Circle (see Section 6.3.2) and the following associated proposed road network changes
    - Signalisation of Vernon Circle north at Northbourne Avenue (subject to a separate works approval)
    - Widened northern circulating lane of Vernon Circle from one lane to two lanes, of which one lane would be a dedicated bus lane

The cumulative impacts of these proposed road network changes are summarised in the Construction Stage Traffic Analysis Technical Note, prepared by Arup in September 2021 included in Appendix A.

The assessment concluded that the RLC construction would include the following key impacts on the road network:

AM peak impacts

- *Increased congestion associated with traffic diverting away from Commonwealth Avenue to use the westbound Edinburgh Avenue off-ramp, resulting in 84 seconds of additional delay on Parkes Way*
- *Increased delays of around 50 seconds on the westbound approach to the Edinburgh Avenue and Marcus Clarke Street intersection*
- *Travel time increases of around one minute along Commonwealth Avenue in each direction*
- *Travel time increases of around one and a half minutes eastbound along and Parkes Way.*

PM peak impacts

- *Travel time increases of around one minute along Commonwealth Avenue in each direction*
- *Increased delays of almost one minute of the off-ramp approaches to the Parkes Way and Edinburgh Avenue interchange*
- *Increased delays of around five minutes on the westbound approach to the Constitution Avenue and Blamey Crescent intersection (to the west of the study area)*
- *Increased delays of almost one minute on the westbound approach to the Northbourne Avenue and London Circuit intersection*
- *Travel time increases of around one minute along Commonwealth Avenue in each direction.*

6.3.2 Public transport

As discussed in Section 5.6, inbound buses currently use the north-west cloverleaf to access London Circuit eastbound from Commonwealth Avenue northbound. The outbound buses use the existing left-turn slip lane to move between London Circuit westbound to Commonwealth Avenue southbound.

The north-west cloverleaf and London Circuit between Edinburgh Avenue and Constitution Avenue would be closed and demolished during Phase 1 of the construction works, as discussed in Section 6.2.2. Therefore, buses are to be rerouted via Vernon Circle to move between Commonwealth Avenue and London Circuit, as shown in Figure 46.

To facilitate the proposed bus diversion, the following road network changes are proposed:

- Signalisation of Vernon Circle north at Northbourne Avenue (subject to a separate works approval), creating gaps in the Vernon Circle traffic flow for buses to cross the three circulating lanes of traffic on Vernon Circle before turning left into Constitution Avenue.
- Widened northern circulating lane of Vernon Circle from one lane to two lanes, of which one lane would be a dedicated bus lane.

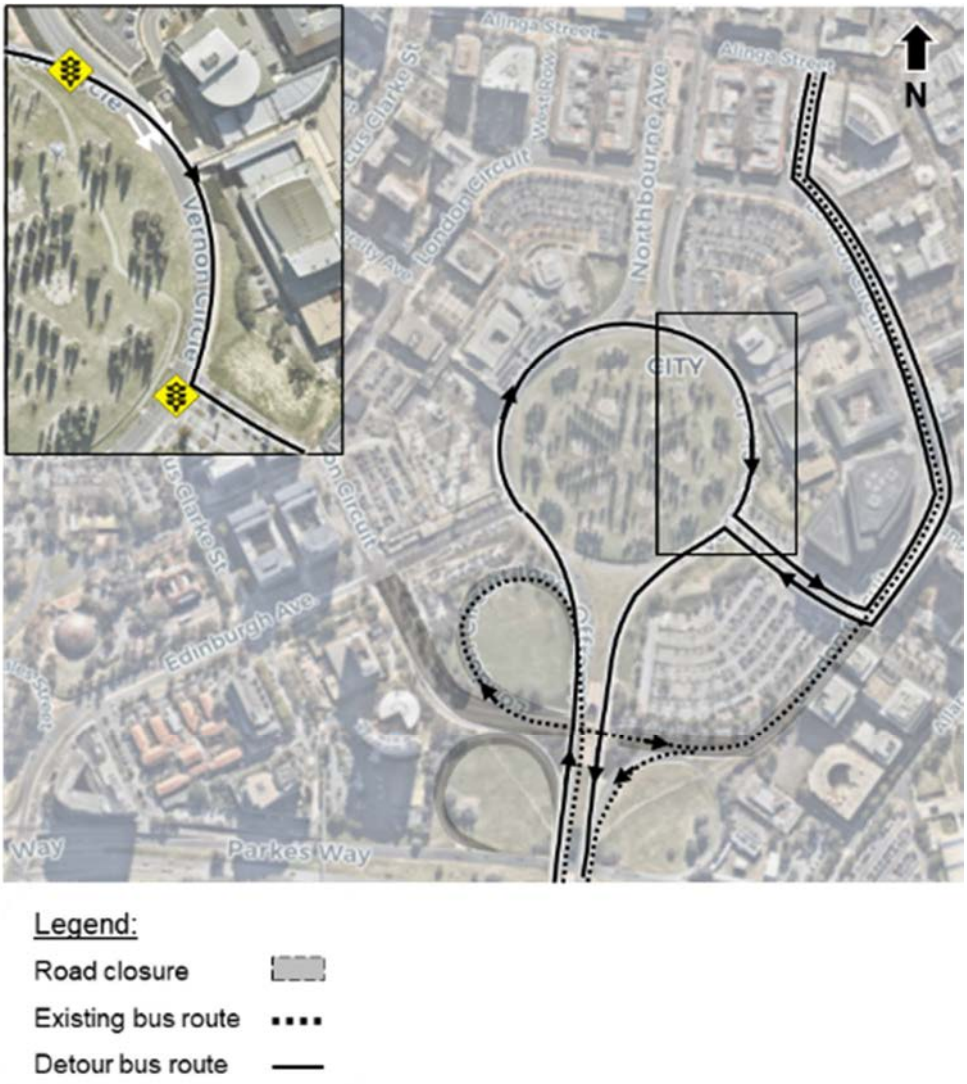


Figure 46 Proposed bus diversion

The cumulative impacts of the proposed bus diversions, associated road network changes and the broader road network changes are detailed in Construction Stage Traffic Analysis Technical Note, prepared by Arup in September 2021 contained in Appendix A. The assessment includes changes to travel times for the following four routes (see Figure 19):

- Route 1 - National Circuit to Alinga Street northbound
- Route 2 - National Circuit to Alinga Street southbound
- Route 3 - State Circuit to Alinga Street northbound
- Route 4 - State Circuit to Alinga Street southbound.

These routes cover most of the existing bus services that use Commonwealth Avenue, including all of the rapid routes and some of the non-rapid routes (discussed in Section 5.6).

The travel time comparisons for all four routes, during the weekday AM and PM peak hours, are summarised in Figure 47.

The travel time assessment indicates that buses that use these routes would likely experience increased travel times during the AM and PM peak hours as a result of the construction works and the increased congestion due to the proposed road closures. Buses along Commonwealth Avenue would

experience delays of around two minutes during the AM and PM peak hours. In the PM peak, some inbound buses may experience an additional one minute of delay along London Circuit, due to increased traffic volumes around London Circuit north as a result of the London Circuit closure between Edinburgh Avenue and Constitution Avenue.

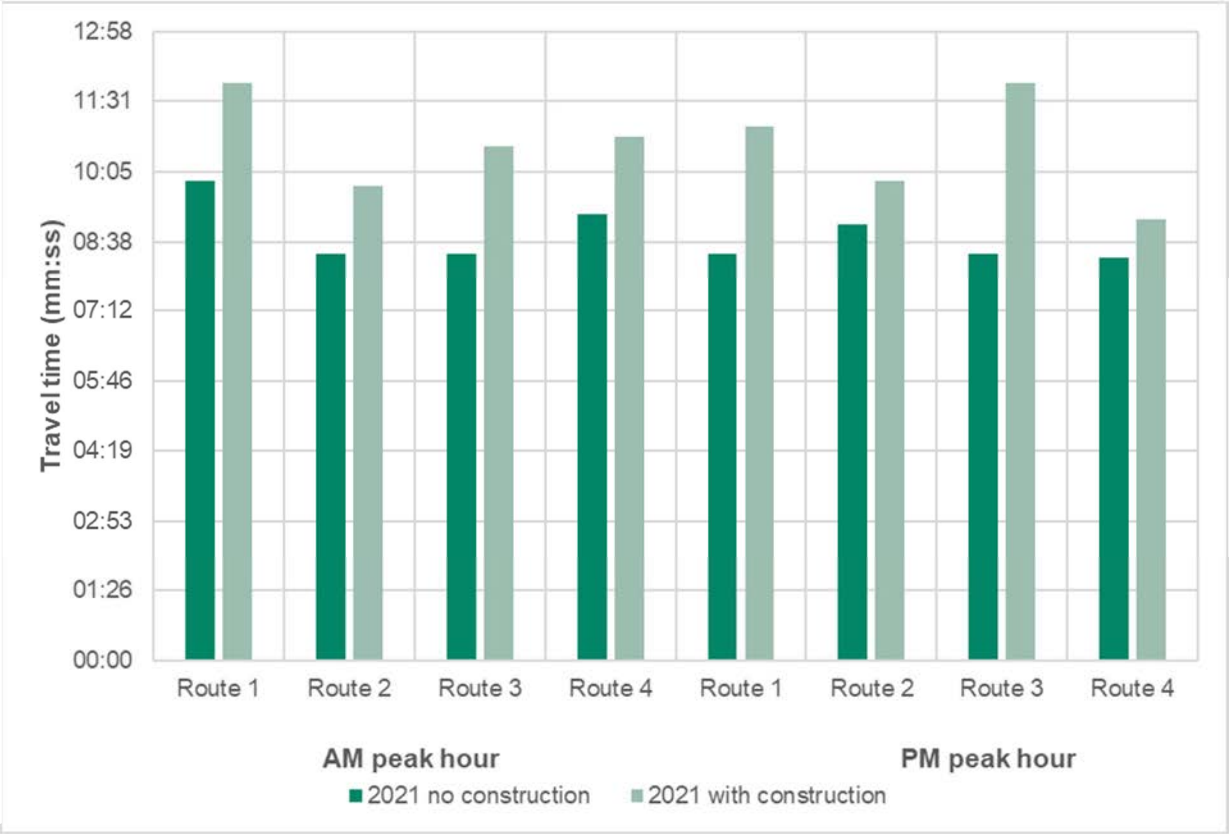


Figure 47 Travel time comparisons without RLC construction vs with RLC construction (Source: Arup, September 2021)

To minimise the bus travel time impacts, it is recommended that provision of bus priority measures be investigated, such that the delays are reduced. This should be combined with a travel demand management strategy that aims to reduce the private vehicle trip generation, particularly during weekday AM and PM peak hours, generated by local residents and employees of the broader CBD area.

6.3.3 Active transport

Along Commonwealth Avenue, the footpaths and narrow on-road cycle lanes would be maintained. However, pedestrians and cyclists would generally be encouraged to use alternative north-south routes via the C8 City Loop, to the east and west of Commonwealth Avenue to avoid the active construction site.

The London Circuit footpaths and on-road cycleways would also be closed between Constitution Avenue and Edinburgh Avenue. Pedestrians and cyclists that currently use these facilities would need to use alternative routes.

The available alternative routes for pedestrians and cyclists and their implications to travel times are discussed in the following sections.

6.3.3.1 Pedestrians

The existing, alternative and encouraged pedestrian routes available during the construction works are shown in Figure 48 and discussed in Table 18.

The available alternative routes that have been identified are limited to those with existing footpaths and crossing facilities. Most of the alternative pedestrian routes would result in minimal increases to walk times of one or two minutes. However, the east-west pedestrian route between Edinburgh Avenue and Constitution Avenue via Vernon Circle would be around four minutes longer than the currently available route via London Circuit south.

To reduce this impact to pedestrians, it is recommended that providing a more direct east-west pedestrian connection be considered.

Table 18 Existing and alternative pedestrian routes and travel time impacts (Source: Google maps)

Route number	Existing route	Alternative route	Impacts to travel time	Encouraged route that avoids Commonwealth Avenue
1	Commonwealth Avenue to/from London Circuit west via the south-west cloverleaf	Commonwealth Avenue to/from London Circuit west via Vernon Circle and Edinburgh Avenue	+1 minute	+ 0 minutes
2	Commonwealth Avenue to/from London Circuit east via the south-east cloverleaf	Commonwealth Avenue to/from London Circuit east via Vernon Circle and Constitution Avenue	+2 minutes	+2 minutes
3	London Circuit south between Edinburgh Avenue and Constitution Avenue.	Vernon Circle between Edinburgh Avenue and Constitution Avenue	+4 minutes	-

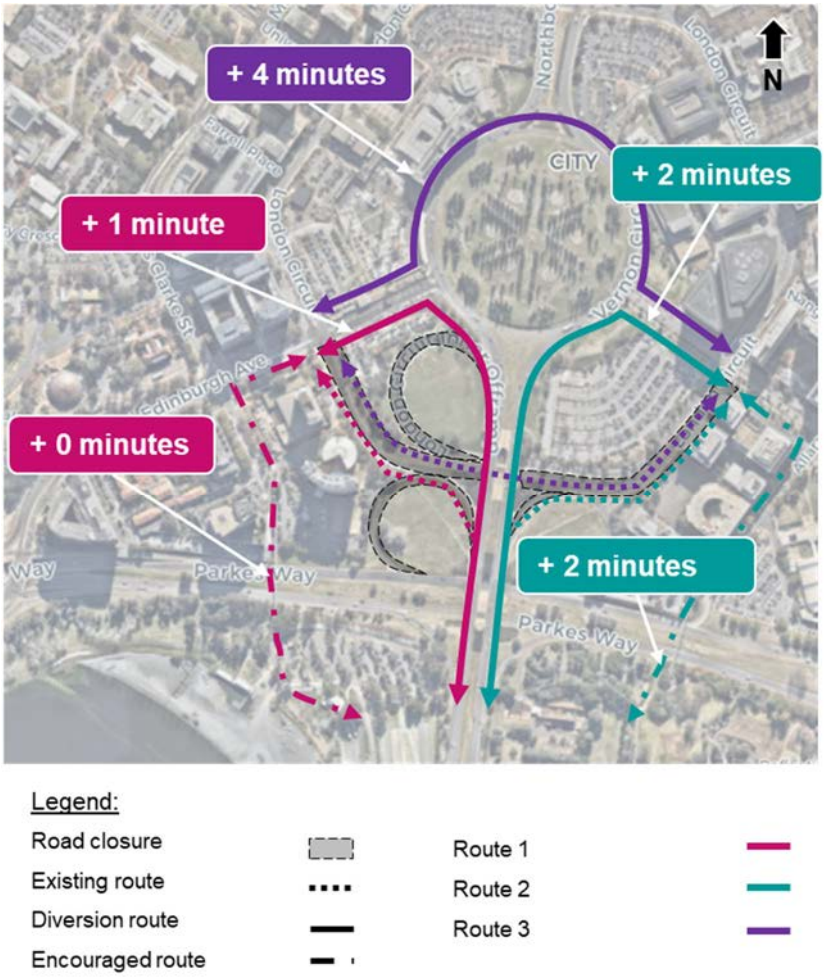


Figure 48 Alternative available pedestrian routes during construction

6.3.3.2 Cyclists

The existing, alternative and encouraged cyclist routes available during the construction works are shown in Figure 49 and discussed in Table 19.

The available alternative routes that have been identified are limited to those with existing cycling provisions or form part of a recognised cycle route. Most of the alternative cycling routes would result in minimal increases to cycle times of one minute. However, the westbound route between Edinburgh Avenue and Constitution Avenue via London Circuit north would be at least three minutes longer than the currently available route via London Circuit south. This does not include the additional time that cyclists would have to wait at intersections along this route.

To reduce this travel time impact to cyclists, it is recommended that providing a more direct westbound cycling connection be considered.

It is noted that the kerbside lane and cycle lane on Vernon Circle is currently closed to the north of Edinburgh Avenue for works at the adjacent Section 100 development. The lane closure is expected to coincide with the RLC construction works for an unknown duration. The cycle lane closure requires pedestrians and cyclists to use a dedicated temporary shared path area in this location. Providing an alternative cycling connection through Vernon Circle could help to minimise the demand along this constrained section of Vernon Circle.

Table 19 Existing and alternative cyclist routes and travel time impacts (Source: Google maps)

Route number	Existing route	Alternative route	Impacts to travel time	Encouraged route that avoids Commonwealth Avenue
1	Commonwealth Avenue northbound to London Circuit west via Vernon Circle and Edinburgh Avenue	Not required	-	+ 0 minutes
2	London Circuit east to Commonwealth Avenue southbound via the south-east cloverleaf	London Circuit east to Commonwealth Avenue southbound via Vernon Circle and Constitution Avenue	+0 minutes	+3 minutes
3	London Circuit south eastbound between Edinburgh Avenue and Constitution Avenue.	Vernon Circle between Edinburgh Avenue and Constitution Avenue	+1 minute	-
4	London Circuit south westbound between Constitution Avenue and Edinburgh Avenue.	London Circuit north between Edinburgh Avenue and Constitution Avenue.	+3 minutes	-

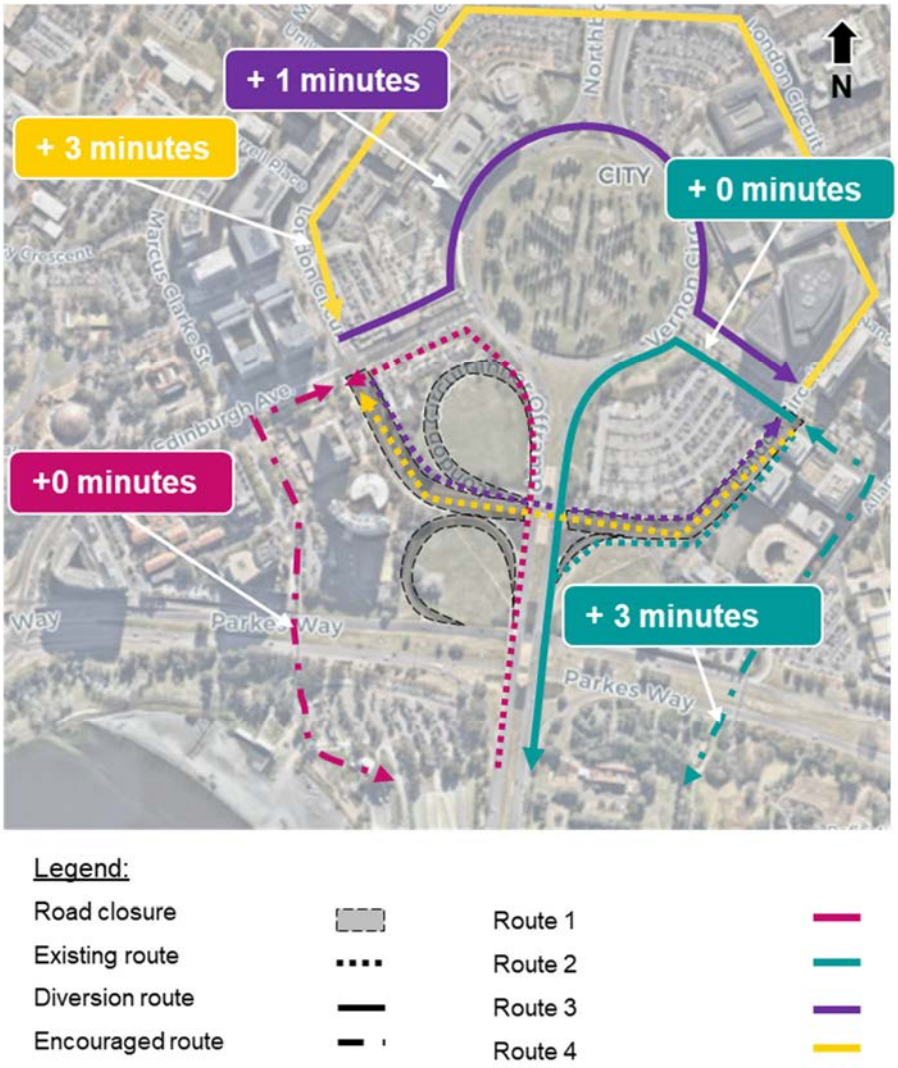


Figure 49 Alternative available cycling routes during construction

6.3.4 Parking and access

6.3.4.1 Kerbside uses

An on-street parking space is located on the eastern part of London Circuit outside the Department of Foreign Affairs and Trade building. This space is typically used by priority visitors to the adjacent building. The proposed London Circuit closure would make this space inaccessible during the RLC construction. An alternative space may need to be temporarily provided on Constitution Avenue or Allara Street.

6.3.4.2 Local area traffic access

As discussed in Section 6.2.2, several road closures are proposed during the RLC construction works. The cumulative traffic impacts of these are discussed in Section 6.3.1.2 and detailed in Appendix A. In terms of local area access, the proposed London Circuit closure as well as the closure of the cloverleaf ramps would require some local area traffic diversions for the following routes:

- Route 1 – Commonwealth Avenue northbound to London Circuit west
- Route 2 – Commonwealth Avenue northbound to London Circuit east
- Route 3 – London Circuit westbound to Commonwealth Avenue southbound
- Route 4 – London Circuit eastbound between Edinburgh Avenue and Constitution Avenue
- Route 5 - London Circuit westbound between Constitution Avenue and Edinburgh Avenue.

The existing routes and the available diversions are shown in Figure 50. The available local area traffic diversions generally have similar lengths to the existing routes and would therefore result in negligible increases to travel distances.

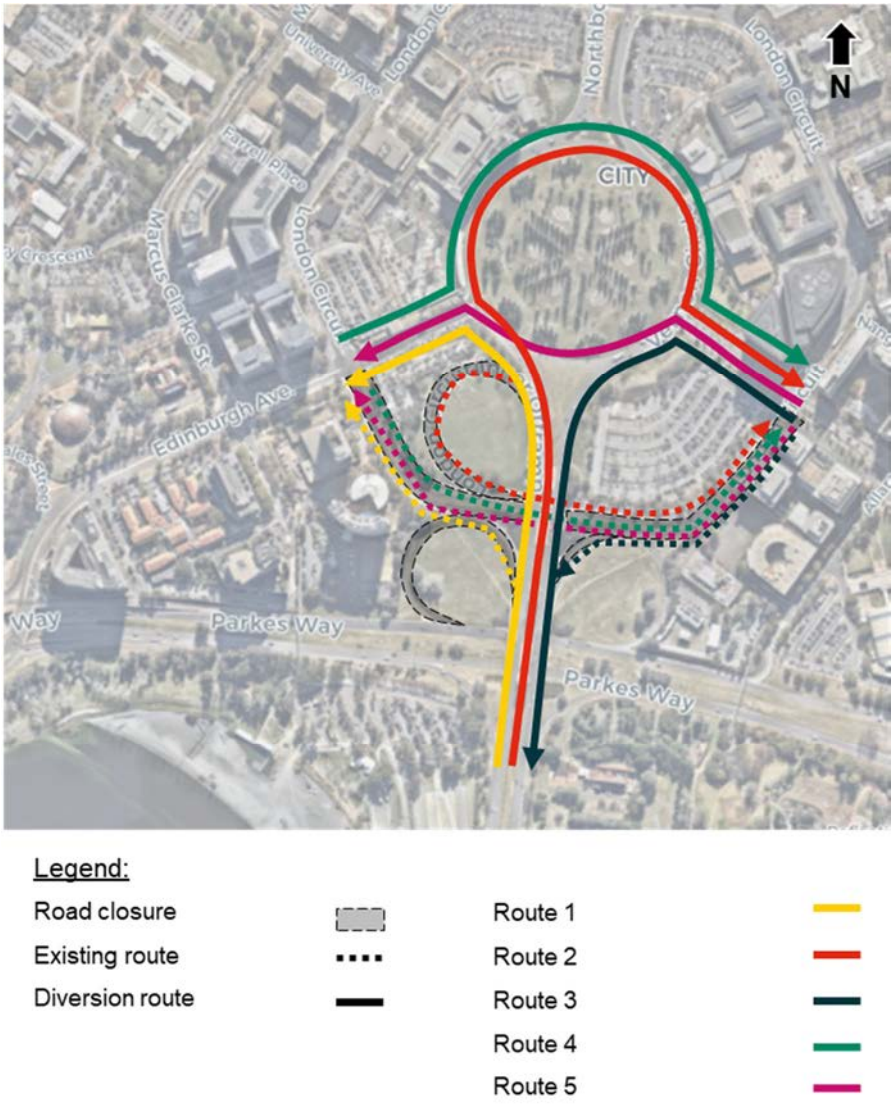


Figure 50 Alternative local area traffic diversion routes during construction

6.3.4.3 Property access

As discussed in Section 5.8.3, the study area directly interfaces with two existing property accesses for the QT Hotel and the Section 63 at-grade car park.

Access to the QT Hotel would be maintained throughout construction, but only to/from the north via the London Circuit/Edinburgh Avenue intersection, as London Circuit would be closed between Edinburgh Avenue and Constitution Avenue.

The Section 63 at-grade car park would be temporarily removed for construction, as discussed in Section 6.3.4.4.

6.3.4.4 Off-street Parking

As discussed in Section 6.2.3, the construction area and compounds include existing car parks. Therefore, RLC construction would result in the following off-street car parking impacts:

- Section 116 compound – temporary loss of approximately 280 public long-stay parking spaces in addition to those that would be lost during the enabling works that would precede the Project's construction
- Section 63 car park – loss of approximately 90 privately operated short-stay parking spaces, which are unlikely to be reinstated after construction given their location on the future Section 63 development site
- Marcus Clarke Street compound – loss of approximately 190 public long-stay car parking spaces
- Acton compound - temporary loss of approximately 80 long-stay parking spaces in the Acton Park car park, for the construction compound.

The works could result in the temporary loss of approximately 640 parking spaces in the study area.

As discussed in Section 5.8.2, the study area currently has a total parking supply of approximately 2,300 spaces. Therefore, nearly 30 per cent of the current parking supply would be affected by the construction works.

Based on parking count data from 2019 and provided by TCCS, it is expected that some of the displaced vehicles could use alternative car parks on a typical weekday, such as the Commonwealth Park car parks and the car park in Acton Park located to the south of the proposed Acton compound. Drivers that choose to use these alternative car parks would have longer walking distances to/from their destinations in the city, which would be commensurate with other Australian cities, where car parking supply is provided on the outer regions of a city centre.

Notwithstanding this, the parking loss brought about by RLC presents an opportunity for a long-term travel demand management strategy that could encourage long-stay visitors and employees of the surrounding CBD area to use more sustainable transport practices, consistent with the strategic transport objectives for the area, where possible. This would minimise the impacts of any parking loss associated with RLC and future planned construction activities within the CBD. More sustainable transport practices could include:

- Increased active and public transport use
- Car pooling
- Work from home practices.

Any affected accessible parking spaces are planned to be replaced in a nearby location to maintain at least the existing accessible parking supply within the study area.

In addition, additional parking management may be required to promote CBD parking for those who need it e.g. parents and carers, elderly etc.

6.3.5 Road safety

The construction activities would generate additional heavy vehicle activity within the study area and along the adjoining road network. This could increase the risk of collisions involving a heavy vehicle. Given the CBD environment and the high level of vulnerable road users in the area, the following measures are proposed to minimise the road safety risks associated with the construction works:

- Full road closure of London Circuit to minimise the interaction between road users and the active constriction site and internal heavy vehicle activity
- Barriers to be provided between Commonwealth Avenue traffic lanes and the adjacent work sites
- 40km/h Road Works speed zone to be posted on Commonwealth Avenue between Vernon Circle and Parkes Way for the duration of the works.

In addition to the above, detailed traffic management measures that promote safe pedestrian crossing and consider other vulnerable road users and their interaction with the construction activities should be established and documented in a Construction Transport Management Plan (CTMP). The CTMP would be developed by the appointed contractor in consultation with Transport Canberra.

6.4 Management and mitigation measures

A summary of the mitigation measures that could support management or mitigation of the construction related transport impacts are summarised in Table 20.

Table 20 Construction safeguards and management measures

Ref	Mitigation measure	Timing	Responsibility
C1	A Traffic and Transport Liaison Group (TTLG) will be established to oversee and review traffic and multi-modal implications of proposed construction activities and network arrangements. TTLG will include representation from: • TCCS • MPC • ACT Emergency Services Agency (ESA) • NCA • Australian Federal Police (AFP) • CRA.	Prior to and during construction	MPC
C2	Prior to implementation, Temporary Traffic Management (TTM) Plans must be endorsed by the Traffic and Transport Liaison Group and have all other necessary approvals in place.	During construction	Contractor
C3	A travel demand management strategy will be developed, to reduce the private vehicle trip generation and parking demand, particularly during weekday AM and PM peak hours, generated by local residents and employees of the broader CBD and surrounding area.	Prior to construction	Territory
C4	A more direct east-west active travel connection between Edinburgh Avenue and Constitution Avenue will be investigated.	Detailed design, Prior to construction	RLC project team/MPC
C5	In consultation with relevant stakeholders, appropriate vehicular access will be maintained to 255 London Circuit (Department of Foreign Affairs and Trade building) and 1 London Circuit (QT Hotel) at all times during construction.	During construction	MPC
C6	A Construction Transport Management Plan (CTMP) will be developed to manage the impacts of the construction activities on the transport network and local parking.	Prior to construction	Contractor
C7	As part of the CTMP, construction vehicle movement arrangements will be developed in consultation with the Traffic and Transport liaison Group (TTLG) to minimise impacts on the city generally, with specific regard to: • Bus movements, and bus priority measures	Prior to and during construction	Contractor

Ref	Mitigation measure	Timing	Responsibility
	• Key pedestrian movements and activity areas • Other construction projects in the locality • Local traffic movement requirements and peak traffic volumes, including long weekends and holiday periods. • Crime prevention through environmental design principles • Special events.		
C8	No net loss of accessible parking across the Project area.	During construction and operation	Contractor
C9	To reduce the impact on public parking facilities, particularly in the Civic region, site workers parking would be provided at appropriate construction compounds to minimise the use of on-street parking. Consideration would be given to providing shuttle services to transport site workers. If shuttle buses are not provided as part of the Project, parking restrictions around work zones will be considered to prevent potential impacts due to the Project use of on- or off-street parking, this must be included in the relevant TMP and approved by TCCS.	During construction	Contractor

6.5 Residual impacts

The residual (after mitigation) impacts associated with the RLC construction works are summarised in Table 21.

Table 21 Summary of construction related impacts of RLC (after mitigation)

Category	Construction transport impact	Likelihood	Consequence	Residual rating
Road network	Increased traffic delays of around one and a half minutes and one minute at the Parkes Way and Edinburgh Avenue interchange during the AM and PM peak hours, respectively.	Possible	Minor	Low
	Increased delays of around fifty seconds on the westbound approach to the Edinburgh Avenue and Marcus Clarke Street intersection in the AM peak hour.	Possible	Minor	Low
	Travel time increases of around one minute along Commonwealth Avenue in each direction in the AM and PM peak hours.	Possible	Minor	Low
	Travel time increases of around one and a half minutes eastbound along and Parkes Way in the AM peak hour.	Possible	Minor	Low
	Increased delays of around five minutes on the westbound approach to the Constitution Avenue and Blamey Crescent intersection in the PM peak hour.	Possible	Minor (very small number of vehicles impacted)	Low
	Increased delays of almost one minute on the westbound approach to the Northbourne Avenue and London Circuit intersection in the PM peak hour.	Possible	Minor	Low
	Additional construction related heavy vehicles using the local road network.	Possible	Minor	Low
	Additional construction worker traffic using the local road network.	Possible	Minor	Low
Public transport	Bus travel time increases of around 2 minutes for bus routes on Commonwealth Avenue in the AM and PM peak hours.	Possible	Moderate	Medium
	Bus travel times increases of an additional 1 minute due to delay experienced by inbound buses on London Circuit in the PM peak hour.	Possible	Moderate	Medium
Pedestrians	London Circuit footpaths closed between Edinburgh Avenue and Constitution Avenue requiring use of alternative routes with increased	Possible	Minor	Low

Category	Construction transport impact	Likelihood	Consequence	Residual rating
	travel times of up to four minutes (from an existing walk time of approximately eight minutes).			
	Removal of pedestrian facilities between London Circuit and Commonwealth Avenue requiring use of alternative routes with increased travel times of up to two minutes.	Possible	Minor	Low
Cyclists	Loss of cyclist connection between London Circuit east and Commonwealth Avenue, requiring use of alternative routes with increased travel times of up to three minutes.	Possible	Minor	Low
	London Circuit closure between Constitution Avenue and Edinburgh Avenue requiring use of alternative routes with increased travel times of up to three minutes.	Possible	Minor	Low
Kerbside uses	The on-street parking space located on the eastern part of London Circuit outside the Department of Foreign Affairs and Trade building would be temporarily lost during construction.	Possible	Minor	Low
Local area traffic access	Road closures would require use of alternative local area traffic routes via Vernon Circle, Edinburgh Avenue and Constitution Avenue with limited to no increase to travel distances.	Likely	Insignificant	Low
Property access	Access to the QT Hotel would be maintained but only to/from the north via the London Circuit/Edinburgh Avenue intersection. Some vehicles would need to use alternative routes and/or use the main QT Hotel access via Edinburgh Avenue.	Likely	Insignificant	Low
Parking	Temporary loss of approximately 640 long-stay parking spaces in the study area.	Possible	Moderate	Medium
Road safety	Additional heavy vehicles within the area, conflicting with pedestrians and cyclists.	Possible	Minor	Low

7.0 Operation impact assessment

7.1 Summary of impacts

A summary of the operational related transport impacts (post-construction) are summarised in Table 22 and discussed in the following sections of this report.

Table 22 Summary of unmitigated operational impacts of RLC (post-construction)

Type	Operational impacts	Likelihood	Consequence	Rating
Road network	Increased travel times due to traffic growth and RLC in 2026	Possible	Minor	Low
	Increased weekday peak period travel times due to the cumulative impacts of RLC, other planned projects and traffic growth in 2036	Possible	Moderate	Medium
	Cumulative impacts of RLC, other planned projects and traffic growth on weekday peak period traffic congestion (density) in 2036	Possible	Moderate	Medium
	Cumulative impacts of RLC, other planned projects and traffic growth on weekday peak period performance of the London Circuit and Commonwealth Avenue intersection o in 2036	Possible	Moderate	Medium
Public transport	Increased weekday peak period bus travel times due to the cumulative impacts of RLC, other planned projects and traffic growth in 2036	Possible	Minor	Low
Pedestrians and cyclists	Providing signalised pedestrian crossings for all legs at the intersection of Commonwealth Avenue and London Circuit could result in delays for pedestrians waiting at the proposed intersection of London Circuit and Commonwealth Avenue.	Possible	Insignificant	Very low
	The continuous footpaths proposed along London Circuit would make it easier to walk between London Circuit east and west, improving east-west connectivity for the southern CBD area and generally improving walkability in the area.	N/A	N/A	Beneficial
	Providing intersecting footpaths and cycleways along London Circuit and Commonwealth Avenue would improve permeability and access to/from the city south. The proposed paths are more direct and more legible than the current facilities via the cloverleaf ramps, making it easier for cyclists and pedestrians to navigate between London Circuit and the City Hill area and areas to the south such as Lake Burley Griffin or Capital Hill via Commonwealth Avenue.	N/A	N/A	Beneficial

Type	Operational impacts	Likelihood	Consequence	Rating
Local area traffic access	Removal of the southbound right turn at the intersection of London Circuit and Edinburgh Avenue requires traffic moving between London Circuit and Edinburgh Avenue to use alternative routes.	Likely	Insignificant	Low
Property access	Access to the QT porte-cochere via London Circuit would be restricted to left-in and left-out instead of all movements. Vehicles approaching from the north and departing to the south would need to use alternative routes and/or the main QT Hotel access via Edinburgh Avenue.	Likely	Insignificant	Low
Off-street parking	Loss of approximately 50 long-stay parking spaces from the Section 116 long-stay car park on London Circuit east.	Likely	Minor	Medium
Road safety	Proposed signalised intersection of London Circuit and Commonwealth Avenue could create new intersection related conflicts.	Possible	Moderate	Medium
	Providing off-road cycling facilities along Commonwealth Avenue and London Circuit, combined with wider footpaths improves safety for vulnerable users, by separating cyclists, pedestrians, and traffic.	N/A	N/A	Beneficial
	The removal of the south-west and north-west cloverleaf ramps and provision of signalised crossings on all legs of the intersection of Commonwealth Avenue and London Circuit would accommodate safer pedestrian and cyclist crossings, particularly for movements between London Circuit and Commonwealth Avenue and minimising safety risks and complexities associated with the current uncontrolled crossings on the cloverleaf ramps.	N/A	N/A	Beneficial

7.2 Impact assessment

7.2.1 Road network

7.2.1.1 Network changes

RLC modifies the road network, largely along London Circuit between Edinburgh Avenue and Commonwealth Avenue, as well as some localised changes on Commonwealth Avenue, as indicatively shown in Figure 51.

At the signalised intersection of London Circuit and Edinburgh Avenue, the southbound right turn and the northbound right turn would be banned in anticipation of a future Light Rail to Woden arrangement on London Circuit, where these right turns could not be accommodated.

The largest road network changes are associated with the conversion of London Circuit and Commonwealth Avenue from a grade separated arrangement to an urban signalised intersection. This involves removing the north-west and south-west cloverleaf ramps and adjoining slip lanes which currently accommodate movements between Commonwealth Avenue and London Circuit.

The proposed intersection of London Circuit and Commonwealth Avenue would form the city's gateway to/from the south. It aims to slow vehicles down and transition them from an environment with limited interaction between different road users and typically higher travel speeds, to a slower speed area with significantly higher pedestrian and cyclist activity and more interaction between different road users.

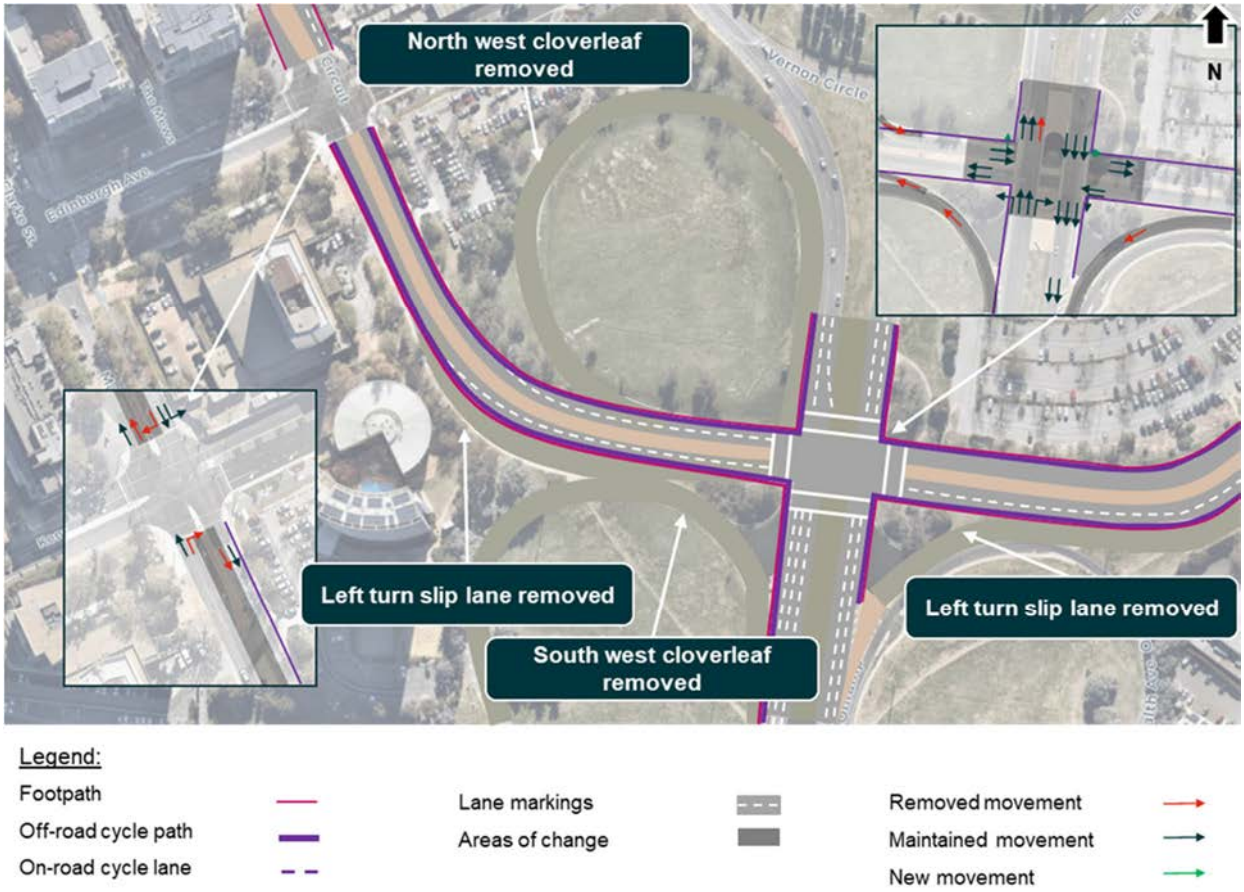


Figure 51 RLC road network changes

The proposed London Circuit and Commonwealth Avenue intersection would accommodate all of the existing traffic movements between London Circuit and Commonwealth Avenue, including:

- north-west cloverleaf to be replaced by the northbound right turn from Commonwealth Avenue to London Circuit
- westbound slip lane from London Circuit to Commonwealth Avenue southbound to be replaced by the westbound left turn from London Circuit to Commonwealth Avenue
- northbound slip lane from Commonwealth Avenue to London Circuit westbound to be replaced by a northbound left turn from Commonwealth Avenue to London Circuit.

In addition, the following new movements would be catered for by the new London Circuit and Commonwealth Avenue intersection:

- eastbound left turn from London Circuit to Commonwealth Avenue
- southbound left turn from Commonwealth Avenue to London Circuit.

The Project includes removal of the south-west cloverleaf, which currently facilitates the northbound movement from Commonwealth Avenue to Parkes Way eastbound. The Project doesn't replace this movement.

The following road network changes are also proposed:

- Northbound through capacity on Commonwealth Avenue is reduced from three lanes to two lanes, to accommodate the new dedicated right turn lane and left turn lane on the Commonwealth Avenue northbound approach to the proposed London Circuit and Commonwealth Avenue intersection.
- The southbound merge from three lanes to two lanes on Commonwealth Avenue would be shifted to the south, to the departure side of the new intersection.

The cumulative impacts of the proposed road network changes are discussed in the following sections of this report.

7.2.1.2 Travel times

7.2.1.2.1 2026

Figure 52 and Figure 53 shows the assessed forecast travel times for 2026 in the AM and PM peak hours, respectively, for the without Project and the with Project scenario.

The introduction of RLC is likely to cause some minor traffic reassignment around the city centre. Travel time route 1 State Circle to Barry Drive via Commonwealth Avenue and route 6 State Circle to City via Kings Avenue are the two routes that would most likely be directly affected by RLC in 2026.

In the AM peak, Figure 52 shows the relatively minor forecast impact on northbound and southbound journey times of RLC. This would arise from the introduction of a signal-controlled intersection at London Circuit and Commonwealth Avenue. The following potential impacts are noted:

- Route 1– travel time increases of approximately one minute in the southbound direction
- Route 6 - travel time increases of one minute in the southbound direction.

Figure 53 shows that in the PM peak the effects of RLC are similar to those observed in AM peak, including:

- Route 1– travel time increases of nearly 30 seconds in the northbound and southbound direction
- Route 4 – travel time increases of nearly two and a half minutes in the southbound direction
- Route 6 - travel time increases of approximately three minutes in the northbound direction.

Travel time reductions would be expected across most other routes during the AM and PM peak hours.

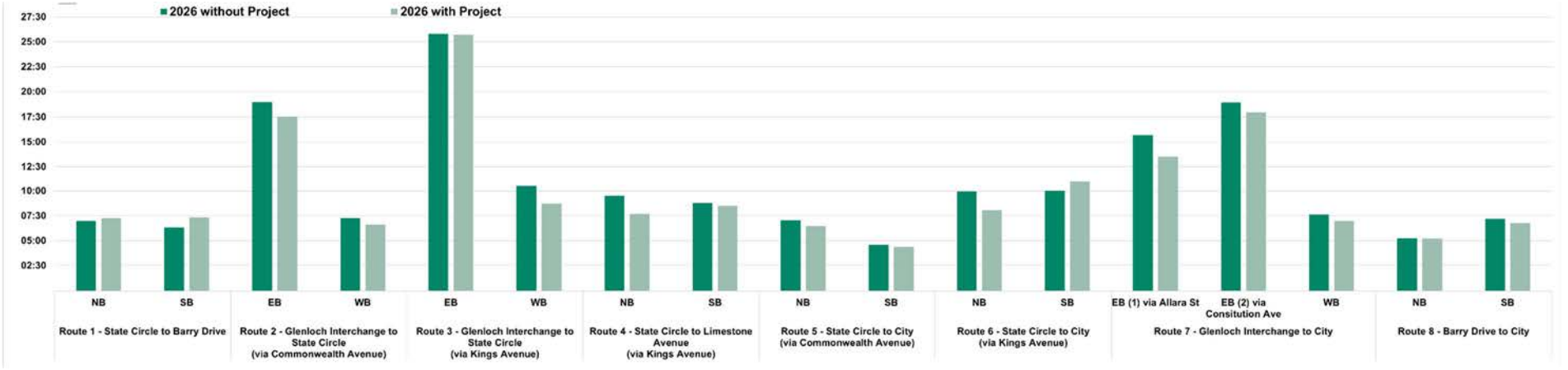


Figure 52 Travel time comparison for AM peak in 2026

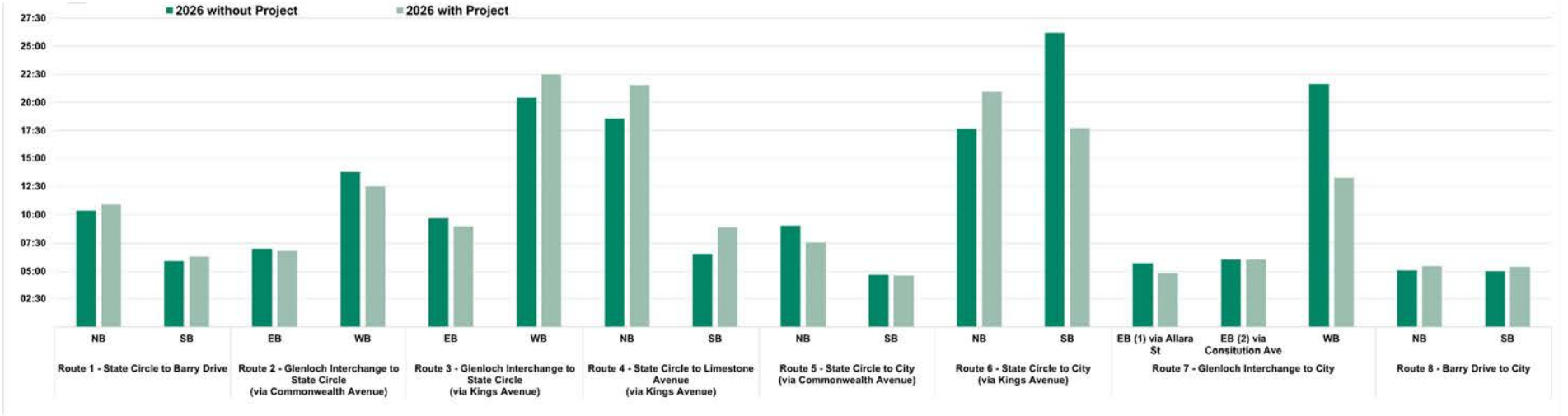


Figure 53 Travel time comparison for PM peak in 2026

7.2.1.2.2 2036

In 2036, the introduction of the Project, Light Rail to Woden as well as the two most significant land use developments, Section 100 and Section 63 are likely to change traffic patterns in the localised area and may result in increased travel times on some parts of the road network, in the vicinity of the Project.

. Figure 54 shows that in the AM peak, the following travel time changes could occur:

- Route 1 - northbound travel times could increase by nearly four minutes, as a result of the addition of light rail in the London Circuit and Commonwealth Avenue intersection.
- Route 2 – an increase in westbound travel times from the Glenloch Interchange to State Circle via Commonwealth Avenue of nearly two minutes, as a result of the addition of traffic signals at the potential future Commonwealth Avenue Light Rail to Woden stop by Albert Street.
- Route 3 - increase in westbound travel times by approximately four minutes from the Glenloch Interchange to State Circle via Kings Avenue, as a result of reassignment of traffic and potential congestion on Parkes Avenue westbound.
- Route 5 – northbound journeys could increase by about two and a half minutes, due to the introduction of a light rail at the intersection of London Circuit and Commonwealth Avenue.
- Route 6 - a small increase in northbound travel times of two minutes could occur, due to road users changing route between State Circle and the City, from Commonwealth Avenue to Kings Avenue.

Figure 55 shows that in the PM peak the effects of RLC and other planned projects on travel times would likely be similar to those observed in AM peak.

- Route 1 – northbound journeys could increase by approximately three minutes in the PM peak, due to the introduction of a light rail at the intersection of London Circuit and Commonwealth Avenue as well as the introduction of new traffic signals on Commonwealth Avenue at Albert Street to provide full access to the potential, future Commonwealth Park stop.
- Route 2 – could result in a small increase in westbound travel times of two and a half minutes, as a result of the addition of traffic signals at the potential future Commonwealth Park light rail stop by Albert Street.
- Route 5 – northbound journeys could increase by about one and a half minutes, due to the introduction of a light rail at the intersection of London Circuit and Commonwealth Avenue.
- Route 6 – northbound and southbound travel times could increase by approximately four minutes and two minutes respectively, as a result of light rail running through the London Circuit and Commonwealth Avenue intersection operation and associated traffic reassignment.

There is the potential for travel time increases on the network in the longer term. This is primarily as a result of continued land use development and resultant additional growth in trip making, and travel demand, in the Canberra metropolitan area.

The differences in travel times that could occur in future between the with Project scenario and the without Project scenario in 2036 are primarily due to the implementation of the infrastructure to facilitate the future Light Rail to Woden stages and the operation of light rail, rather than RLC.

Furthermore, the assessment of travel times is based on a conservative analysis that assumes traffic growth and travel patterns that are based on historical conditions and that doesn't consider any modal shift (for example from car to light rail) that could be expected with the introduction of Light Rail to Woden. All of which would present overall an improved outcome over that presented here.

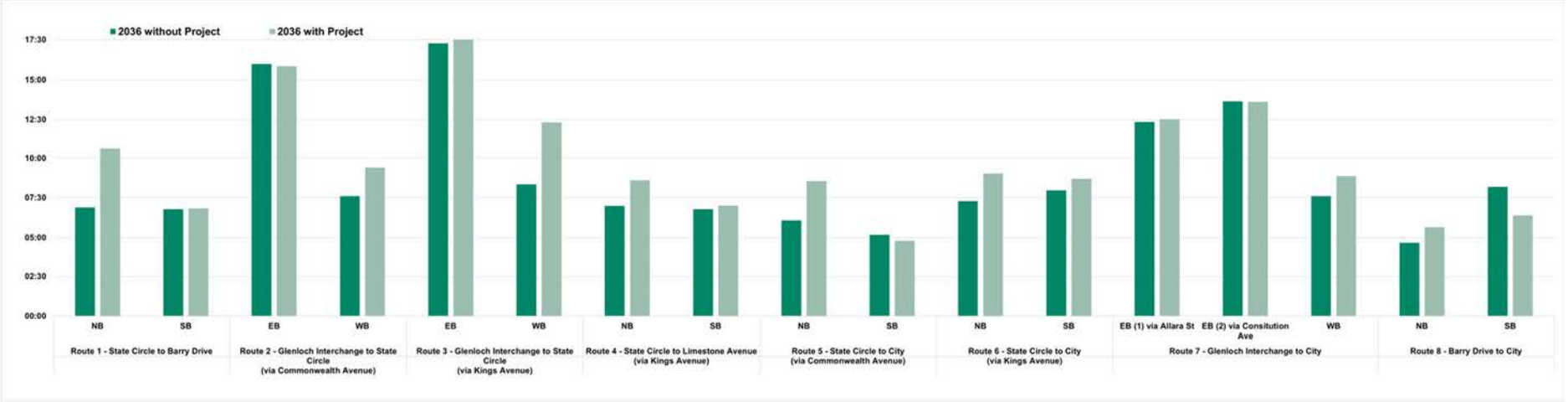


Figure 54 Travel time comparison for AM peak in 2036

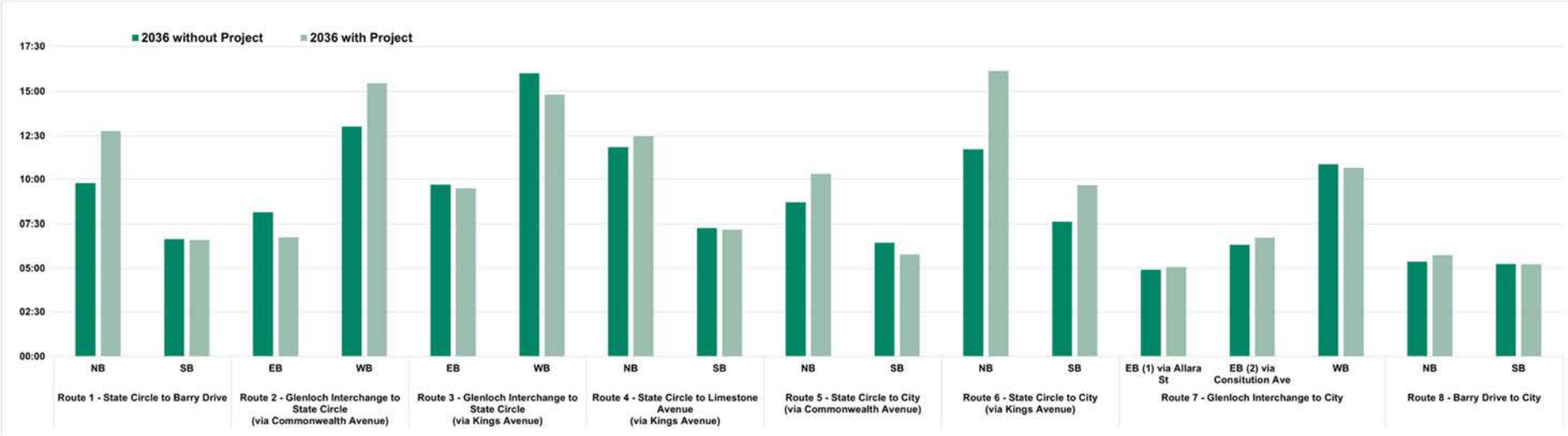


Figure 55 Travel time comparison for PM peak in 2036

7.2.1.3 Density

7.2.1.3.1 2026

A comparison of Figure 56 and Figure 57 indicates that in 2026, RLC would have very little effect on network density in the AM peak hour. Minor increases in density could occur at the intersection of London Circuit and Commonwealth Avenue due to its signalisation.

A comparison of Figure 58 and Figure 59 also indicates that RLC would have very little effect on network density in the PM peak hour. Additional density was noted at the Kings Avenue interchange with Parkes Avenue due to redistribution of traffic after removing the north-west and the south-west cloverleaf ramps and the signalisation of the London Circuit and Commonwealth Avenue intersection.

Overall, RLC would have minimal impacts on network density in the 2026 AM and PM peak hours.

Figure 56 Network density AM peak without Project in 2026

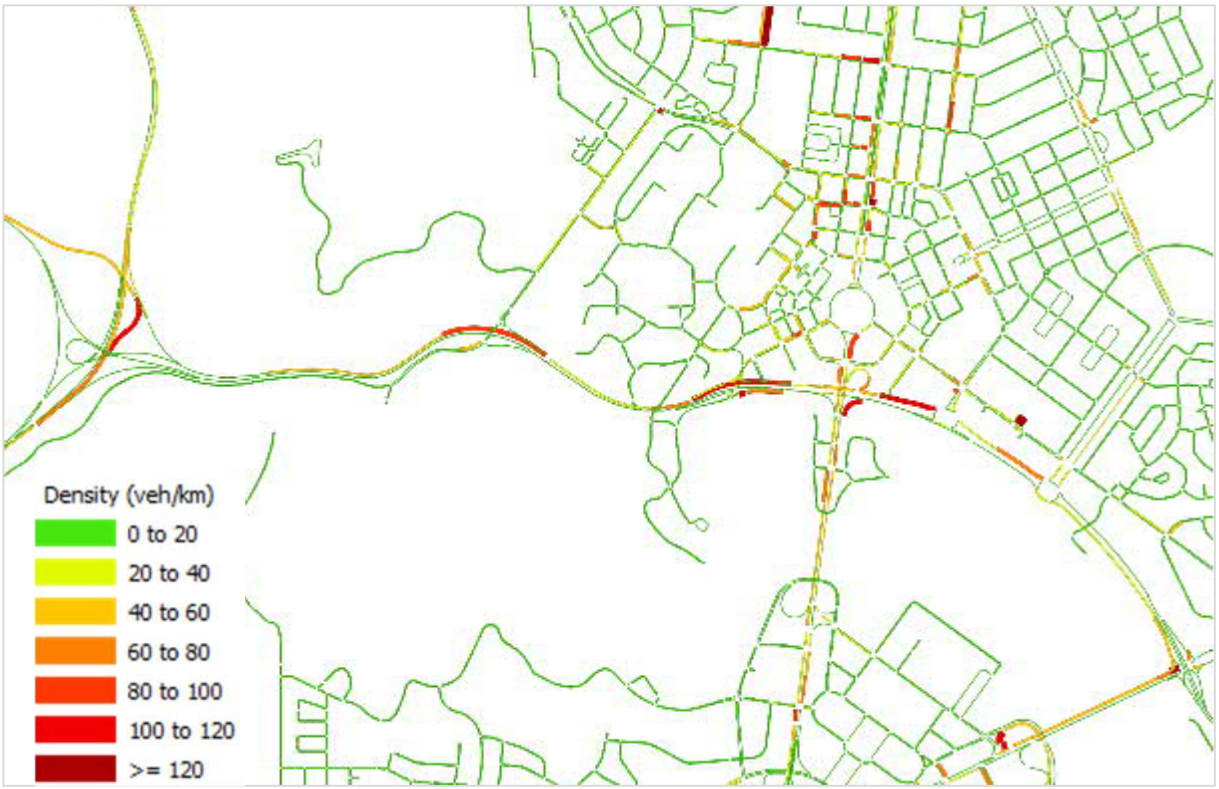


Figure 57 Network density AM peak with Project in 2026

Figure 58 Network density PM peak without Project in 2026

Figure 59 Network density PM peak with Project in 2026

7.2.1.3.2 2036

A comparison of Figure 60 and Figure 61 shows that the Project could result in minor increases in density in the 2036 AM peak hour at the following locations:

- Commonwealth Avenue and London Circuit intersection due to the additional phase time allocated to the potential future light rail movement
- Northbourne Avenue and London Circuit intersection due to the additional phase time allocated to the potential future light rail movement
- Along London Circuit between West Row and Commonwealth Avenue, due to the reduction of lane capacity and additional phase time allocated to the potential future light rail movement
- Commonwealth Avenue northbound due to the signalisation of the intersection of Commonwealth Avenue and Albert Street

A minor reduction in density is shown on Parkes Way eastbound between Allara Street and Anzac Parade, due to the potential future Parkes Way upgrade.

Similarly, comparison of Figure 62 and Figure 63 shows that the Project could cause minor increases in density during the 2036 PM peak hour at the following locations:

- Commonwealth Avenue and London Circuit intersection due to the additional phase time allocated to the potential future light rail movement
- Northbourne Avenue and London Circuit intersection due to the additional phase time allocated to the potential future light rail movement.

Overall, the cumulative impacts of RLC and Light Rail to Woden would have minimal impacts on network density in the 2036 AM and PM peak hours. Notwithstanding this, a travel demand management strategy should be developed by the Territory to support a mode shift towards public transport including the potential future Light Rail to Woden. This could lead to less peak hour traffic volumes and reduced traffic congestion in the future than the worst-case assessment that is documented in this report.

Figure 60 Network density AM peak without Project in 2036

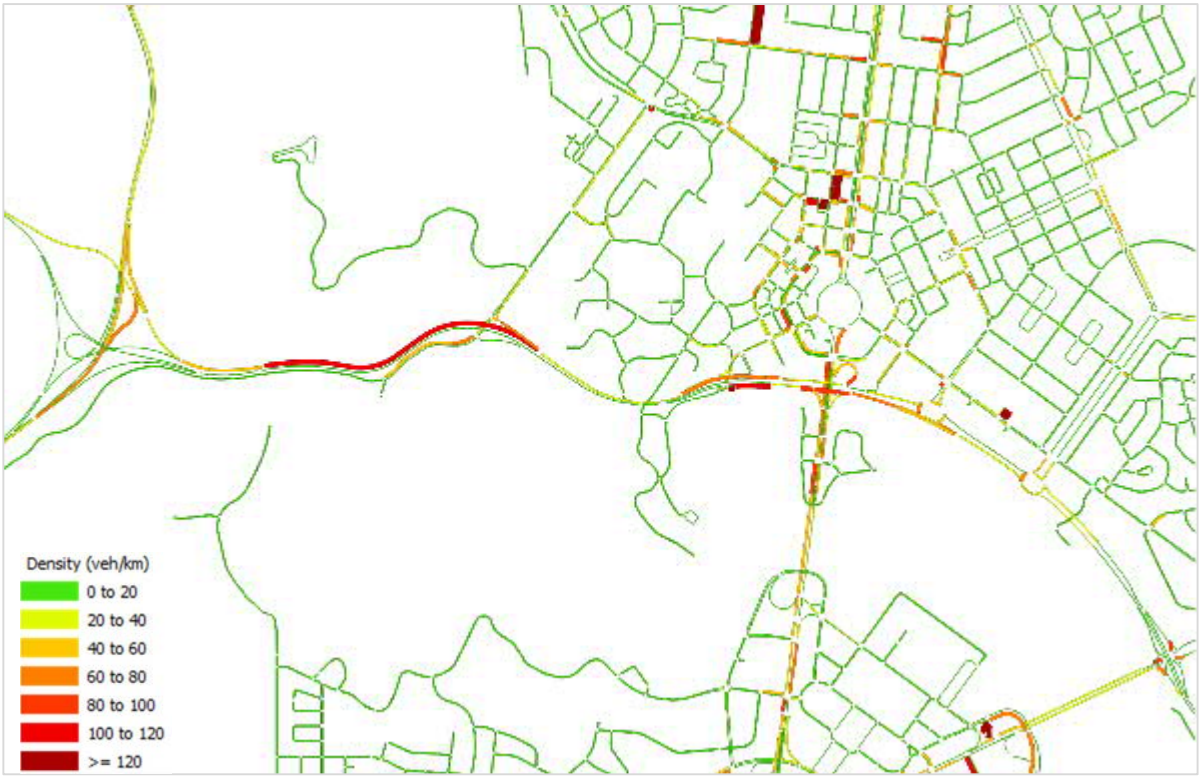


Figure 61 Network density AM peak with Project in 2036

Figure 62 Network density PM peak without Project in 2036

Figure 63 Network density PM peak with Project in 2036

7.2.1.4 Network performance statistics

As noted in Section 4.4.2.3, a range of network performance statistics have been drawn from the Aimsun mesoscopic model. Comparing these statistics give an understanding of the modelled conditions for each scenario. These can be compared to understand the overall network impacts of the Project during 2026 and 2036.

7.2.1.4.1 AM peak

Table 23 presents a comparison of the network statistics for all assessment scenarios in the AM peak.

Table 23 Comparison of network statistics in the AM peak for all scenarios

Network performance statistics	2026 without Project	2026 with Project	2036 without Project	2036 with Project
Total vehicle kilometres travelled through network (km)	831,310	828,623	866,486	865,523
Total vehicle travel time through the network (hours)	22,077	22,001	25,939	26,354
Average network speed	37.7	37.7	33.4	32.8
Total demand (1h)	106,108	106,108	115,324	115,256
Unreleased trips	1,627	2,256	2,579	2,348
Unreleased trips (% of total demand)	1.5%	2.1%	2.2%	2.0%

Table 23 indicates that the percentage of unreleased trips that fail to enter the model space in the AM peak is very small in 2026 without Project. One and a half per cent is significantly less than benchmark microsimulation models for other City centres within Australian state capitals that would typically range from two to five per cent (but can be far greater).

Comparing the network performance between the 2026 without Project and the 2026 with Project scenarios indicates that RLC would have a negligible impact on congestion within the area of the area covered by the Aimsun mesoscopic model, noting the following:

- Total vehicle kilometres and vehicle travel time change very little between the without Project and with Project scenarios
- Very small increase in unreleased vehicles (less than one per cent) occurred in the with Project scenario
- Average vehicle speed within the network and total demand remain unchanged between the without Project and with Project scenarios.

Table 23 also indicates that as population and employment within Canberra grows, total traffic demand would grow by about nine per cent to 2036, and average vehicle speeds would fall by less than three km/h. The increased travel demand would also result in a small increase in the number of unreleased vehicles (less than one per cent). An increase in vehicle kilometres travelled (less than five per cent) and an increase in vehicle travel time (about 19 per cent) could also occur. These network statistics indicate that traffic congestion and delay would slightly increase with population growth between 2026 and 2036.

The introduction of Light Rail to Woden in the AM peak hour in 2036 would also likely have a negligible impact on congestion within the area of the city covered by the Aimsun mesoscopic model.

7.2.1.4.2 PM peak

Table 24 presents a comparison of network statistics for all assessment scenarios in the PM peak.

Table 24 Comparison of network statistics in the PM peak for all scenarios

Network performance statistics	2026 without Project	2026 with Project	2036 without Project	2036 with Project
Total vehicle kilometres travelled through network (km)	773,612	771,945	803,075	804,273
Total vehicle travel time through the network (hours)	18,945	19,211	21,363	21,200
Average network speed	40.8	40.2	37.6	37.9
Total demand (1h)	98,315	98,315	104,692	104,626
Unreleased trips	1,295	1,443	2,495	2,507
Unreleased trips (% of total demand)	1.3%	1.5%	2.4%	2.4%

Table 24 also shows small volumes of unreleased vehicles and well within the range that would be expected for a capital city.

Comparing the network performance between the 2026 without Project and the 2026 with Project scenarios indicates that RLC would have a negligible impact on congestion within the area of the city covered by the Aimsun mesoscopic model, noting the following:

- Total vehicle kilometres and vehicle travel time change very little between the without Project and with Project scenarios
- Very small increase in unreleased vehicles (less than one per cent) occurred in the with Project scenario
- Average vehicle speed within the network falls by less than one km/h with Project
- Total demand remains unchanged between the without Project and with Project scenarios.

Table 24 also indicates that as population and employment within Canberra grows, total traffic demand would grow by about six per cent and average vehicle speeds could fall by three km/h. The increase travel demand would also result in a small increase in the number of unreleased vehicles (less than two per cent). An increase in vehicle kilometres travelled (about four per cent) and an increase vehicle travel time (about 12 per cent) could also occur. These network statistics indicate that traffic congestion and delay slightly increases with population growth between 2026 and 2036.

The introduction of Light Rail to Woden in the PM peak hour in 2036 would also likely have a negligible impact on congestion within the area of the city covered by the Aimsun mesoscopic model.

7.2.1.5 Intersection performance

7.2.1.5.1 London Circuit and Commonwealth Avenue

The forecast performance for the intersection of London Circuit and Commonwealth Avenue for all assessment scenarios is summarised in Table 25.

Table 25 Intersection performance for London Circuit and Commonwealth Avenue intersection

Scenario	AM peak		PM peak	
	Average delay (seconds)	Level of Service	Average delay (seconds)	Level of Service
2026 with Project	63	E	58	E
2036 with Project Woden	133	F	74	F

Table 25 shows that the proposed London Circuit and Commonwealth Avenue intersection would operate with a Level of Service E in the AM and PM peaks in 2026.

The introduction of the potential Light Rail to Woden and traffic demand growth would likely have a minor impact on the London Circuit and Commonwealth Avenue intersection's performance, resulting in a Level of Service F during both peak hours in 2036.

Background traffic growth arising from changes in population and employment results in increased traffic demand in 2036 (7 per cent in the AM peak and six per cent in the PM peak). When traffic demand increases through intersections with high volume/capacity ratios the increase in delay can be much more pronounced. Such an increase in delay at the intersection could be addressed by increasing mode shift to public transport or further upgrades/enhancements to the intersection to increase capacity.

7.2.1.5.2 London Circuit and Edinburgh Avenue

The forecast performance for the intersection of London Circuit and Edinburgh Avenue for all assessment scenarios is summarised in Table 26 and shown in Figure 64.

The intersection of London Circuit and Edinburgh Avenue would operate with a good Level of Service (C or D) for all scenarios.

Table 26 Intersection performance for London Circuit and Edinburgh Avenue intersection

Scenario	AM peak		PM peak	
	Average delay (seconds)	Level of Service	Average delay (seconds)	Level of Service
2026 without Project	46	D	39	C
2026 with Project	42	C	41	C
2036 without Project	33	C	32	C
2036 with Project	46	D	40	C

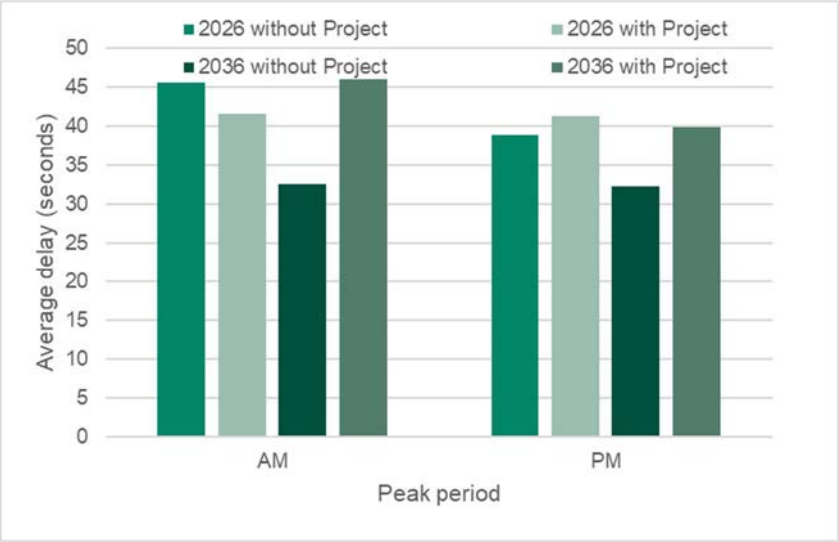


Figure 64 Average delay for London Circuit and Edinburgh Avenue intersection

7.2.1.6 Summary

The assessment presented shows that the proposed road network changes associated with Project are expected to have a minor impact to the local road network in the short-term (2026). However, the cumulative impacts of RLC and other planned projects could cause some impacts to the road network in the future (in 2036).

This could include traffic redistribution away from Commonwealth Avenue and some increased travel times and potentially some minor increases in congestion across the city centre. These impacts are anticipated as a result of the following key network changes that would be needed to accommodate the future potential Light Rail to Woden:

- Reduction of lane capacity along London Circuit
- Additional phase time allocated to the light rail movements at intersections, particularly at the London Circuit and Commonwealth Avenue intersection and the London Circuit and Northbourne Avenue intersection
- Introduction of traffic signals on Commonwealth Avenue by Albert Street, close to the potential future Commonwealth Park stop.

In addition, it is expected that congestion along Parkes Way may decrease, should the Parkes Way upgrade be completed in the future.

Notwithstanding the above, it is noted that the assessment documented in Section 7.2.1.2 to Section 7.2.1.5 is based on conservative analysis and that the modelling assumes traffic growth and travel patterns based on historical conditions and doesn't consider any modal shift that could be expected with the future, potential introduction of Light Rail to Woden and other associated strategic transport initiatives.

As reference, along the CLR1 alignment, peak hourly traffic volumes have generally decreased since the light rail was opened in 2019. Providing a high-quality public transport alternative has encouraged transport users to travel to/ from the north via public transport instead of using private vehicles.

It is therefore anticipated that similar outcomes would result from Light Rail to Woden. Therefore, the overall road network performance discussed in this report is considered a worst-case assessment that would be unlikely to eventuate should the planned public transport improvements proceed (subject to separate planning approvals).

7.2.2 Public transport

Buses currently use the existing north-west cloverleaf and the westbound slip lane to travel between London Circuit and Commonwealth Avenue in the inbound and outbound directions, respectively. These movements would continue to be facilitated by the northbound right turn and the westbound left turn at the proposed signalised intersection of London Circuit and Commonwealth Avenue, as discussed in Section 7.2.1.1. Therefore, buses may need to stop at the London Circuit and Commonwealth Avenue intersection, experiencing minor delays that they don't currently experience.

The buses that use Commonwealth Avenue may also experience the travel time impacts to route 1 and 5, that were discussed in Section 7.2.1.2. However, as buses have longer travel times due to their stopping patterns, they wouldn't experience the full extent of the travel time increases that general traffic could experience. Given this, the overall impact of RLC to buses and their travel times is expected to be minor.

7.2.3 Active transport

7.2.3.1 Proposed infrastructure

RLC proposes safer, more legible, and more direct, active transport infrastructure that would improve pedestrian and cyclist safety, connectivity and amenity along London Circuit and Commonwealth Avenue as well as between the two corridors and adjoining principal active travel routes.

The proposed active transport provisions are shown in Figure 65 and include:

1. Two m wide off-road cycle paths on Commonwealth Avenue within the works extent and tying into the existing on-road cycle lanes at the northern and southern extents of the study area
2. Two and a half m wide footpaths along both sides of Commonwealth Avenue
3. Continuous three to three and a half m wide footpaths along both sides of London Circuit between Edinburgh Avenue and near Constitution Avenue at the eastern extent of works
4. Two m wide off-road separated cycle paths on both sides of London Circuit between Edinburgh Avenue and near Constitution Avenue
5. Signalised pedestrian and cyclist crossings on all legs of the proposed Commonwealth Avenue and London Circuit intersection.

No changes are proposed outside the study area or to the existing crossing facilities at the London Circuit and Edinburgh Avenue intersection and the London Circuit and Constitution Avenue intersection.

Collectively, the proposed active transport improvements would offer the following benefits:

- The continuous footpaths proposed along London Circuit would make it easier to walk between London Circuit east and west, improving east-west connectivity for the southern CBD area and generally improving walkability in the area.
- The removal of the south-west and north-west cloverleaf ramps and provision of signalised crossings on all legs of the intersection of Commonwealth Avenue and London Circuit would accommodate safer pedestrian and cyclist crossings, particularly for movements between London Circuit and Commonwealth Avenue and minimising safety risks and complexities associated with the current uncontrolled crossings on the cloverleaf ramps.
- Providing off-road cycling facilities along Commonwealth Avenue and London Circuit, combined with wider footpaths improves safety for vulnerable users, by separating cyclists, pedestrians, and traffic.
- Providing intersecting footpaths and cycleways along London Circuit and Commonwealth Avenue would improve permeability and access to/from the city south. The proposed paths are more direct and more legible than the current facilities via the cloverleaf ramps, making it easier for cyclists and pedestrians to navigate between London Circuit and the City Hill area and areas to the south such as Lake Burley Griffin or Capital Hill via Commonwealth Avenue.

The proposed Commonwealth Avenue active transport facilities are limited to the RLC study area.

Given the above benefits of these facilities, it is recommended that future planned projects along Commonwealth Avenue, such as Light Rail to Woden, consider the continuation of the proposed off-road cycleways and the widened footpaths on Commonwealth Avenue.

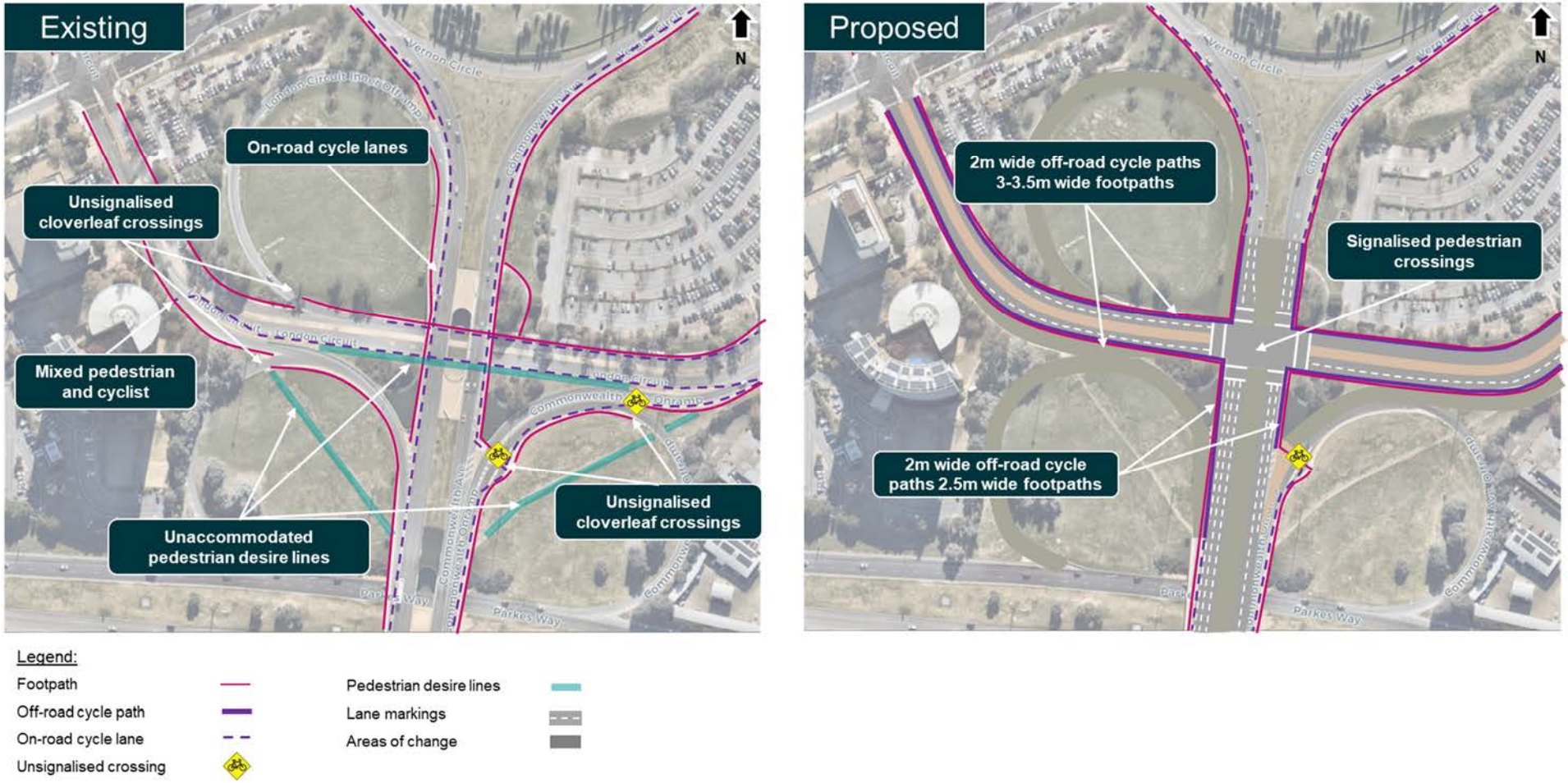


Figure 65 Proposed active transport infrastructure changes

7.2.3.2 Suitability of infrastructure

The Active Travel Facilities Design Municipal Infrastructure Standards 05 (TCCS, 2019) recommends design criteria for new active transport infrastructure in the ACT. The relevant design criteria and assessment of the proposed facilities is summarised in Table 27.

Table 27 Active transport infrastructure requirements

Facility type	Required facility widths	Proposed facility	Proposal meets minimum criteria	Proposal meets desirable criteria
Bicycle-only path	2m desirable 1.5m minimum if no kerbs	2m wide off-road cycle lanes along both sides of London Circuit	✓	✓
		2m wide cycle lanes along both sides of Commonwealth Avenue	✓	✓
Pedestrian-only footpath	2m desirable 1.5m minimum	3-4m footpaths along London Circuit	✓	✓
		2.5m footpaths along Commonwealth Avenue	✓	✓

Table 27 indicates that the proposed active transport facilities would meet the desired width requirements and are therefore considered suitable provisions.

7.2.4 Parking and access

7.2.4.1 Kerbside uses

As discussed in Section 5.8.1, an on-street parking space is located on the southern side of London Circuit east, outside the Department of Foreign Affairs and Trade building. This space is typically used by priority visitors to the adjacent building. As part of the Project, this parking space would be maintained, in its current location (post-construction).

There are no other kerbside uses in the RLC study area. Therefore, the Project would have no impact on kerbside uses and activity.

7.2.4.2 Local area traffic access

As discussed in Section 7.2.1.1, the southbound right turn at the intersection of London Circuit and Edinburgh Avenue is proposed to be removed as part of RLC. This right turn currently carries up to 280 vehicles during a weekday peak hour. Traffic currently using the southbound right turn (or other relevant movements) at the intersection of London Circuit and Edinburgh Avenue would need to use alternative routes.

Several alternative routes are available for the displaced traffic, including Gordon Street, approximately 100m to the north of Edinburgh Avenue or Farrell Place and University Avenue located further north, or other alternative routes further afield. The relevant alternative route would be dependent on the specific origin and destination of the vehicles. Overall, it is expected that the displaced traffic from the southbound right turn at the intersection of London Circuit and Edinburgh Avenue would largely disperse across the road network via the several available alternative routes. This would have minimal impact on any one particularly intersection and minimal impacts on the associated travel times and travel distances.

In addition, the northbound right turn at the intersection of London Circuit and Edinburgh Avenue is also proposed to be removed as part of RLC. This right turn currently has limited demand and Aimsun mesoscopic modelling shows that the right turn demand would continue to be minimal in the future 2026 and 2036 years. Alternative access arrangements are available for the future development sites with access form Edinburgh Avenue between London Circuit and Vernon Circle. Therefore, the removal of the northbound right turn at the intersection of London Circuit and Edinburgh Avenue would have a negligible impact to local area access.

7.2.4.3 Property access

The following two properties currently have a vehicle access along London Circuit within the RLC study area:

- QT Hotel porte-cochere access on the south-west corner of London Circuit and Edinburgh Avenue
- Car park located on the Section 63 site, adjacent to Edinburgh Avenue.

These site accesses currently have full movement access via a break in the London Circuit central median. The following changes are proposed to these accesses:

- The QT Hotel porte-cochere access on London Circuit would be restricted to left-in/left-out, with the central median to be removed as part of RLC in anticipation for the potential future Light Rail to Woden alignment along the centre of London Circuit.
- The Section 63 car park would remain closed post-RLC construction in anticipation for the future Section 63 development on this site.

For the QT Hotel, the right turn bans would restrict direct vehicle access to the port-cochere from the north and exit the porte-cochere towards to south. It is noted that the QT Hotel's primary vehicle access is provided via Marcus Clarke Street, which can be accessed from all directions, as per the alternative routes shown in Figure 66. Therefore, the changes to the QT Hotel porte-cochere would have a minor impact on the property's overall accessibility, which could be communicated to hotel visitors prior to their arrival.

The Section 63 car park closure is required for future development of the Section 63 site and therefore, is not considered a direct impact of RLC.

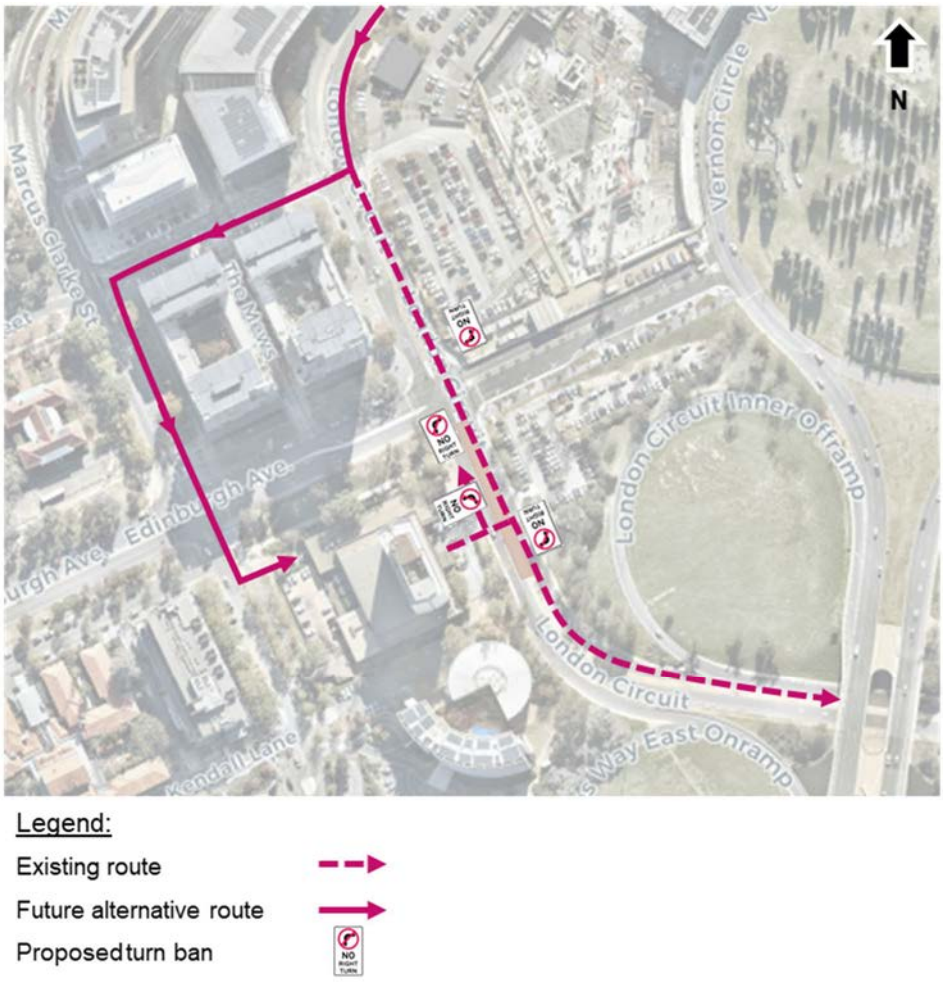


Figure 66 Alternative property accesses and routes

7.2.4.4 Off-street parking

The Project results in the permanent loss of approximately 50 parking spaces from the Section 116 long-stay car park along London Circuit east.

Given that some of the car parks in Acton Park and Commonwealth Park located to the south of the study area often have spare capacity on a typical weekday, it is expected that the displaced car parking spaces from the Section 116 long-stay car park could be accommodated within the broader local network, albeit with longer walking distances to/from their destinations. As discussed in Section 6.3.4.4, the parking loss also presents an opportunity for a travel demand management strategy that could encourage long-stay visitors and employees of the surrounding CBD area to use more sustainable transport practices.

7.2.5 Movement and Place

The existing Movement and Place environments of the study area were classified as M2/P2 and M3/P1 for the London Circuit and Commonwealth Avenue/Vernon Circle sections, respectively.

RLC itself isn't expected to change the overall Movement and Place classifications. However, RLC could change the following Movement aspects considered in the assessment:

- Improve public transport priority, throughput and level of service along London Circuit West and Commonwealth Avenue
- Improve walking facilities and therefore Level of Service for pedestrians and mobility impaired persons traveling along and across the road sections
- Provide more safe and direct crossing opportunities servicing the desire lines
- Improve the cyclist Level of Service by providing separated cycling facilities along the road sections
- Reduce the dominance of cars through London Circuit by allocating more space to walking, cycling and the future public transport (Light Rail to Woden).

RLC would also likely to make improvements to and enable further improvements to be made to the Place function of the corridors, especially along London Circuit and the sections of Commonwealth Avenue immediately adjacent to London Circuit. These would include:

- Opportunity to improve urban design, a more connected and accessible contribution to the city's infrastructure, a more desirable appearance and local amenity, and inclusion of modern, well-design active transport infrastructure
- Improve the potential coverage of trees and green space by closing the cloverleaf ramps
- Releases developable land at the sites where the existing cloverleaf ramps are – i.e. the Section 63 development site, as discussed in Section 3.4.5
- Provide better permeability and access to the activities along the corridors
- Increase footpath widths which would enable better streetscape / urban design elements to be introduced
- Enable the provision for future Light Rail to Woden stations which would be expected to concentrate patronage and increase both the passive and active surveillance and therefore sense of security along these corridors.

While the proposed footpath facilities are a significant improvement over the current provisions in some locations, and the cycling facilities proposed would generally provide an improved Level of Service and a safer cycling experience, there are locations where the provision can be improved to provide better outcomes to these modes.

From a Movement perspective, this is undesirable in terms of walking and cycling safety and Level of Service. From a Place perspective it reduces the effective pedestrian dwellable area and makes the street a less person friendly place.

7.2.5.1 London Circuit east

Figure 67 displays the Movement and Place scoring for London Circuit east following completion of RLC. The following changes are expected as a result of RLC:

- Pedestrians and cyclist scoring could increase and all other modes would be maintained
- Accessibility, safety and comfort scoring could increase
- Speeds and infrastructure could increase and crash data would be maintained
- Noise and urban design scoring would be maintained and tree cover would increase.

These changes support the Transport Strategy's strategic directions for London Circuit, to prioritise public transport and walking and cycling.

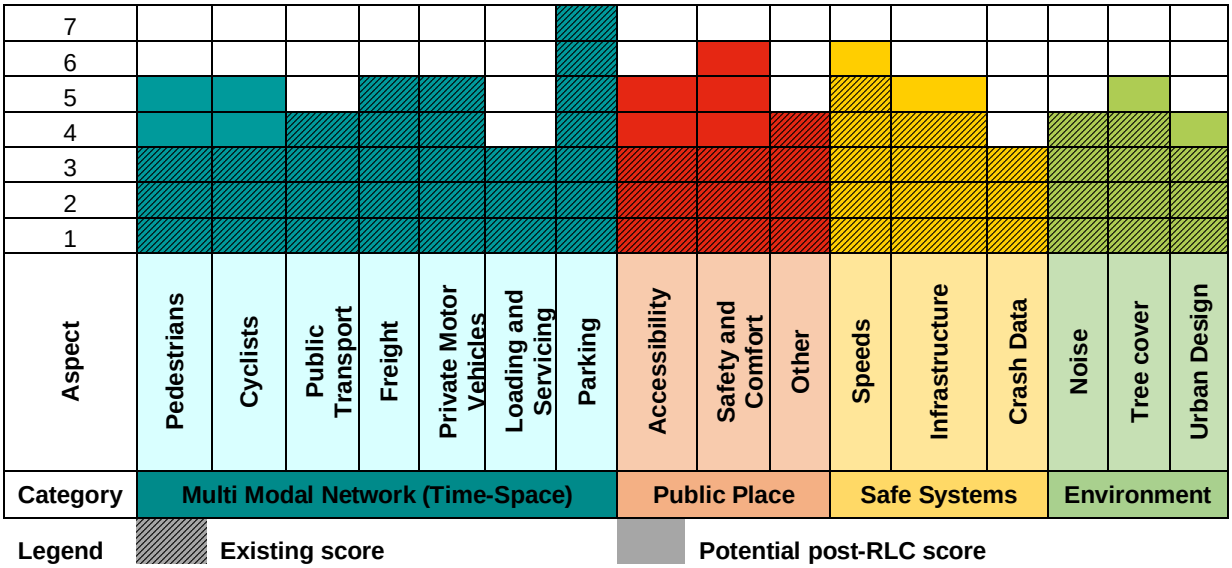


Figure 67 Movement and Place impacts for London Circuit east

On London Circuit east, the proposal requires cyclists to share space with pedestrians for a considerable length (±100m) on the eastern side of London Circuit along the frontage of the Department of Foreign Affairs and Trade building. The effective available width between the existing trees and the building is about three m which is the minimum width of a shared path as per the ACT Standard for Active Travel.

The space behind the indented parking bay outside the Department of Foreign Affairs and Trade building is roughly four m wide, which is considered less than desired (five m) given the pedestrian movements to and from the parked vehicle could interact with commuting cyclists travelling at higher speeds (in the order of 20km/h).

7.2.5.2 London Circuit west

Figure 68 displays the Movement and Place scoring for London Circuit west following completion of RLC. The following changes are expected as a result of RLC:

- Pedestrians and cyclist scoring could increase and all other modes would be maintained
- Accessibility, safety and comfort scoring could increase
- Speeds and infrastructure could increase and crash data would be maintained
- Noise scoring would increase and urban design and tree cover would be maintained.

These changes support the Transport Strategy's strategic directions for London Circuit, to prioritise public transport and walking and cycling.

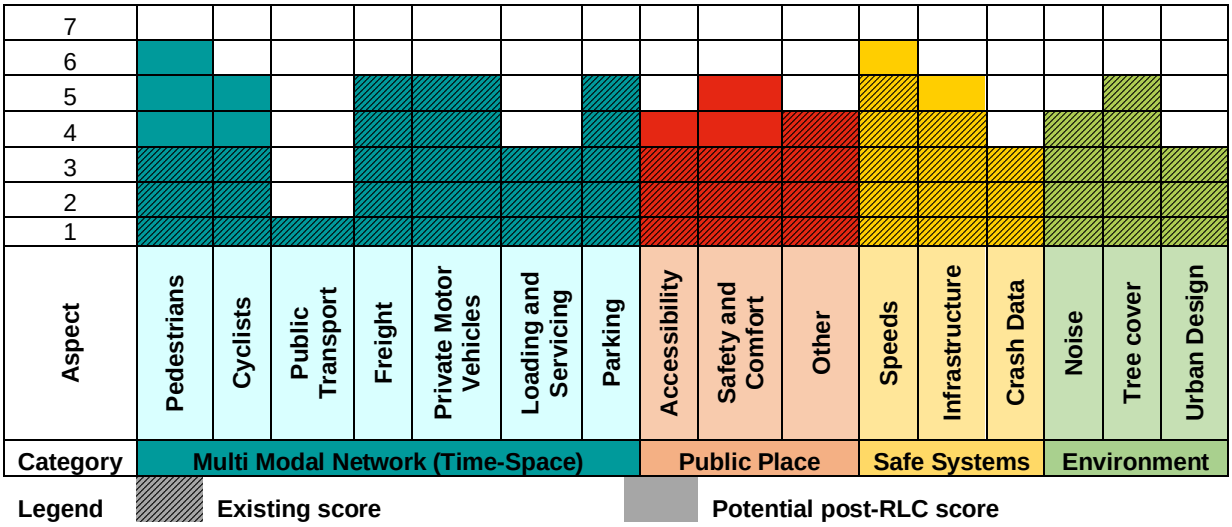


Figure 68 Movement and Place impacts for London Circuit west

7.2.5.3 Commonwealth Avenue

Figure 69 displays the Movement and Place scoring for Commonwealth Avenue following completion of RLC. The pedestrians and cyclist scoring could increase but all other scorings would stay the same.

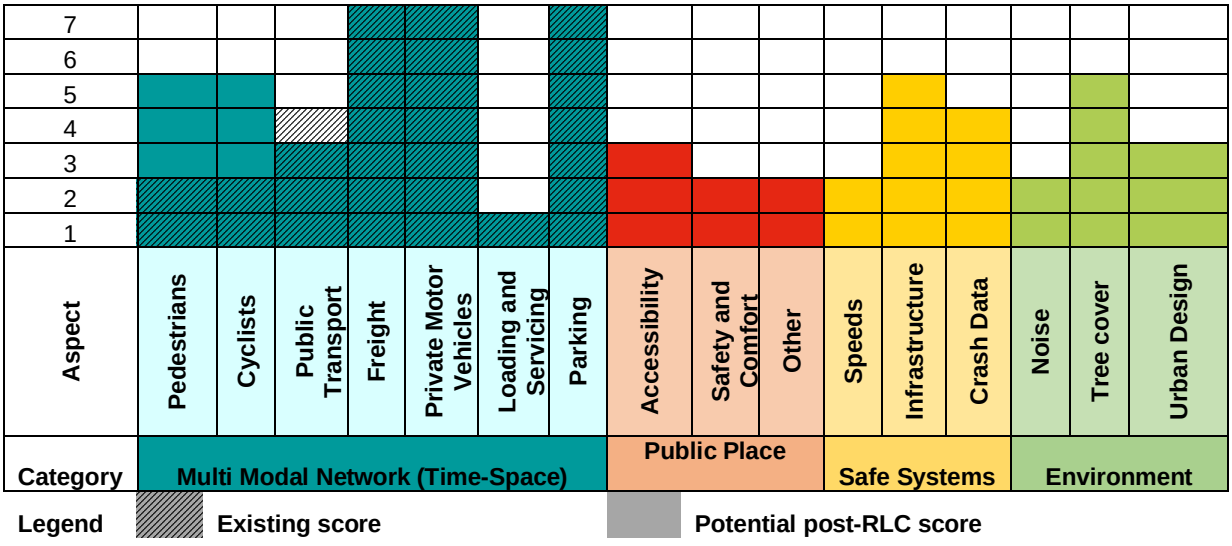


Figure 69 Movement and Place impacts for Commonwealth Avenue

7.2.5.4 Vernon Circle

Figure 70 displays the Movement and Place scoring for Vernon Circle following completion of RLC. No changes are expected as a result of RLC.

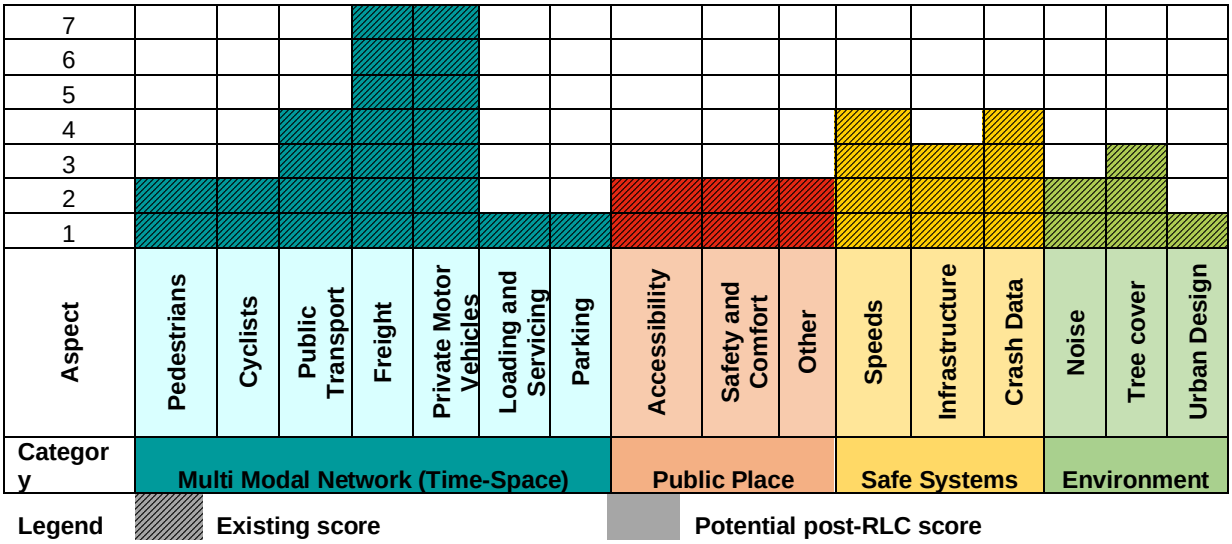


Figure 70 Movement and Place impacts for Vernon Circle

7.2.6 Road safety

From a road safety perspective RLC presents the following road safety benefits:

- Minimise the number of crashes related to ramp merges, where crash clusters have been observed in the last five years, as discussed in Section 5.4
- Providing a slower speed environment along Commonwealth Avenue has the potential to result in lower crash severity for crashes that could occur in the area in the future
- Providing separated off-road cycleways has the potential to result in less cyclist crash frequency
- Providing improved footpath facilities and separating cyclists from pedestrians would likely reduce the pedestrian crash frequency.

The proposed signalised intersection of London Circuit and Commonwealth Avenue could create new intersection related conflicts. However, the Project would be designed in accordance with the appropriate Australian and ACT standards and guidelines and would be reviewed through formal road safety assessments to minimise road safety risks.

7.3 Management and mitigation measures

A summary of the mitigation measures that could support in managing or mitigating the operational (post-construction) related transport impacts of RLC are summarised in Table 28.

Table 28 Operational safeguards and management measures

Ref	Mitigation measure	Timing	Responsibility
O1	Continue to investigate measures to optimise the performance of key intersections (e.g. adjusted signal phasing).	Prior to operation	RLC project team/MPC
O2	A travel demand management strategy will be developed, to reduce the private vehicle trip generation and parking demand, particularly during weekday AM and PM peak hours, generated by local residents and employees of the broader CBD and surrounding area.	Prior to operation	Territory

7.4 Residual impacts

The residual (after mitigation) impacts associated with the RLC operational assessment are summarised in Table 29.

Table 29 Summary of post-construction related impacts of RLC (after mitigation)

Type	Operational transport impact	Likelihood	Consequence	Residual rating
Road network	Increased travel times due to traffic growth and RLC in 2026	Possible	Minor	Low
	Increased weekday peak period travel times due to the cumulative impacts of RLC, other planned projects and traffic growth in 2036	Unlikely	Moderate	Low
	Cumulative impacts of RLC, other planned projects and traffic growth on weekday peak period traffic congestion (density) in 2036	Unlikely	Moderate	Low
	Cumulative impacts of RLC, other planned projects and traffic growth on weekday peak period performance of the London Circuit and Commonwealth Avenue intersection o in 2036	Unlikely	Moderate	Low
Public transport	Increased weekday peak period bus travel times due to the cumulative impacts of RLC, other planned projects and traffic growth in 2036	Possible	Minor	Low
Pedestrians and cyclists	Providing signalised pedestrian crossings for all legs at the intersection of Commonwealth Avenue and London Circuit could result in delays for pedestrians waiting at the proposed intersection of London Circuit and Commonwealth Avenue.	Possible	Insignificant	Very low
	The continuous footpaths proposed along London Circuit would make it easier to walk between London Circuit east and west, improving east-west connectivity for the southern CBD area and generally improving walkability in the area.	N/A	N/A	Beneficial
	Providing intersecting footpaths and cycleways along London Circuit and Commonwealth Avenue would improve permeability and access to/from the city south. The proposed paths are more direct and more legible than the current facilities via the cloverleaf ramps, making it easier for cyclists and pedestrians to navigate between London Circuit and the City Hill area and areas to the south such as Lake Burley Griffin or Capital Hill via Commonwealth Avenue.	N/A	N/A	Beneficial

Type	Operational transport impact	Likelihood	Consequence	Residual rating
Local area traffic access	Removal of the southbound right turn at the intersection of London Circuit and Edinburgh Avenue requires traffic moving between London Circuit and Edinburgh Avenue to use alternative routes.	Likely	Insignificant	Low
Property access	Access to the QT porte-cochere via London Circuit would be restricted to left-in and left-out instead of all movements. Vehicles approaching from the north and departing to the south would need to use alternative routes and/or the main QT Hotel access via Edinburgh Avenue.	Likely	Insignificant	Low
Off-street parking	Loss of approximately 50 long-stay parking spaces from the Section 116 long-stay car park on London Circuit east.	Possible	Minor	Low
Road safety	Proposed signalised intersection of London Circuit and Commonwealth Avenue could create new intersection related conflicts	Possible	Minor	Low
	Providing off-road cycling facilities along Commonwealth Avenue and London Circuit, combined with wider footpaths improves safety for vulnerable users, by separating cyclists, pedestrians, and traffic.	N/A	N/A	Beneficial
	The removal of the south-west and north-west cloverleaf ramps and provision of signalised crossings on all legs of the intersection of Commonwealth Avenue and London Circuit would accommodate safer pedestrian and cyclist crossings, particularly for movements between London Circuit and Commonwealth Avenue and minimising safety risks and complexities associated with the current uncontrolled crossings on the cloverleaf ramps.	N/A	N/A	Beneficial

8.0 Conclusions

8.1 Project Benefits

This report has set out an assessment of the expected traffic and transport impacts of the RLC project during construction and operation (post-construction).

Overall, the assessment demonstrates that the Project could remove the grade separated Commonwealth Avenue and London Circuit sections and the ramps that currently accommodate movements between these with minor local area and wider network traffic and transport impacts.

The Project would also offer the following benefits within the study area:

- Opportunity to improve public transport priority, as an enabling project for the future potential Light Rail to Woden
- Reduces the dominance of cars through London Circuit east by allocating more space to walking, cycling and the future public transport (Light Rail to Woden), delivering on a number of strategic planning and policy goals
- Provides safer and more direct pedestrian and cyclist crossing opportunities servicing the desire lines and improving pedestrian and cyclist Level of Service within the local area, by providing the following:
    - Continuous three to three and a half m wide footpaths along both sides of London Circuit between Edinburgh Avenue and near Constitution, Avenue at the eastern extent of works
    - two and a half m wide footpaths to be provided along Commonwealth Avenue
    - Separated two m wide off-road cycling facilities along Commonwealth Avenue and London Circuit
    - On-road cycle lanes at the London Circuit and Commonwealth Avenue intersection
    - Full cyclist connectivity between London Circuit and Commonwealth Avenue (all directions).
- Releases developable land at the sites where the existing cloverleaf ramps currently exist delivering on key objectives of the NCP
- Opportunity to improve urban design, a more connected and accessible contribution to the city's infrastructure, a more desirable appearance and local amenity, and inclusion of modern, well-design active transport infrastructure

These benefits generally align with the NCA's and Territory's strategic plans for Commonwealth Avenue, London Circuit, and the CBD area, specifically:

- London Circuit is to transition into a central link prioritising public transport and walking and cycling
- Commonwealth Avenue and Vernon Circle would be considered a key north-south Central Link and also a Local Link. Its role needs to be balanced between connecting walkable places and accommodating efficient public transport routes, such as light rail.
- The City Centre is to be walkable and pedestrian friendly that is connected to urban areas and surrounds
- The City Hill Precinct is to be the transport and pedestrian hub for the whole city
- The dual functions of the streets need to be balanced between moving people and goods and enhancing the places they connect and pass through.

8.2 Construction

The RLC construction works are anticipated to occur over a period of 24 months from Quarter two 2022. The construction strategy focuses on maintaining road network capacity as much as practical. A temporary sidetrack would be constructed to the east of the existing Commonwealth Avenue. The sidetrack and parts of the Commonwealth Avenue median would be paved to provide two traffic lanes, with connections to allow cross-over of traffic between the northbound and southbound traffic lanes and the sidetrack. Therefore at least two lanes in each direction can be maintained along Commonwealth Avenue.

The Commonwealth Avenue footpaths and on-road cycle paths could also be maintained during construction. However, to facilitate the construction activities, London Circuit would need to be closed between Edinburgh Avenue and Constitution Avenue.

Traffic modelling assessed a construction scenario that considers the loss of a northbound lane on Commonwealth Avenue, planned bus diversions and other network changes proposed during the Project construction.

The construction assessment indicates that the local road network would experience some minor increases to congestion, delays and travel times. Buses could experience moderate travel time increases due to increased congestion on London Circuit and lower speed limits along Commonwealth Avenue. However, these impacts could be minimised through implementation of the committed mitigation and management measures.

The closure of London Circuit and the removal of the cloverleaf ramps would require pedestrians and cyclists to use alternative routes. While most of the impacts to pedestrians and cyclists are considered minor, there are limited convenient alternatives to replace the pedestrian and cyclist desire lines along London Circuit between Constitution Avenue and Edinburgh Avenue. Temporary convenient routes may be needed to minimise impacts to pedestrians and cyclists and maintain and walkable and cyclable city centre throughout construction.

8.3 Operations

The introduction of RLC along with forecast traffic growth could result in small, localised increases in delay and slight increases to congestion, most notably in the vicinity of the newly created London Circuit and Commonwealth Avenue intersection, resulting from removal of the grade separated cloverleaf slip lanes. However, overall, RLC is expected to have a minor impact to the local road network in the short-term (2026).

The cumulative impacts of RLC, the potential Light Rail to Woden , significant development sites at Section 100 and Section 63and the forecast traffic volume growth could cause impacts to the road network in the future (2036). These impacts could include traffic redistributions away from Commonwealth Avenue and some potential for minor increases in travel times and low-level increased congestion across the city centre. These impacts are anticipated as a result of the following key network changes that would be needed to accommodate the future potential Light Rail to Woden:

- Reduction of lane capacity along London Circuit west between Northbourne Avenue and Commonwealth Avenue.
- Additional phase time allocated to the light rail movements at intersections, particularly at the London Circuit and Commonwealth Avenue intersection and the London Circuit and Northbourne Avenue intersection.
- Introduction of traffic signals on Commonwealth Avenue by Albert Street, close to the potential future Commonwealth Park stop.

The above impacts may warrant the potential need for road network upgrades on the surrounding road network to encourage drivers to use alternative routes travelling around Canberra's city centre rather than through it. However, it is noted that the assessment has been undertaken based on a very conservative methodology and has used modelling that assumes traffic growth and travel patterns based on historical conditions and doesn't consider any modal shift that would be expected with the introduction of Light Rail to Woden and other public transport initiatives.

Along the CLR1 alignment, peak hourly traffic volumes have generally decreased since the light rail was opened in 2019. Providing a high-quality public transport alternative has encouraged travellers to/from the north to utilise public transport instead of private vehicles. It is anticipated that the same situation would occur with Light Rail to Woden. Therefore, the overall road network performance discussed in this report is considered a worst-case assessment that would be unlikely to eventuate should the planned public transport improvements proceed (subject to separate planning approvals).

Similarly, surrounding road network upgrades may not be needed if travel demand management measures are successful and a modest level of modal shift can be achieved in line with the objectives of the future Light Rail to Woden project. A successful travel demand management strategy may also see a reduction in the number of trips generated by land-uses in the city centre, as well as peak-spreading and an increase in the number of walking and cycling trips utilising the improved active transport facilities and improved urban amenity, especially across the city centre as a result of the Project.

Appendix A

RLC Construction Traffic Assessment

Technical Note

ARUP

Level 4, 108 Wickham Street
Fortitude Valley
QLD 4006
GPO Box 685 Brisbane QLD 4001
Australia
www.arup.com

t +61 7 3023 6000
f +61 7 3023 6023

Project title	Raised London Circuit	Job number	279838-00
cc	Major Projects Canberra	File reference	
Prepared by	Kevin Kong	Date	16 September 2021
Subject	Construction Stage Traffic Analysis **DRAFT FOR COMMENT**		

Arup have been engaged by Major Projects Canberra and Transport Canberra and City Services to undertake traffic modelling analysis of the construction stage impacts for the Raised London Circuit intersection.

This technical note documents the modelling analysis undertaken using the 2021 City Centre and Inner North Precinct Reference Model (CINRM) for an existing conditions base case scenario and a construction stage scenario. The construction scenario included closure of the southern sections of London Circuit and the ramp connections to/from Commonwealth Avenue, a lane reduction northbound on Commonwealth Avenue and closure of the south-west clover leaf ramp to Parkes Way. It also included diversion of bus routes impacted by road and ramp closures and the changes needed to facilitate the bus diversions.

1.1 Technical note structure

This technical note documents the traffic modelling analysis that was undertaken to identify potential traffic impacts during construction of the Raised London Circuit intersection.

The note is structured as follows:

- Section 2 outlines the methodology including modelling approach, a description of the construction scenario and modifications made to the traffic model.
- Section 3 describes the network impacts of the construction stage.
- Section 4 provides an analysis of predicted impacts on journey times along key traffic routes and bus routes.
- Section 5 summarises the results and identifies possible construction traffic impacts along with suggested mitigation measures that could be considered.

1.2 Background

Modelling of the construction impacts was undertaken using the 2021 City Centre and Inner North Precinct Reference Model (CINRM), recently developed by Transport Canberra and City Services (TCCS) using Aimsun traffic modelling software.

The CINRM was calibrated and validated to a 2019 base year with future year traffic demands derived from the Canberra Strategic Transport Model. The model represents the weekday AM and PM two hour peak periods of 7:15 to 9:15 and 16:15 to 18:15.

The extent of the CINRM study area is depicted by the purple boundary shown in Figure 1. The CINRM includes a core microsimulation area (depicted in red) within an overall mesoscopic model.

The CINRM also sits within a larger mesoscopic network model which allows wider area traffic impacts to be considered. It should be noted that the wider area network (i.e. the network outside of the purple boundary) was not updated or calibrated/validated as part of the CINRM study, but was previously calibrated/validated for a 2017 base year during development of the City to Woden (C2W) Aimsun Model.

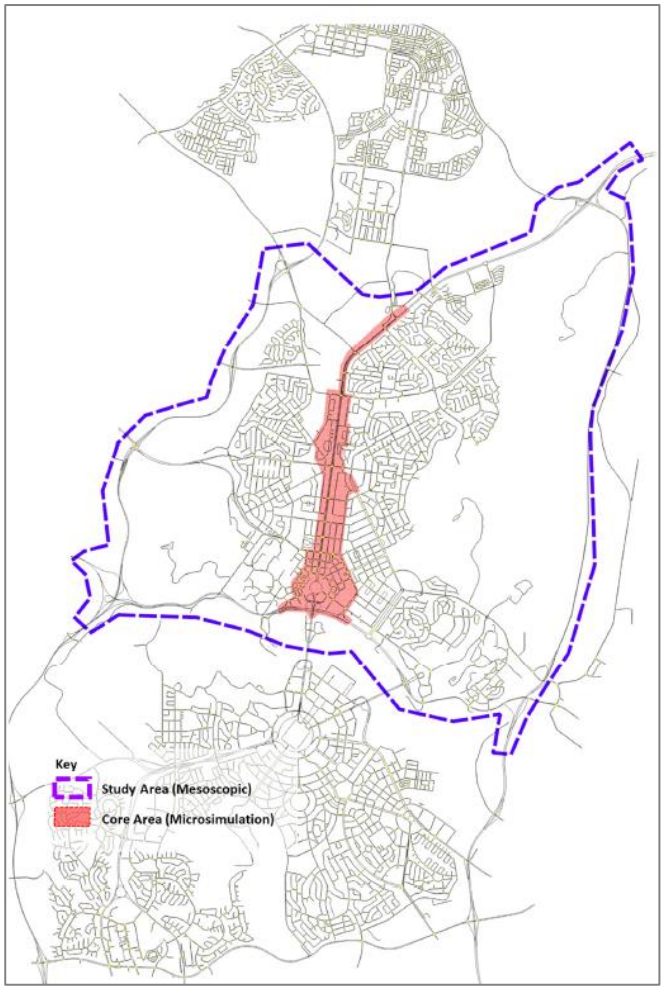


Figure 1 CINRM model extents in context of C2W model network[1]

[1] Source: Canberra CINRM – Base Year Model Development Report, Rev E, September 2020

2 Methodology

The traffic modelling analysis was undertaken using the 2021 City Centre and Inner North Precinct Reference Model (CINRM).

Model outputs reported in this technical note relate the peak hour of each peak period, being:

- AM peak hour: 8:00 to 9:00
- PM peak hour: 16:45 to 17:45

Outputs from the traffic model were used to assess the potential impact of the construction stage using the following indicators:

- Network plots showing peak hour volumes and average delays to demonstrate traffic performance of each scenario.
- Network plots showing changes to peak hour traffic volumes, to show traffic diversion due to road closures and capacity reductions.
- Network plots showing changes to average peak hour traffic delays, to show impact of traffic diversion due to road closures and capacity reduction.
- Journey times for general traffic along key routes through Commonwealth Avenue, Parkes Way and Kings Avenue.
- Journey times for bus services along Commonwealth Avenue.

2.1 Model Updates

The 2021 CINRM base case provided by TCCS was updated so that it would be suitable for assessing the impacts of the proposed construction stage scenario. The modifications included:

- Network changes to reflect the current 2021 network, including:
  - Addition of the Edinburgh Avenue extension through to Vernon Circle
  - Removal of the short left-turn lane on Northbourne Avenue on the northern approach to London Circuit.
- Extension of the area modelled in microsimulation to include:
  - Commonwealth Avenue between Parkes Way and Kaye Street
  - Parkes Way and Constitution Avenue between Coranderrk Street and Kings Avenue.
- Coding modification of the Parkes Way / Coranderrk Street roundabout to improve the representation of turn paths from the western approach into the roundabout.
- Coding modification of Vernon Circle approach to Edinburgh Avenue to reflect existing conditions (i.e. the restriction of traffic movements from the Vernon Circle south circulating lane to Edinburgh Avenue).

2.2 Traffic Modelling Methodology

The CINRM was run using Aimsun version 8.4.2. The model is a dynamic hybrid meso-microsimulation model, supported by initial static and mesoscopic assignment outputs.

A three-step assignment process was used to run each scenario:

1. Static assignment – generates an initial set of assignment paths
2. Mesoscopic Dynamic User Equilibrium assignment – uses the static assignment paths as an input and generates a refined set of output paths
3. Hybrid Dynamic User Equilibrium assignment – uses the mesoscopic assignment paths as an input and generates a final set of paths and traffic performance outputs.

Relative gap (RGap) is a key parameter used to specify whether a model assignment run has reached an acceptable level of convergence. It is a measure of the change in results between the current and previous iteration of the model assignment. For the AM peak, an RGap value of 3% was specified (noting the default value for the CINRM base model was 5%). For the PM peak, a lower RGap value of 1% has been used because it was found that there were relatively large differences in the model results between scenarios which could not be attributed to the option being tested. The same RGap value was not adopted for the AM peak as it was found that a value of 1% caused the Base Case results to deviate too much from the calibrated and validated base year results.

2.3 Scenarios Modelled

The scenarios modelled were:

- **2021 Base Case** – existing conditions (Do Nothing)
- **2021 Construction Stage Baseline** – changes to the network due to construction

The construction stage baseline scenario is described further below.

2.3.1 Model Run Statistics

A key output to verify consistency of results between model scenario runs is the network output statistic of unreleased vehicles (also termed ‘vehicles waiting to enter’ in Aimsun). This output indicates whether the model run has experienced high levels of network wide delay or gridlock, which prevents large numbers of vehicles from being released into the model by the end of the modelled time period. The number of unreleased vehicles for each hybrid DUR model run were:

- 2021 AM - Base Case: 11 vehicles
- 2021 PM - Base Case: 152 vehicles
- 2021 AM - Construction Stage Baseline: 38 vehicles
- 2021 PM - Construction Stage Baseline: 46 vehicles

The number of unreleased vehicles is relatively low for each model run, indicating the models ran without experiencing high levels of network delay or gridlock.

2.3.2 Construction Stage Baseline

The Construction Stage Baseline scenario assumed the following changes to the network for construction of the Raised London Circuit intersection:

- Commonwealth Avenue through the Raised London Circuit construction zone with two traffic lanes in each direction, which means Commonwealth Avenue northbound across London Circuit would be reduced from three to two lanes.
- Closure of London Circuit south of Edinburgh Avenue and Constitution Avenue.
- Closure of ramp connections between London Circuit and Commonwealth Avenue.
- Closure of the north-west and south-west clover leaf ramps.
- Traffic signal changes at the London Circuit intersections with Edinburgh Avenue and Constitution Avenue to account for reduced traffic movements (i.e. only construction related traffic) to and from the closed section of London Circuit and increased volumes to/from Vernon Circle.
- Posted traffic speed on Commonwealth Avenue between Parkes Way and Vernon Circle reduced to 40km/h through the construction area.
- Buses that currently use the north-west clover leaf ramp and north-east ramp to connect between Commonwealth Avenue and London Circuit, would divert to use Vernon Circle and Constitution Avenue.
- To facilitate the bus diversion, the northern entry from Northbourne Avenue into Vernon Circle would be temporarily signalised, with the northern circulating lane of Vernon Circle widened to two lanes, of which one lane would be a dedicated bus lane.
- The approach lanes from Constitution Avenue eastbound to London Circuit and westbound to Vernon Circle modelled as one lane to represent buses needing to staddle two lanes to facilitate the turning paths of the diverted buses.
- Traffic signal timing changes at the Vernon Circle / Constitution Avenue intersection to facilitate higher traffic volumes and reduced lane capacity from the Constitution Avenue approach.

3 Model Results

The model results for each scenario are discussed in the following sections with reference to output plots for traffic volumes in vehicles per hour (vph) and average delay in seconds per vehicle. Difference plots have been used to highlight the predicted change in volumes or delays when comparing the Construction Stage Baseline scenario against the Base Case. The differences in these plots are highlighted with blue bands to show reductions or orange bands to show increases.

The scale of the plots shown in this technical note are such that the numerical values for each link are not easily visible. However, high-resolution versions of each plot are available in PDF format, where the numerical values for each link are visible. These have been included as attachments to this technical note for the figures shown in this section.

3.1 Base Case

Traffic performance across the road network for the 2021 Base Case (Do Nothing) scenario is depicted in the delay plots shown in Figure 2 and Figure 3 for the AM and PM peaks respectively.

3.1.1 AM Peak Results

In the AM peak, key areas of congestion predicted by the model were as follows:

- Long delays eastbound on Parkes Way on approach to the Coranderrk Street roundabout with queues extending almost back to Glenloch Interchange. The summation of delays from Glenloch Interchange to Coranderrk Street was around nine minutes.

  A significant portion of this delay occurs in the section near Clunies Ross Street. It is caused by traffic from Clunies Ross Street merging onto Parkes Way and mixing with traffic on Parkes Way that is preparing to exit left onto Edinburgh Avenue. This causes a section of high traffic density that propagates a queue back towards Glenloch Interchange.
- The Edinburgh Avenue / Marcus Clarke St and Edinburgh Avenue / London Circuit intersections are approaching capacity with delays on all approaches of 40 to 130 seconds.

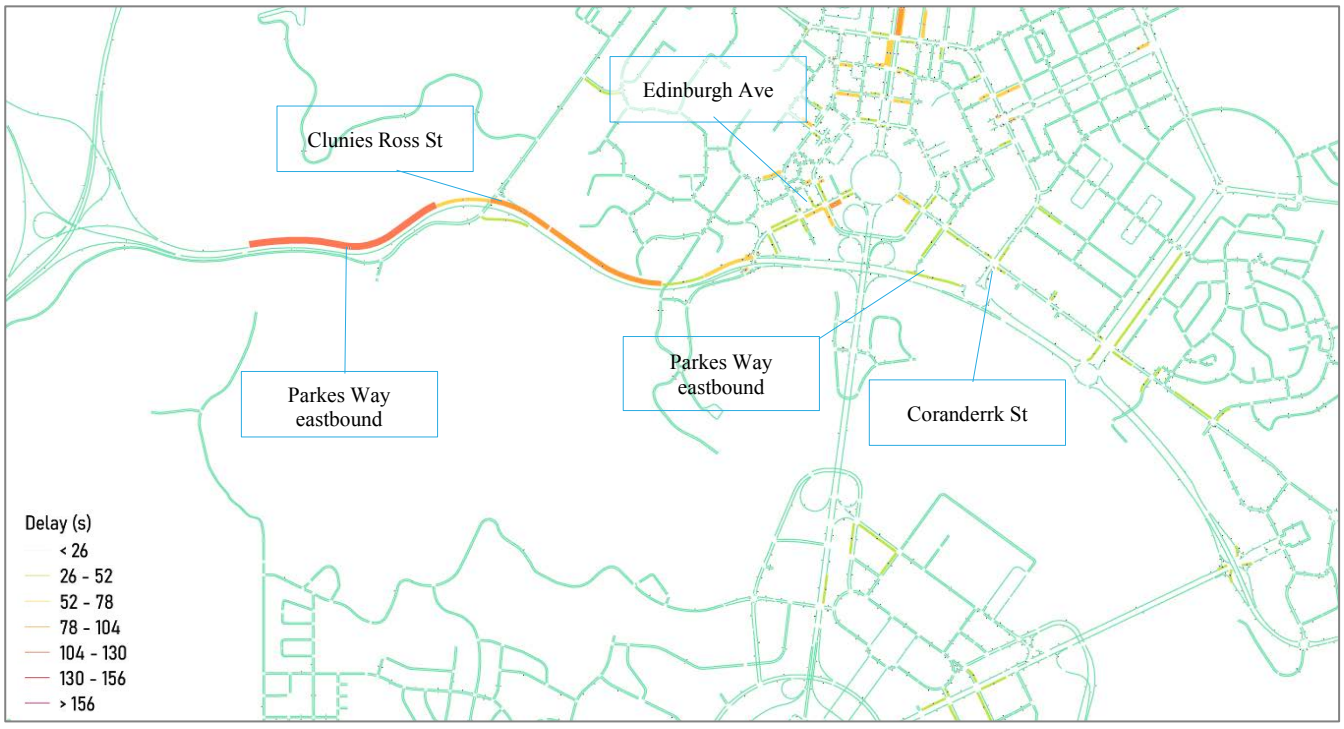


Figure 2 Base Case average delay (2021 AM peak)

3.1.2 PM Peak Results

In the PM peak the key areas of congestion were as follows:

- Traffic congestion was predicted on the westbound Parkes Way approach to the Anzac Parade roundabout, caused by the merge of the ramp from Kings Avenue and traffic weaving (lane changing) on approach to the roundabout. Queues extended along Parkes Way and Kings Avenue back towards Bowen Place. Overall, delays for the Kings Avenue northbound to Parkes Way westbound movement summed to around five minutes.
- There are long delays of around two minutes on Lawson Crescent on the northbound approach to the Edinburgh Avenue interchange.

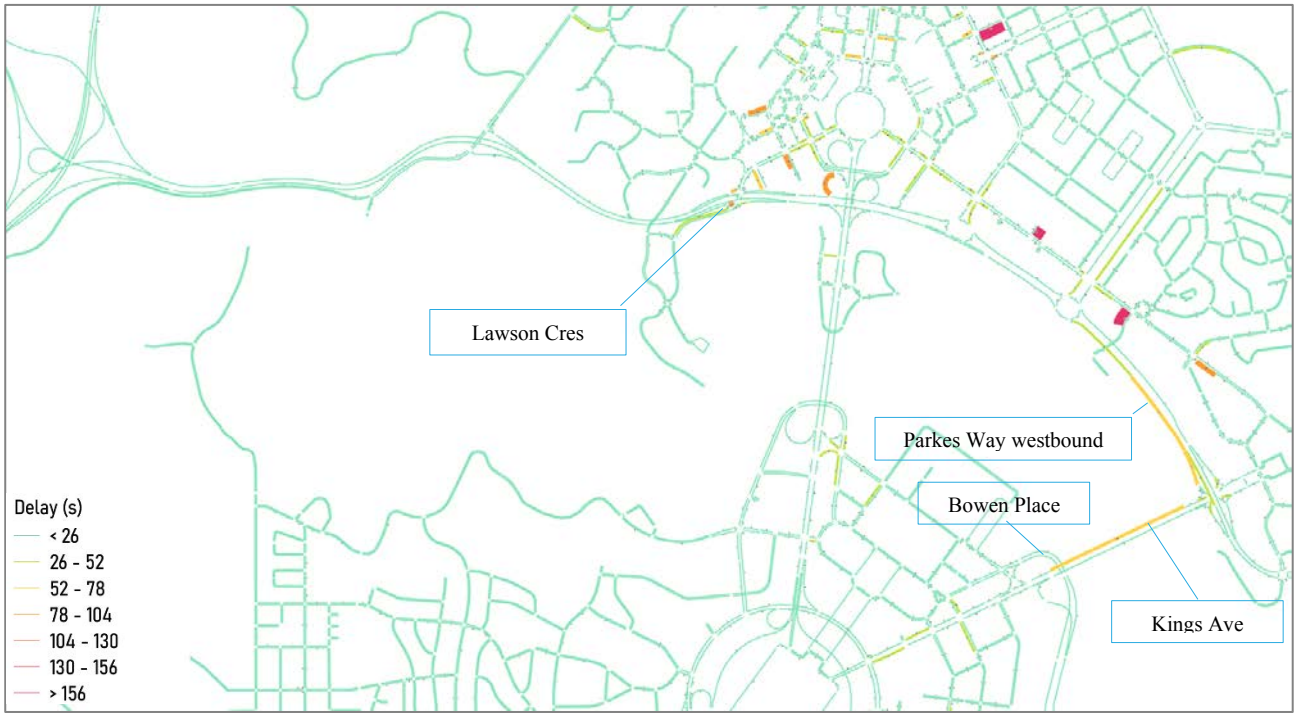


Figure 3 Base Case average delay (2021 PM peak)

3.2 Construction Stage Baseline

The Construction Stage scenario involves the closure of London Circuit south of Edinburgh and Constitution Avenues; closure of the north-west clover leaf ramp, south-west clover leaf ramp, and the connections between London Circuit and Commonwealth Avenue; and the staged removal and then reconstruction of the Commonwealth Avenue bridges over London Circuit. A temporary side-track will constructed on embankment so that at least two lanes northbound and southbound can be maintained on Commonwealth Avenue, which means the northbound carriageway at the crossing of London Circuit would be reduced by one lane.

Figure 4 and Figure 6 show how the forecast peak hour volumes were predicted to change on the network in the AM and PM peaks respectively when compared to the Base Case. Figure 5 and

Figure 7 show the predicted changes in delays. Reductions in volume or delay in the Construction Stage are shown with blue bands and increases are shown with orange bands.

3.2.1 AM Peak Results

The AM peak model results for the Construction Stage scenario are discussed in comparison to the Base Case as follows:

- Traffic volumes northbound on Commonwealth Avenue Bridge were predicted to reduce by around 300vph due to reduced traffic capacity and removal of the north-west and south-west clover leaf ramps.
- The reduction of three northbound lanes to two lanes on Commonwealth Avenue resulted in a minimal increase in delay (13s) on Commonwealth Avenue.
- Traffic previously using the north-west clover leaf ramp were mostly predicted to continue straight on Commonwealth Avenue, rerouting through Vernon Circle and Edinburgh Avenue extension. Traffic volumes on approach to Vernon Circle and along Edinburgh Avenue increased by around 550 and 350vph respectively.
- Some traffic also rerouted through the Edinburgh Ave interchange via Parkes Way. This resulted in a 50s increase in delays along Parkes Way westbound between Coranderrk Street and Edinburgh Avenue. Delays on the Edinburgh Avenue off-ramp increased by around 30s.
- Some northbound traffic on Commonwealth Avenue was also predicted to divert to Kings Avenue, with an increase of around 200vph on the Kings Avenue Bridge. Most of the increased traffic travelled westbound along Parkes Way to turn right into Coranderrk Street.
- The additional traffic entering Parkes Way from Kings Avenue resulted in minimal delay increases.
- The increased volume of traffic turning right into Coranderrk Street from Parkes Way reduced the capacity of eastbound flow along Parkes Way entering the Coranderrk Street roundabout, resulting in increased delay of around 70s for eastbound travel along Parkes Way between Glenloch Interchange and Coranderrk Street.
- Traffic volumes southbound on Commonwealth Avenue Bridge were predicted to reduce by around 100vph due to ramp closures. Ramp traffic was predicted to find alternative routes through Vernon Circle or Coranderrk Street.
- Traffic volumes of Coranderrk Street increased by around 150vph in each direction with minimal increases in delays.
- Increased delays of 27s southbound on Vernon Circle were predicted as a result of new signals on Vernon Circle north and changes to signal timings at Vernon Circle / Constitution Avenue.
- Increased traffic volumes westbound on Edinburgh Avenue caused increased delays of around 50s on the westbound approach to the Edinburgh Avenue / Marcus Clarke Street intersection.

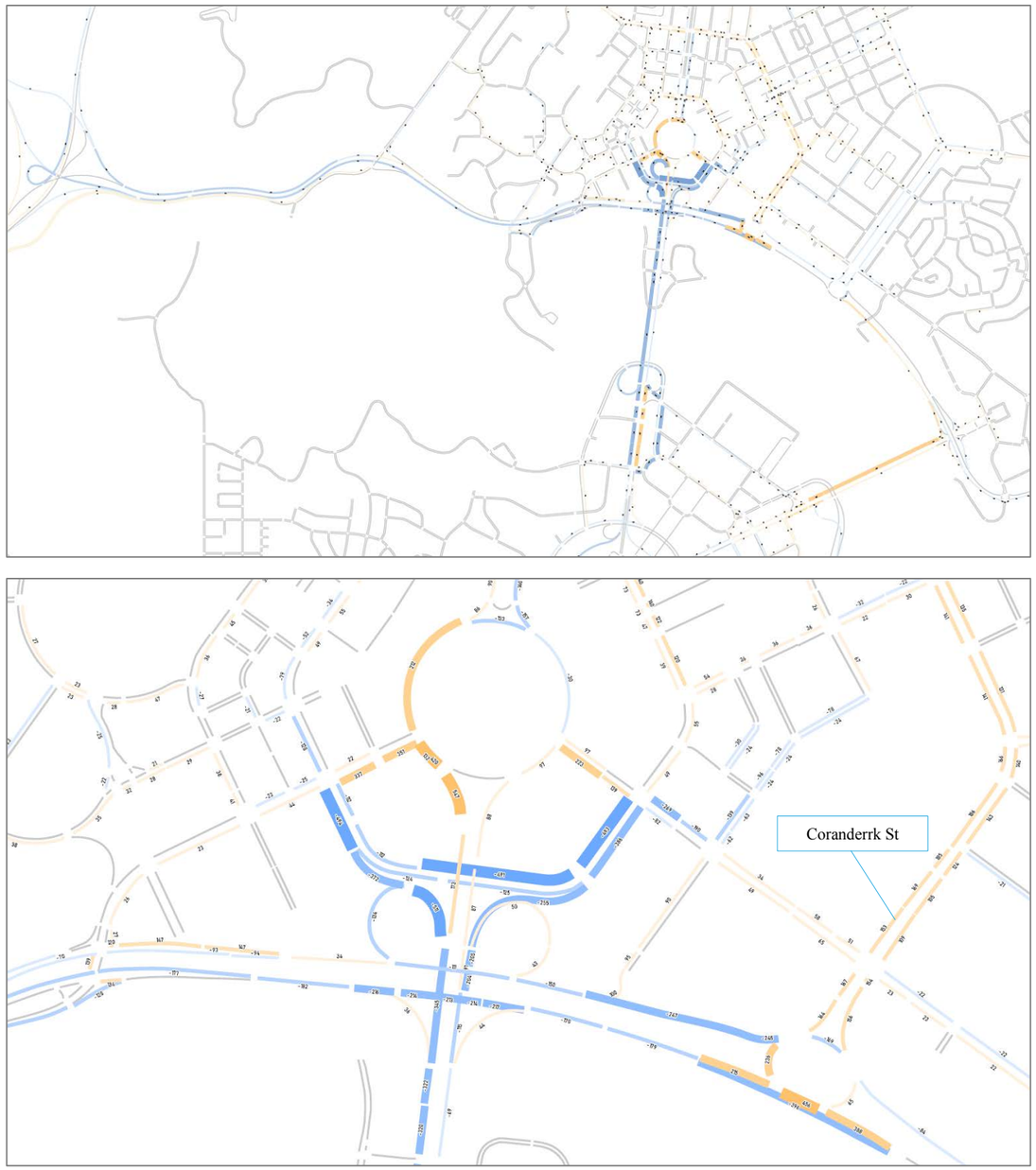


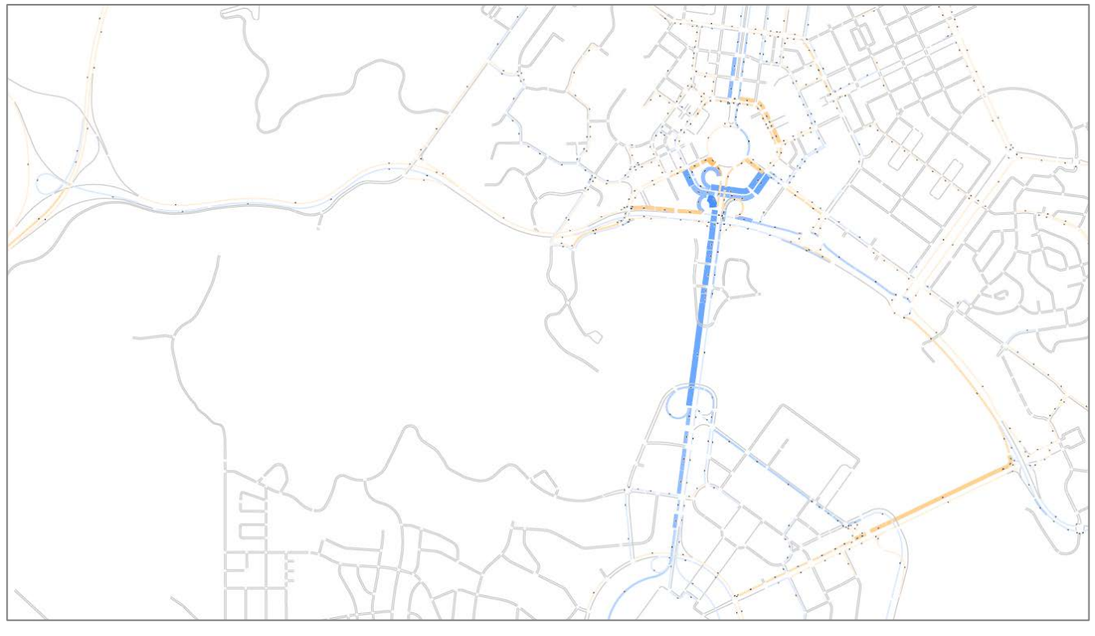
Figure 4 CS Baseline vs Base Case volume difference (2021 AM peak)

Figure 5 CS Baseline vs Base Case delay difference (2021 AM peak)

3.2.2 PM Peak Results

The PM peak model results for the Construction Stage scenario are discussed in comparison to the Base Case as follows:

- Traffic volumes northbound on Commonwealth Avenue Bridge were predicted to reduce by around 400vph due to reduced traffic capacity and removal of the north-west and south-west clover leaf ramps.
- The reduction of three northbound lanes to two lanes on Commonwealth Avenue resulted in minimal increases in delays on Commonwealth Avenue.
- Traffic previously using the north-west clover leaf ramp were mostly predicted to continue straight on Commonwealth Avenue, rerouting through Vernon Circle and Edinburgh Avenue extension. The traffic volumes on approach to Vernon Circle and along Edinburgh Avenue increased by around 500 and 400vph respectively.
- Some traffic also rerouted through Edinburgh Avenue interchange via Parkes Way. This diverted traffic displaced other traffic using Parkes Way westbound and as a result westbound traffic along Parkes Way was predicted to reduce by around 100vph. Most of the displaced vehicles were shown to divert through Fairbairn Avenue, with traffic from the Monaro Highway and Pialligo Avenue making a route choice decision to avoid Parkes Way.
- Increased traffic through the Parkes Way / Edinburgh Avenue interchange causes increased delays of almost one minute on the off-ramp approaches to the interchange.
- Due to the reduced volumes on Parkes Way westbound, there was reduced congestion at the merge from Kings Avenue, which resulted in reduced delays of around one minute for the route from Kings Avenue northbound to Parkes Way westbound.
- Some northbound traffic on Commonwealth Avenue which used the ramp to Parkes Way westbound also was also displaced and diverted to the Lady Denman Drive and onto Tuggeranong Parkway (around 120vph).
- Some northbound traffic diverted from Commonwealth Avenue to Kings Avenue, with an increase of around 250vph on the Kings Avenue Bridge. Most of the increased traffic travelled onto Parkes Way westbound.
- The additional traffic travelling through Russell onto Constitution Avenue caused additional delays of around five minutes at the intersection of Constitution Avenue and Blamey Crescent.
- Traffic volumes southbound on Commonwealth Avenue Bridge were predicted to reduce by around 100vph due to ramp closures and reduced capacity through the City via Vernon Circle.
- Southbound traffic was predicted to divert to Kings Avenue, with an increase of around 100vph on the Kings Avenue Bridge.
- Increased traffic volumes of around 200vph each way on the northern sections London Circuit caused increased delays of around 45 seconds on the westbound approach to the Northbourne Avenue / London Circuit intersection.



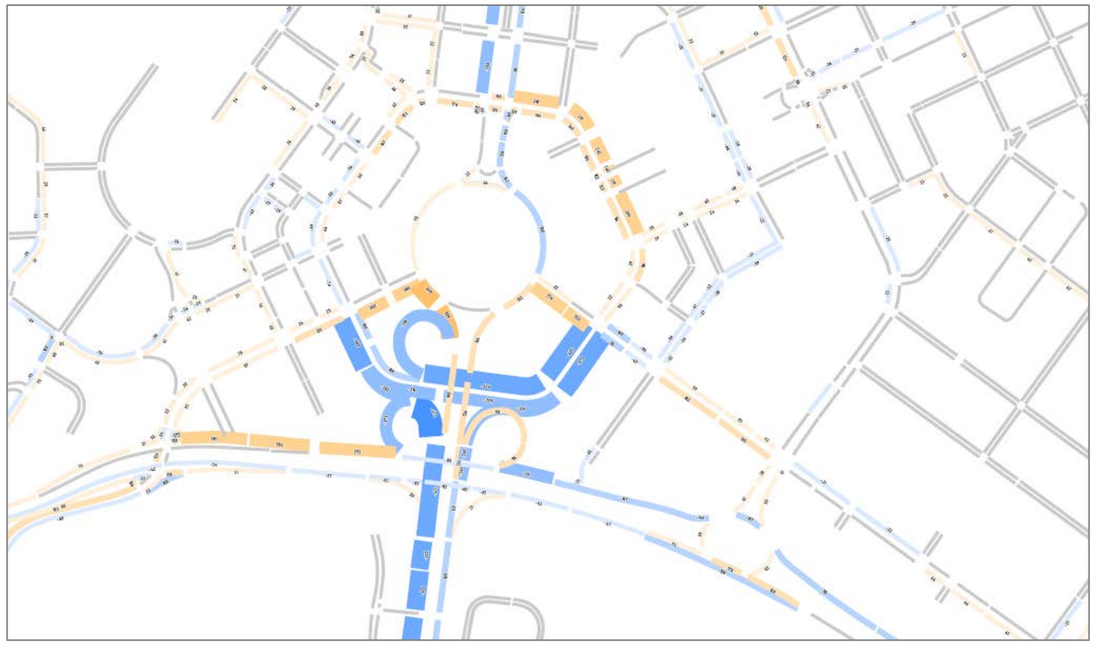


Figure 6 CS Baseline vs Base Case volume difference (2021 PM peak)

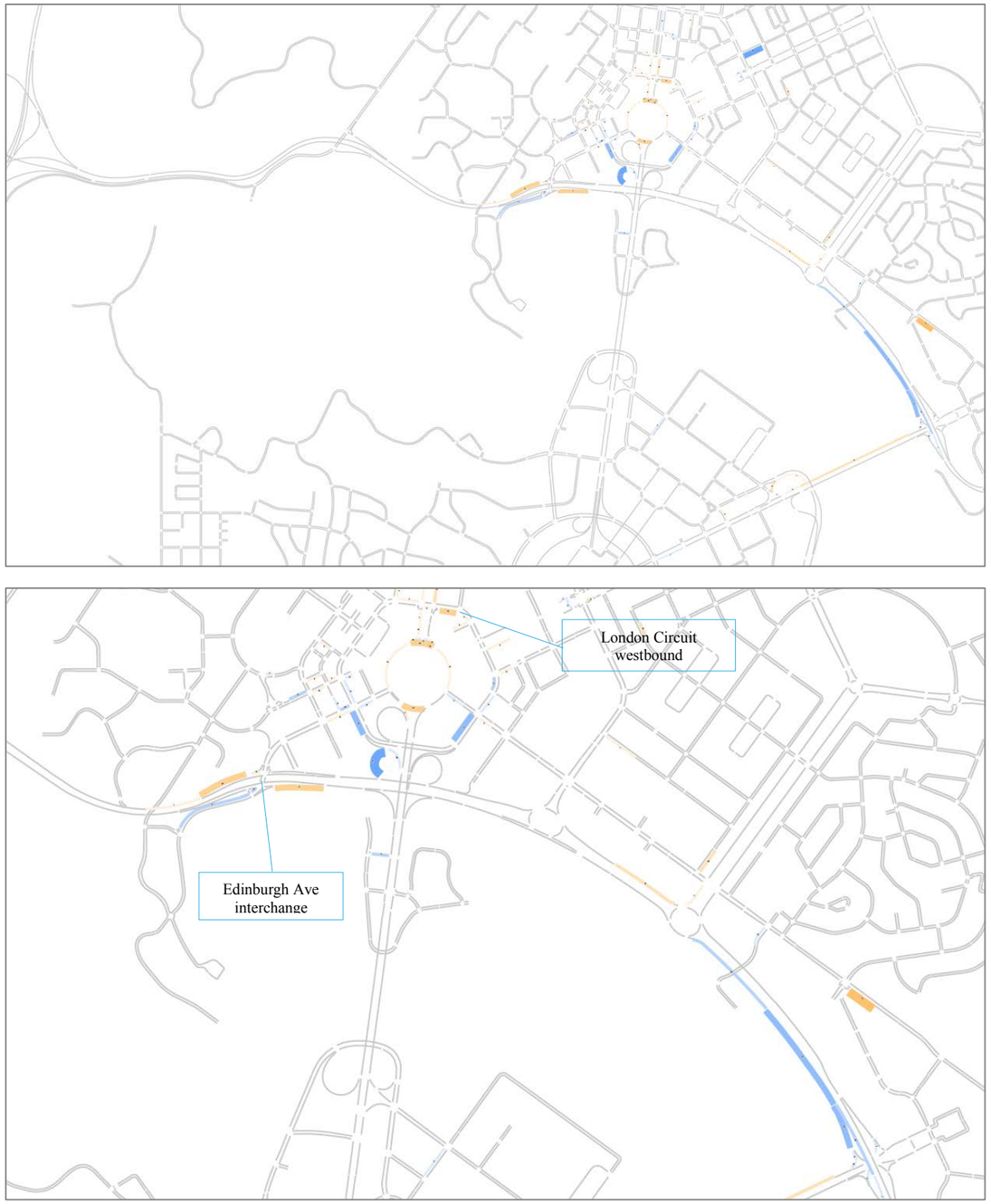


Figure 7 CS Baseline vs Base Case delay difference (2021 PM peak)

4 Journey Time Analysis

4.1 Traffic Journey Times

Journey time results for several key routes have been reported from the model results. The results are used to highlight the change in journey times between the Base Case and Construction Stage Baseline.

Journey times for eight vehicle routes were measured for the assessment as shown in Figure 8:

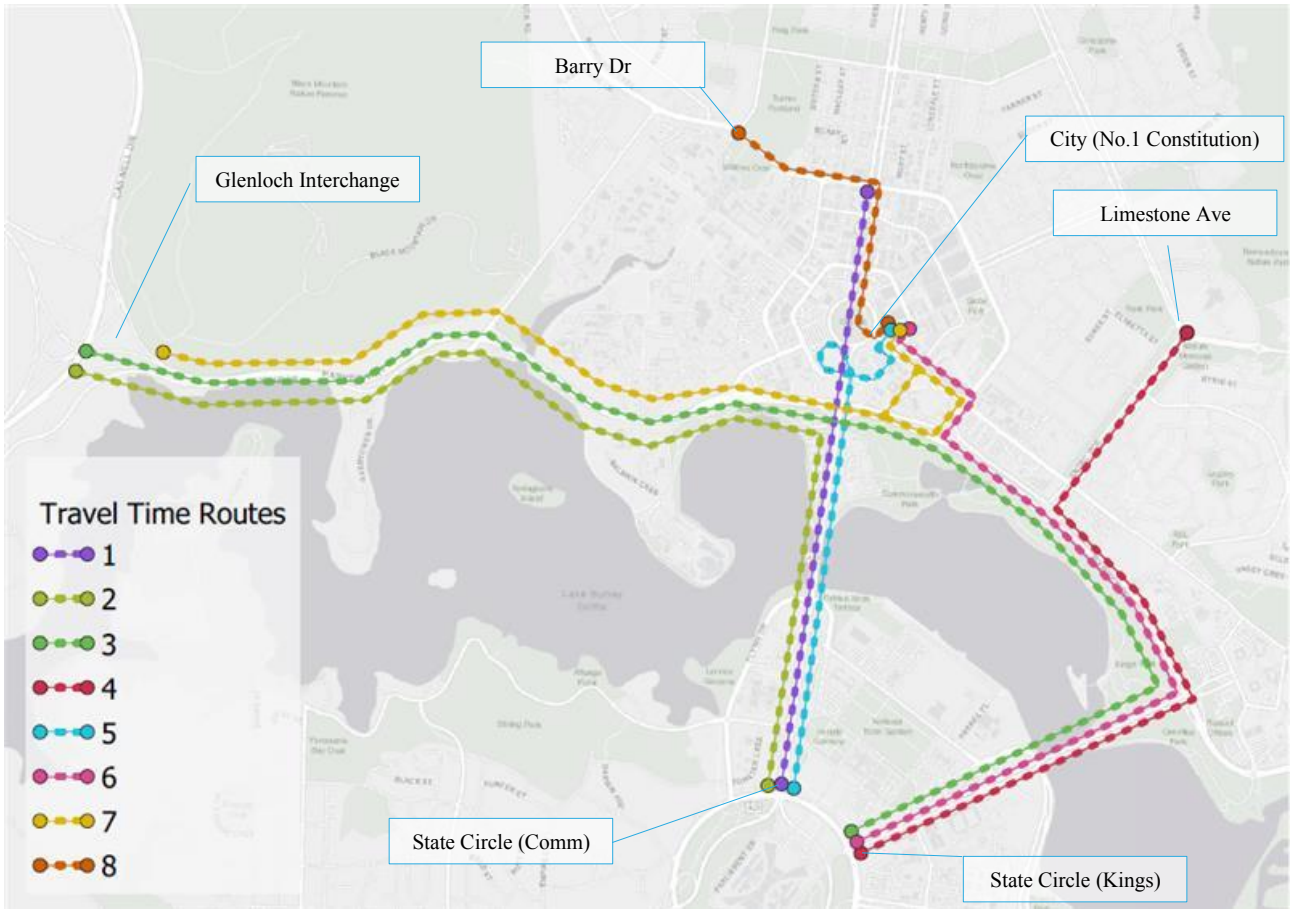


Figure 8 Vehicle travel time routes (Base Case)

1. State Circle - Barry Drive along Commonwealth Avenue
2. State Circle - Glenloch Interchange via Commonwealth Avenue
3. State Circle - Glenloch Interchange via Kings Avenue
4. State Circle - Limestone Avenue via Kings Avenue
5. State Circle - City (No.1 Constitution Ave) via Commonwealth Avenue
    a. Inbound via London Circuit
    b. Outbound via Vernon Circle

6. State Circle - City via Kings Avenue
7. Glenloch Interchange - City
    a. Inbound via Allara Street
    b. Outbound via Coranderrk Street
8. Barry Drive - City

Table 1 summarises the AM and PM peak journey times for each route for each model scenario:

- 2021 Base Case (BC)
- Construction Stage (CS)

Table 2 shows the change in journey time for the Construction Stage compared to the Base Case. The table shows minor increases of around one minute across most journey times. The key observations from the journey time results are summarised below:

- Journey times northbound and southbound along Commonwealth Avenue increase by around one minute in the AM and PM peaks.
- Journey times eastbound along Parkes Way increase by around 1.5 minutes in the AM peak. Changes were minimal during the PM peak.
- Journey times westbound along Parkes Way increase by around one minute in the AM peak due to increased congestion between Commonwealth Avenue and Edinburgh Avenue.
- Journey times northbound on Kings Avenue to Parkes Way westbound decrease by around one minutes in the PM peak. This was due to a small reduction in vehicles travelling westbound along Parkes Way from Anzac Avenue and Pialligo.

Table 1 Vehicle journey times in minutes

Scenario	Route 1		Route 2		Route 3		Route 4		Route 5		Route 6		Route 7		Route 8	
	NB State Cir - Barry Dr (via Comm Ave)	**SB Barry Dr - State Cir** (via Comm Ave)	**WB State Cir - Glenloch** (via Comm Ave)	**EB Glenloch - State Cir** (via Comm Ave)	**WB State Cir - Glenloch** (via Kings Ave)	**EB Glenloch - State Cir** (via Kings Ave)	**NB State Cir - L'stone Ave** (via Kings Ave)	**SB L'stone Ave - State Cir** (via Kings Ave)	**IB State Cir - City** (via Comm Ave)	**OB City - State Cir** (via Comm Ave)	**IB State Cir - City** (via Kings Ave)	**OB City - State Cir** (via Kings Ave)	**IB Glenloch - City** (via Parkes Way)	**OB City - Glenloch** (via Parkes Way)	**IB Barry Dr - City**	**OB City - Barry Dr**
AM																
BC	**5.7**	**4.4**	**4.8**	**13.9**	**7.1**	**17.1**	**5.6**	**6.4**	**4.0**	**4.3**	**6.3**	**7.9**	**12.6**	**6.3**	**3.5**	**5.4**
CS	6.4	5.5	5.8	15.2	8.1	18.5	5.7	6.4	5.4	4.4	6.3	8.5	14.2	8.0	4.2	5.7
PM																
BC	**5.2**	**4.4**	**5.1**	**5.4**	**12.0**	**8.7**	**10.3**	**6.7**	**3.9**	**3.6**	**11.1**	**8.4**	**4.5**	**6.6**	**3.8**	**4.8**
CS	6.2	5.4	5.0	5.6	10.7	9.0	9.2	6.5	4.8	3.7	10.0	8.7	4.9	6.8	4.5	6.1

Table 2 Change in vehicle journey times in minutes compared to 2021 Base Case

Scenario	Route 1		Route 2		Route 3		Route 4		Route 5		Route 6		Route 7		Route 8	
	NB State Cir - Barry Dr (via Comm Ave)	**SB Barry Dr - State Cir** (via Comm Ave)	**WB State Cir - Glenloch** (via Comm Ave)	**EB Glenloch - State Cir** (via Comm Ave)	**WB State Cir - Glenloch** (via Kings Ave)	**EB Glenloch - State Cir** (via Kings Ave)	**NB State Cir - L'stone Ave** (via Kings Ave)	**SB L'stone Ave - State Cir** (via Kings Ave)	**IB State Cir - City** (via Comm Ave)	**OB City - State Cir** (via Comm Ave)	**IB State Cir - City** (via Kings Ave)	**OB City - State Cir** (via Kings Ave)	**IB Glenloch - City** (via Parkes Way)	**OB City - Glenloch** (via Parkes Way)	**IB Barry Dr - City**	**OB City - Barry Dr**
AM																
BC	**5.7**	**4.4**	**4.8**	**13.9**	**7.1**	**17.1**	**5.6**	**6.4**	**4.0**	**4.3**	**6.3**	**7.9**	**12.6**	**6.3**	**3.5**	**5.4**
CS vs BC	0.7	1.2	1.0	1.4	1.0	1.4	0.1	0.0	1.3	0.1	0.0	0.6	1.6	1.7	0.7	0.2
PM																
BC	**5.2**	**4.4**	**5.1**	**5.4**	**12.0**	**8.7**	**10.3**	**6.7**	**3.9**	**3.6**	**11.1**	**8.4**	**4.5**	**6.6**	**3.8**	**4.8**
CS vs BC	1.1	0.9	0.0	0.3	-1.3	0.3	-1.1	-0.2	0.9	0.1	-1.1	0.3	0.4	0.2	0.7	1.4

4.2 Bus Journey Times

Journey time results for two key bus routes on Commonwealth Ave have been reported from the model results. The results are used to highlight the change in journey times between the Base Case and Construction Stage.

Journey times for two bus routes were measured for the assessment:

1. Bus R2 – between National Circuit and Alinga Street
2. Bus R4 – between State Circle and Alinga Street

Figure 9 shows the vehicle routes with start/end locations. Bus routes previously using the north-west loop ramp at Commonwealth Ave / London Circuit in the Base Case would be rerouted onto Vernon Circle.

Figure 9 Bus travel time routes

Table 3 shows the AM and PM peak journey times for each route for each model scenario:

- 2021 Base Case (BC)
- Construction Stage (CS)

Table 4 shows the change in journey time for the Construction Stage compared to the Base Case. The key observations from the bus journey time results are summarised below:

- Northbound bus journey times increase by around two minutes in the AM peak due to rerouting through Vernon Circle versus using the north-west clover leaf ramp.
- Northbound bus journey times increase by around 2.7 minutes for R2 and 3.5 minutes for R4 in the PM peak due to rerouting through Vernon Circle plus increased delay of around 45 seconds experienced by R4 along London Circuit between East Row and Northbourne Ave.
- Southbound bus journey times increase by around 1 to 1.5 minutes in both peaks due to rerouting through Vernon Circle versus using the Commonwealth Ave on-ramp.

Table 3 Bus journey times in minutes

	Bus R2		Bus R4	
Scenario	NB Nat Cct - Alinga St	SB Alinga St - Nat Cct	NB State Cir - Alinga St	NB State Cir - Alinga St
AM				
BC	9.9	8.4	8.4	9.2
CS	11.9	9.8	10.6	10.8
PM				
BC	8.4	9.0	8.4	8.3
CS	11.0	9.9	11.9	9.1

Table 4 Summary of change in bus journey times in minutes compared to 2021 Base Case

	Bus R2		Bus R4	
Scenario	NB Nat Cct - Alinga St	SB Alinga St - Nat Cct	NB State Cir - Alinga St	SB State Cir - Alinga St
AM				
BC	**9.9**	**8.4**	**8.4**	**9.2**
CS vs BC	2.1	1.4	2.3	1.6
PM				
BC	**8.4**	**9.0**	**8.4**	**8.3**
CS vs BC	2.7	0.8	3.5	0.9

5 Summary

This technical note documents the traffic modelling analysis that was undertaken to identify the possible traffic impacts due to the construction of the Raised London Circuit intersection.

For the analysis, the 2021 City Centre and Inner North Precinct Reference Model (CINRM) was used to model two scenarios:

- Base Case – existing conditions (that is, a 'do nothing' scenario).
- Construction Stage Baseline – changes to the network due to construction, which included: the closure of southern section of London Circuit and connecting ramps to/from Commonwealth Avenue, the closure of the north-west and south-west clover leaf ramps, a one lane reduction on Commonwealth Ave bridge northbound over London Circuit and diversion of affected bus routes.

Model results for the Construction Baseline scenario showed that localised rerouting of traffic would occur in response to the closure of ramps. It was predicted that most vehicles would reroute via Vernon Circle, Edinburgh Avenue and Constitution Avenue. Traffic was also predicted to reroute through the Edinburgh Ave interchange via Parkes Way.

Longer distance diversions were also predicted with around 300vph in the AM peak and 400vph in the PM diverted away from Commonwealth Avenue in the northbound direction.

Summary of AM Peak Impacts

The most significant impacts during the AM peak were:

- Increased congestion associated with traffic diverting to use the westbound Edinburgh Avenue off-ramp, resulting in 84s of additional delay.
- Increased delays of around 50s on the westbound approach to the Edinburgh Avenue / Marcus Clarke Street intersection.
- Travel time increased by around one minute along Commonwealth Avenue in each direction.
- Travel time increased by around 1.5 minutes eastbound along and Parkes Way.
- Bus travel time increased by around two minutes for bus routes on Commonwealth Avenue.

Summary of PM Peak Impacts

The most significant impacts during the PM peak were:

- Travel time increased by around one minute along Commonwealth Avenue in each direction.
- Increased delays of almost one minute on the off-ramp approaches to the Parkes Way / Edinburgh Avenue interchange.
- Increased delays of almost one minute on the westbound approach to the Northbourne Avenue / London Circuit intersection.
- Bus travel time increased by around two minutes for bus routes on Commonwealth Avenue with an additional one minute of delay experienced by some inbound buses on London Circuit.

Areas of further investigation

Modelling of the Construction Stage scenario indicated further areas where mitigation measures could be investigated. These include:

- Increasing capacity of the Parkes Way eastbound approach to the Parkes Way / Coranderrk Street roundabout.

  Signalisation of the Coranderrk Street roundabout is currently being investing, which could assist in this regard. However, it is noted that although signalisation of the roundabout would benefit the Raised London Circuit project, the project is not dependent on the signalisation and the Coranderrk signalisation project will be addressed with a separate works approval.

- Adjusting signal timings or increasing capacity at the following intersection to facilitate changed traffic volumes:
  - Edinburgh Avenue / Marcus Clarke Street intersection
  - Northbourne Avenue / London Circuit intersection
  - Edinburgh Avenue / Parkes Way interchange.

Traffic model limitations

In considering the predicted impacts of the construction stage and the preferred option, it should be noted that the traffic model predicts changes in travel patterns in response to changing levels of delay, such as the diversion of traffic away Commonwealth Avenue to Kings Avenue and Parkes Way. The model seeks to establish a state of equilibrium, which assumes drivers adapt their route choice to optimise their journey time. In the case of disruption caused by construction impacts, it is likely that a state of equilibrium may take some time to be established. Initial impacts on Commonwealth Avenue will be much higher until enough drivers 'learn' to change their travel patterns. Changes to travel patterns could be assisted through prior communications to the public from the Territory on the likely impacts and alternative routes.

The impacts of the construction stage predicted by the traffic model are predicated on the level of traffic diversion predicted by the model, which is influenced by levels of delay and congestion. The Canberra road network is predicted to experience high levels of congestion in some areas under normal conditions. As with real traffic conditions, the traffic model is sensitive to variations in traffic levels which in turn results in different levels of predicted congestion. In modelling terms, this is referred to model stochasticity, where there will be slight variations in the model inputs and outputs from run to run. Areas of the network that experience high congestion levels are particularly sensitive to slight variations and this can result in relatively large changes in predicted delays and travel times.

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	Kevin Kong	Roland Cathcart	Roland Cathcart
Signature			