Prepared for
Major Projects Canberra
ABN: 66 676 633 401

Traffic and Transport Impact Assessment

24-Mar-2023
Light Rail City to Commonwealth Park

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Traffic and Transport Impact Assessment

Client: Major Projects Canberra

ABN: 66 676 633 401

Prepared by

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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
ACTION	Bus operator owned by the ACT Government
Aimsun model	Aimsun mesoscopic modelling package
AFP	Australian Federal Police
ANU	Australian National University
CBD	Central Business District
CLR1	Canberra Light Rail Stage 1
CRA	City Renewal Authority
CTMP	Construction transport 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
EPSDD	Environment, Planning and Sustainable Development Directorate
ESA	Emergency Services Agency
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
NCA	National Capital Authority
NCP	National Capital Plan
NSW	New South Wales
PBS	Performance Based Standards
PCU	Passenger car unit
QT	A hotel located near the intersection of Commonwealth Avenue and London Circuit
RLC	Raising London Circuit
TCCS	Transport Canberra and City Services Directorate
Territory	ACT Government
Travel time	A measure of the time taken to travel between two defined locations
TTLG	Traffic and Transport Liaison Group
TTM	Temporary Transport Management
UNSW	University of New South Wales

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) has been commissioned to undertake a traffic and transport impact assessment for the proposed works associated with the Canberra Light Rail Stage 2A City to Commonwealth Park Project (the Project).

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) and Territory Plan for the City and its surrounds. In this context, the need for the Project is underpinned by several significant strategic roles:

1. **Direct facilitation of Stage 2B Commonwealth Park to Woden** by facilitating and providing an opportunity for the light rail network extension to connect past Commonwealth Avenue southbound towards Woden
2. **Future-proofing the transport network** by providing public transport infrastructure that responds to current needs and also provides strategic capacity for future growth
3. **Providing sustainable transport options and reaching net zero** by providing public transportation that runs on renewable energy
4. **Facilitating the transition to a compact and connected city** by providing more public transport options closer to the City to limit urban sprawl and car use to limit the stress of a growing Canberra population.

1.2 Project vision and objectives

The ACT Government made a clear commitment in the *Canberra: A Statement of Ambition 2015* and *The City Plan 2014* to construct the Canberra Light Rail network over the coming years to help achieve its vision for Canberra and to:

- Deliver an attractive public transport choice for the City
- Support and generate urban renewal
- Diversify the Canberra economy.

The vision and objectives have been developed for the Project, taking into account the Project's role in responding to the planning and development vision in the NCP, Territory Plan and the other strategies and plans.

In pursuit of visions outlined across relevant planning strategies, the design, development and delivery of the Project would be guided by the seven objectives shown in Figure 1-1. Given the Project's direct facilitation of Light Rail to Woden, the objectives for both projects were considered concurrently by the ACT Government (MPC, 2019).

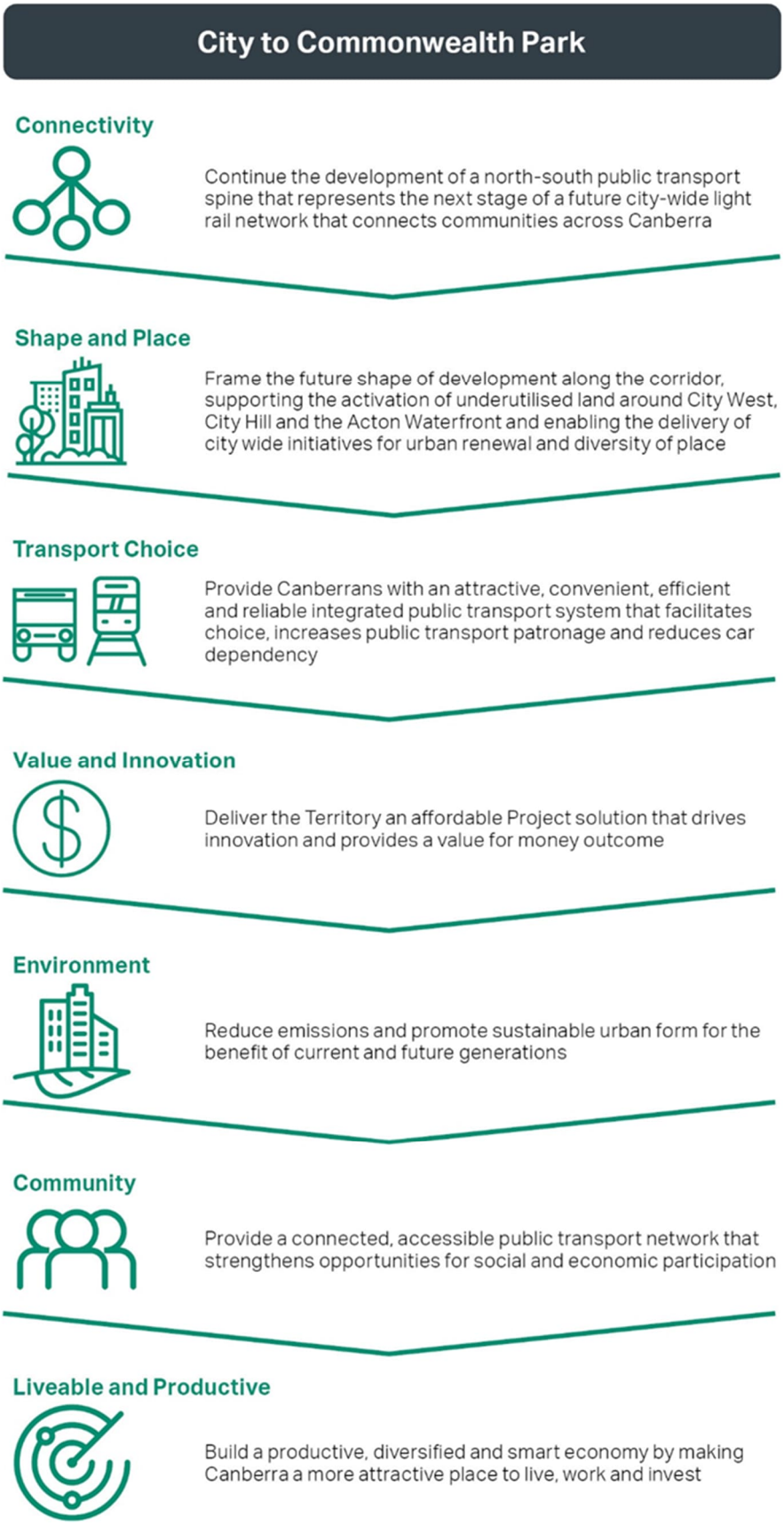


Figure 1-1 Objectives of the Project

1.3 Study area

The Project is located within Civic, in Canberra City. The study area for this assessment is shown in Figure 1-2 and includes:

- Northbourne Avenue between Alinga Street and Vernon Circle
- London Circuit West between Northbourne Avenue and Commonwealth Avenue
- London Circuit East between Petrie Plaza and Northbourne Avenue
- Commonwealth Avenue between Vernon Circle and Lake Burley Griffin
- Vernon Circle
- Edinburgh Avenue between Vernon Circle and Marcus Clarke Street
- Marcus Clarke Street between Edinburgh Avenue and Kendall Lane
- Parkes Way between the pedestrian overpasses east and west of the Parkes Way bridge
- Construction compounds:
    - Site compound A - Constitution Avenue car park, located at the corner of London Circuit and Constitution Avenue
    - Site compound B - Marcus Clarke Street, located at the corner of Marcus Clarke Street and Gordon Street
    - Site compound C - Acton Waterfront Central and Southern car parks, located within Acton Park
    - Site compound D - Parkes Way and southwest cloverleaf.

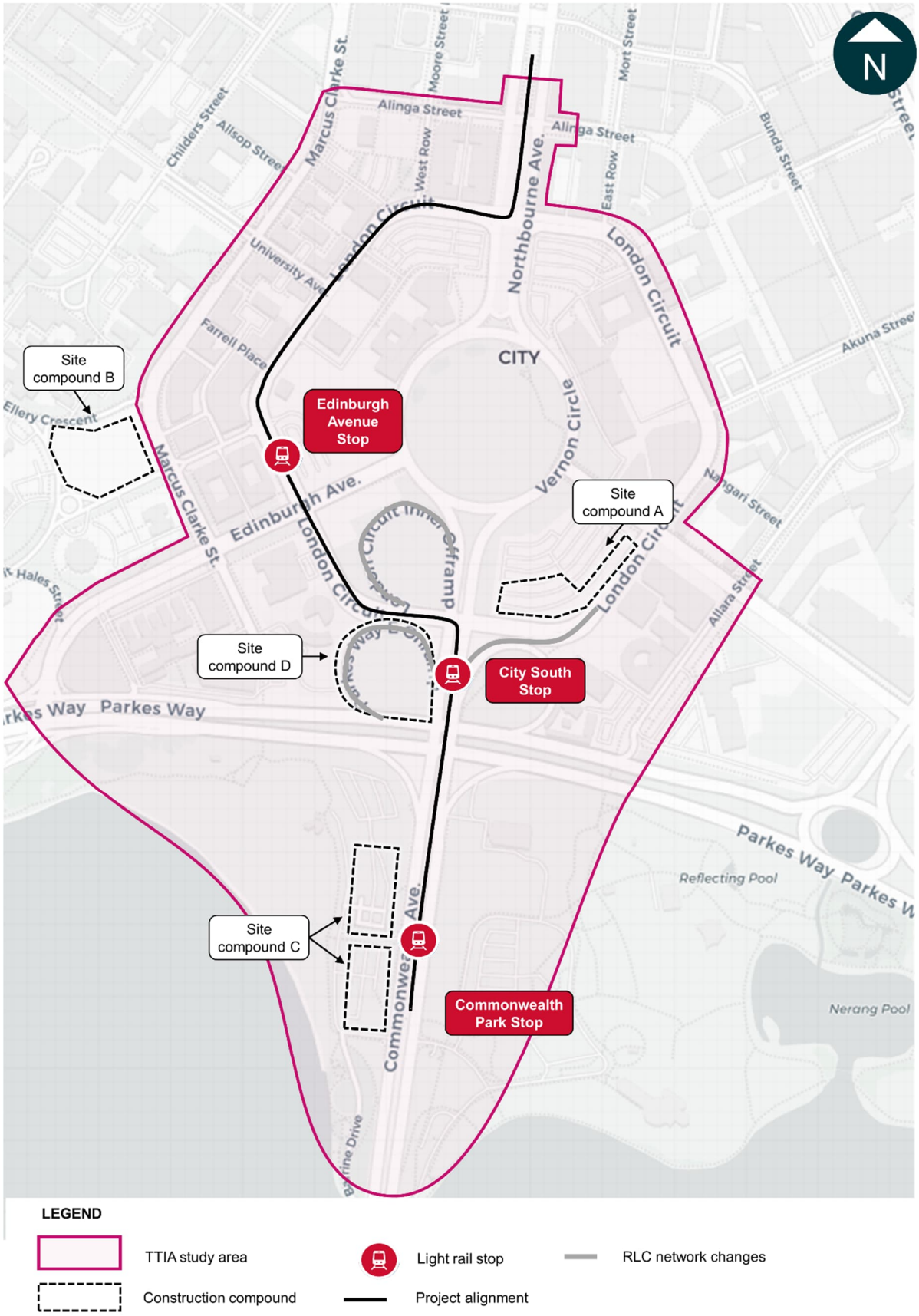


Figure 1-2 Project study area

1.4 Report structure

The structure of this report includes:

- **Section 1.0**: Introduction - introduces the Project and the report
- **Section 2.0**: Project description - provides details of the Project including its design, operation and construction methodology
- **Section 3.0**: 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 4.0**: 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 5.0**: 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 6.0**: 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 7.0**: Operational 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 8.0**: Conclusions - outlines the overall conclusions for the Project's construction and operational impact assessment.

2.0 Project description

Major Projects Canberra (MPC) proposes to extend the Canberra Light Rail (CLR) network from its current southern terminus at Alinga Street, Canberra City, to Woden (Light Rail to Woden). Light Rail to Woden is being progressed in two, self-contained stages for a faster project delivery:

- Stage 2A City to Commonwealth Park (the Project, the subject of this EA)
- Stage 2B Commonwealth Park to Woden.

The Project is needed as part of a coordinated and holistic delivery of a series of major projects in the City and surrounds, to realise the strategic planning and development for the City presented in the Territory Plan, the Transport for Canberra Plan and the NCP. The Project also supports the ACT Government's vision for a compact and efficient city and reaching net zero by 2045. Furthermore, the Project is a specific directive identified as a key strategy for developing and delivering an efficient, compact and sustainable the City within the Moving Canberra Plan, The Light Rail Network Plan and The ACT Planning Strategy.

The Project would involve extending the CLR network from the current southern terminus at Alinga Street to a proposed stop at Commonwealth Park. A full project description for the Project is provided in Chapter 3.0 of the Environmental Assessment.

The Project would include the following key elements:

- An extension of approximately 1.7 km of track, southbound from the current Alinga Street terminus to a new stop at Commonwealth Park. The alignment would extend southbound via the western half of London Circuit before continuing on Commonwealth Avenue, to a new terminus at Commonwealth Park
- One scissor crossover (crossover of railway tracks) to allow Light Rail Vehicles (LRVs) to reverse direction
- 'Green tracks' running along Commonwealth Avenue and Northbourne Place that involve planting grass or shrubs between and beside the alignment
- Three new stops, one located on London Circuit and two located on Commonwealth Avenue
- Intersection layout, traffic signal phasing and road traffic speed changes along the alignment, including new intersections and modifications to existing intersections
- Road widening and verge and kerb line changes
- Pedestrian footpaths and crossing modifications
- Utility, stormwater drainage and streetlighting adjustments, relocations and provisions
- A new bridge across Parkes Way for the light rail
- Landscaping features sympathetic with Canberra's design as envisioned by Walter Burley Griffin's plan along with requirements set out in other Territory and Australian Government policy.

The completed Project, including its key features and elements, is shown in Figure 2-1.

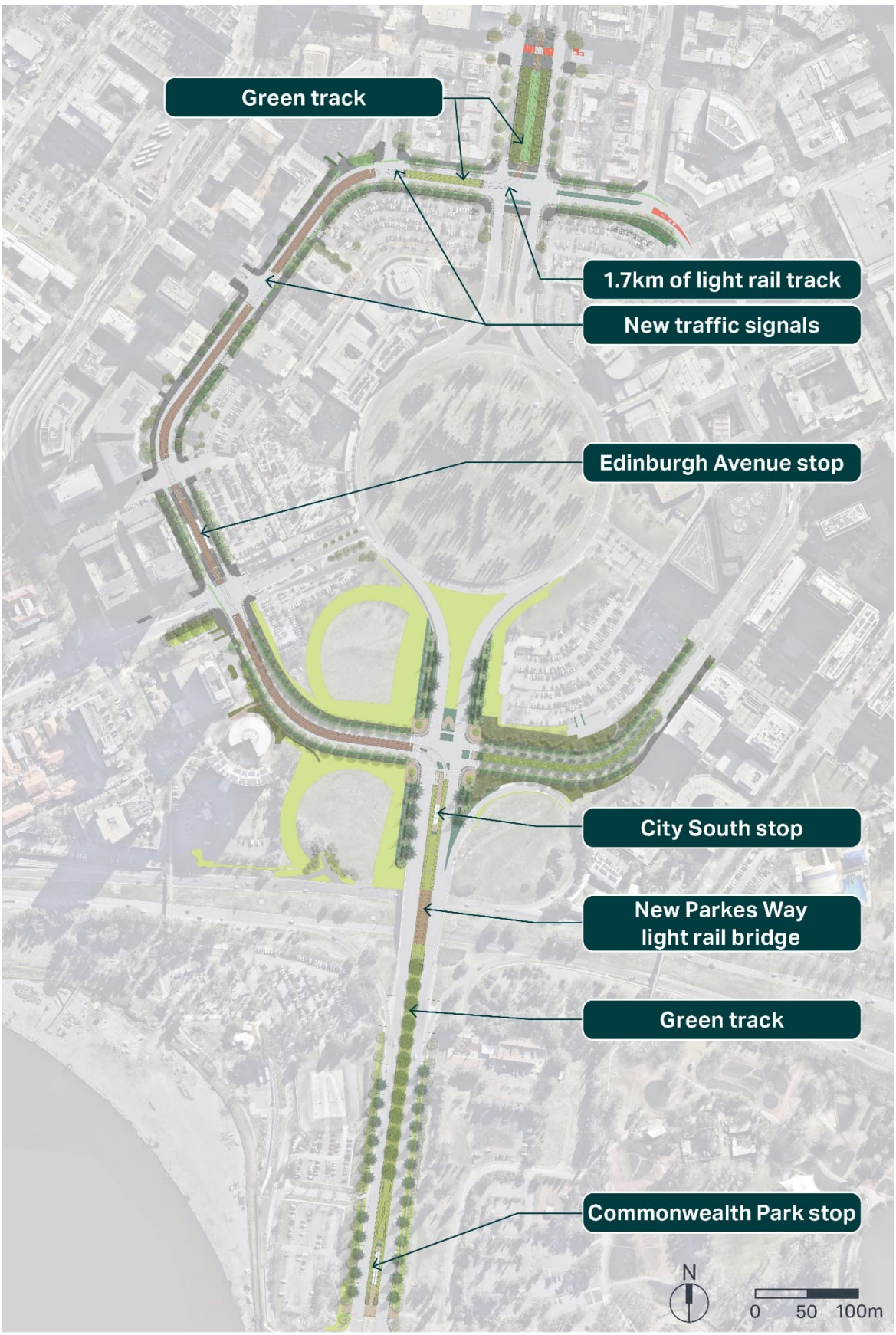


Figure 2-1 The Project and its key features

2.1 Construction

Construction activities associated with the Project would occur within a footprint referred to as the ‘delivery phase area’ (Figure 2-2). The operation of the Project would occur within a subset of the delivery phase area. The delivery phase area includes both Designated Land and Territory land.

Construction of the Project is anticipated to commence in 2024 with completion of construction planned in 2026. However, the duration of the construction would be dependent on final construction methodology and staging selected by the delivery contractor, as well as any efficiencies identified during the program. Following construction, a period of up to nine months would be required for testing and commissioning of the new light rail. Successful completion of the testing and commissioning programme would allow the Project Contractor to obtain accreditation from the Office of the National Rail Safety Regulator (ONRSR). Once complete, the system would be ready to be handed over for operation.

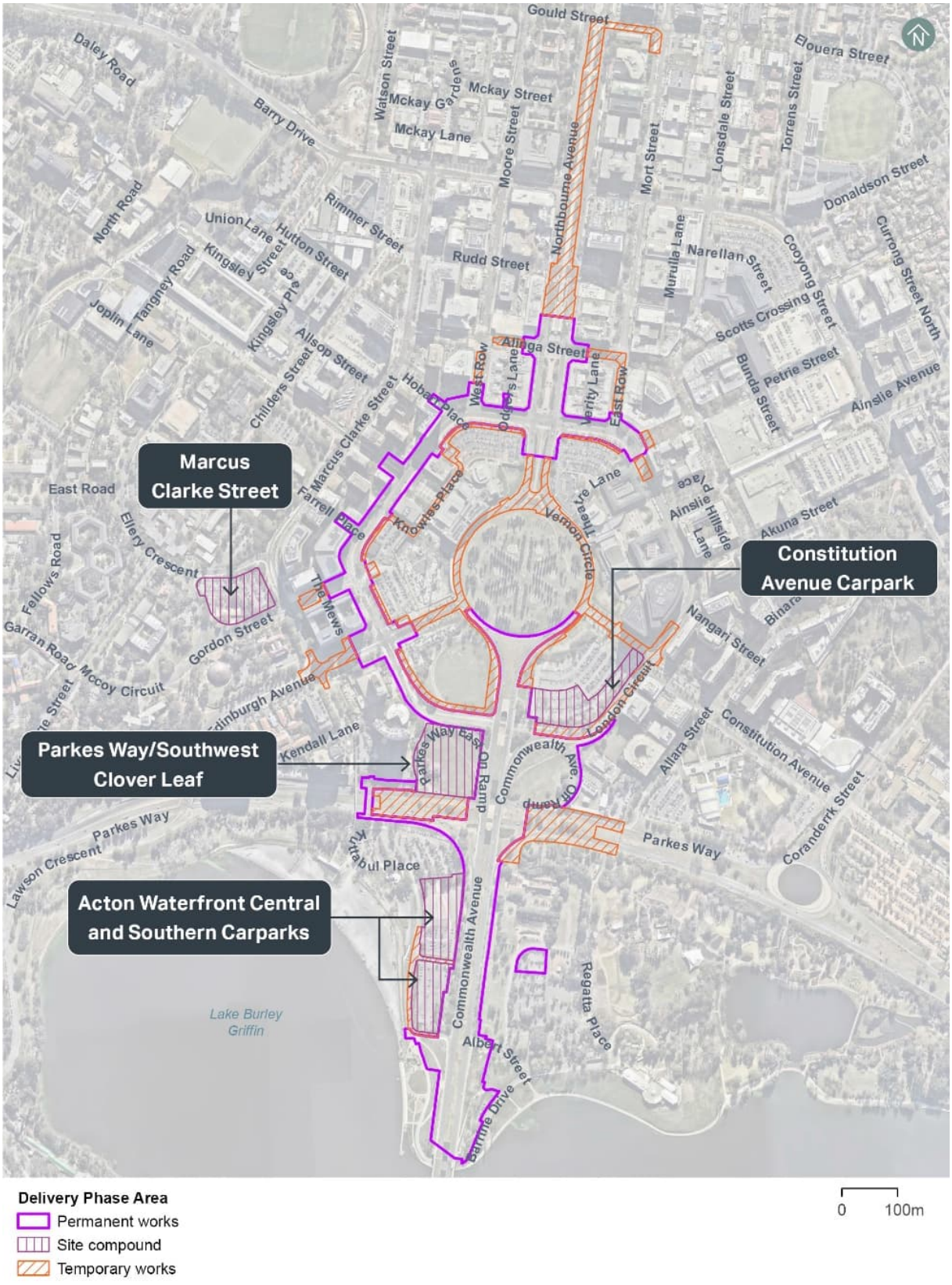


Figure 2-2 Delivery phase area

2.1.1 Site establishment and preparatory works

There would be four major compound sites, as shown in Figure 2-2. Several temporary construction compounds, stockpile sites and laydown areas would also be required as part of the Project. Upon completion of the works all established site compounds would be reinstated prior to handing back to the respective land owners.

There are utilities within the delivery phase area which are affected to various degrees by the Project. Most protection, decommissioning and removal of utilities would be completed early in the Project construction period, but may also be staged during the construction period depending on construction planning requirements.

Traffic management arrangements would include full and partial road closures and would introduce necessary traffic detours to direct the travelling public around work sites and construction access and egress points. Notification of these closures would be advertised in advance and sufficient time to deliver written notice would be required for the local businesses and residents. All temporary traffic management arrangements and diversionary routes would be agreed and approved by TCCS (Roads ACT) prior to implementation.

2.1.2 Construction strategy

The construction strategy of the Project has been divided by construction zones, major intersections and the Parkes Way bridge, as shown in Table 2-1.

Table 2-1 Construction staging locations

Location	Description
Block closures	These are construction areas between major intersections. Block closures would be used to close off entire sections of the road network, typically between blocks to allow the Project contractor full access to the worksite and the best opportunity to complete the Project most efficiently. Stops would be constructed upon the occupation of the block section where it is located. Blocks include: • Northbourne Avenue (between Alinga Street and London Circuit) • London Circuit (between Northbourne Avenue and Petrie Plaza) • London Circuit (between Northbourne Avenue and West Row) • London Circuit (West Row to Knowles Place North) • London Circuit (between Knowles Place North and Gordon Street) • London Circuit (between Gordon Street and Edinburgh Avenue) • London Circuit (between Edinburgh Avenue and Commonwealth Avenue) • Commonwealth Avenue (between London Circuit and Parkes Way) • Commonwealth Avenue (between Parkes Way and Lake Burley Griffin).
Major intersections	The major intersections include Northbourne Avenue and Alinga Street, Northbourne Avenue and London Circuit, London Circuit and Edinburgh Avenue, London Circuit and Gordon Street and Commonwealth Avenue and London Circuit. For works within major intersections, wherever possible the construction of the intersection would be carried out during normal working hours, within the confines of a protected worksite. Closures, where required, are expected to be carried out over several weekends (typically from Friday 10pm to Monday 6am) for a maximum of 56 hours at a time, except during construction of track slab where a continuous 80 hours would be required to facilitate concrete curing and ensure adequate concrete strength is achieved prior to intersection reopening and eventual trafficking. The Commonwealth Avenue and London Circuit intersection would not require full closure and would be subject to a contraflow arrangement for several weeks.

Location	Description
Parkes Way bridge	A new bridge would be built between the two road bridges on Commonwealth Avenue over Parkes Way. In appearance, the gap would be infilled to create a single surface. The new rail bridge would be supported on eight concrete piles (four piles for each bridge abutment) and concrete-walled abutments. The construction of temporary roads allows for the continued movement of traffic during bridge construction activities, with the location of temporary roads selected by the contractor in line with the Roads ACT requirements.

2.2 Operation

The Project would be an extension of the Gungahlin to City service and would therefore have the same frequency. It would take approximately six to nine minutes to travel between Alinga Street and Commonwealth Park.

A minimum of five LRVs would be required for the expansion of the CLR network. The new LRVs would be similar in appearance, size and performance to those that operate on the current CLR network. These LRVs and modifications to the stabling yard at the Mitchell Depot would be complete prior to the operation of this Project.

A wire free track is proposed for the Project alignment with LRVs operating using onboard battery power supply between the current Alinga Street southern terminus and the proposed Commonwealth Park terminus. Battery storage capacity for additional and existing LRVs has been proposed to minimise visual impact in landscape and visual sensitive zones, such as Commonwealth Avenue.

Two track forms, a permanent form of rail infrastructure that provides a surface for rail vehicles to move, are required for the Project. One trackform would operate northbound and the other southbound, with a crossover installed on Commonwealth Avenue to allow LRVs to change direction. Green track would also be included as part of the Project, in three locations: Northbourne Place, London Circuit between Northbourne Avenue and West Row, and Commonwealth Avenue between London Circuit and Albert Street. Non-potable water would be used for the irrigation of the Commonwealth Avenue green track.

2.2.1 Changes to the road network

The proposed light rail track would run within a median between opposing vehicular traffic flows for the entire length of the proposed alignment. The median would be between 80-150 mm high between intersections to minimise the possibility of road vehicles straying into the rail corridor. The median height would transition to be at grade just before each signalised intersection. This would facilitate vehicular and pedestrian movement across the track.

Road network changes required to accommodate the Project's median light rail alignment and associated stops are provided in Table 2-2.

Table 2-2 Lane configuration

Road	Proposed lane configuration
London Circuit	• The lane arrangement on London Circuit between Edinburgh Avenue and Commonwealth Avenue would remain unchanged • Two 3.3 m wide traffic lanes in each direction along London Circuit between Northbourne Avenue and West Row, including a dedicated westbound right turn lane to West Row • A single 3.7 m wide traffic lane in each direction along London Circuit between West Row and Edinburgh Avenue, except on the southbound approach to Gordon Street which would have a dedicated right turn lane. • The posted speed limit along London Circuit would remain 40 km/h except in the vicinity of the Edinburgh Avenue stop where the speed would be reduced to 20 km/h because of the high pedestrian activity expected at the stop • All on street parking and loading along London Circuit would be removed.

Road	Proposed lane configuration
	• Two new signalised intersections on London Circuit to facilitate right turns across the Project's alignment at West Row and University Avenue. The remaining unsignalised intersections along London Circuit would be converted to left-in/left-out out[1].
Alinga Street	One lane in each direction on Alinga Street within the median on Northbourne Avenue. These lanes would be for buses only.
Commonwealth Avenue	No change
Northbourne Avenue	No change

2.2.1 Active transport infrastructure

The Project includes walking and cycling facilities or upgrades that aim to improve pedestrian and cyclist safety, connectivity and amenity within the study area, and in particular along London Circuit West and Commonwealth Avenue. Active transport infrastructure includes dedicated and separate pedestrian and cycling paths.

2.3 Traffic and transport specific features of the Project

2.3.1 Proposed route and stop locations

The Project would have a centre running alignment following the existing road network between the existing Alinga Street stop and Commonwealth Park travelling along Northbourne Avenue, London Circuit West and Commonwealth Avenue. The respective changes to the road network including lane configuration and intersection changes are discussed in detail in the body of this report.

The Project alignment includes three stops: Edinburgh Avenue, City South and Commonwealth Park. The location of the stops are shown Figure 1-2.

2.3.2 Light rail operations

The Project would be an extension to the existing Canberra Light Rail Stage 1 (CLR1) alignment which currently runs between the Gungahlin and the City. The Project includes a minimum of five additional LRVs that would be similar in appearance, size and performance to those that operate on the current Canberra Light Rail network. The LRVs would be stabled and maintained at the existing depot in Mitchell.

The Project would operate with the same frequency as the existing CLR, including at least 10-minute frequency in each direction on a weekday, operating every five minutes during peak hours.

2.3.3 Active transport treatment

The Project includes upgrades to the pedestrian and cyclist infrastructure within the Project study area. The details and impacts of this infrastructure are outlined in the body of this report.

2.3.4 Public transport and interchanges

The Project does not include permanent changes to the existing bus network or City Bus Interchange.

[1] Right turn out from Knowles Place south permitted by emergency vehicles under sirens

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. Over the course of the Project extent, the planning jurisdiction changes multiple times between the National Capital Authority (NCA) and the *Planning and Development Act 2007* (ACT), requiring both a Works Approval (WA) and Development Approval (DA) from the planning authorities respectively.

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. Most of the study area lies within the City Hill or West Basin Precincts, as designated by the NCP (Section 3.1.2). 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 3-1.

Figure 3-1 Legislative directions and context for the Project

3.1.2 Precincts

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 parts of London Circuit and all of Vernon Circle are:

- London Circuit should operate as the main public transport circuit for the 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 3-2
- Access to the inner City Hill Precinct should predominantly be local traffic.

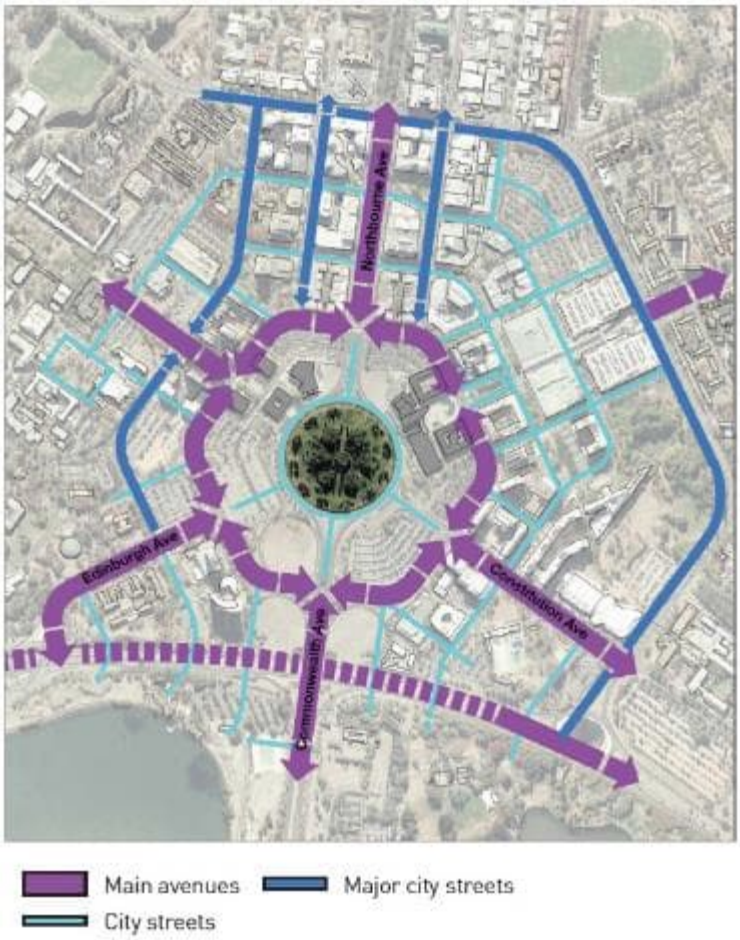


Figure 3-2 City Hill Precinct street network (Source: NCP)

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 Lake Burley Griffin (the Lake), as demonstrated in Figure 3-3
- Provide a vibrant, interesting, and lively centre with high levels of human activity
- Facilitate movement throughout the precinct especially active transport modes
- The avenues and urban areas are 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
- Transition to more sustainable transport methods.

Figure 3-3 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 National

3.2.1.1 Australian Infrastructure Plan, 2021

The Australian Infrastructure Plan, 2021 provides an actionable reform and investment roadmap for Australia and sets out the infrastructure challenges and opportunities that Australia would face over the next 15 years.

The plan recognises the strategic importance of moving people and goods more efficiently, which is a key driver for this Project. In particular, the plan recognises the importance of investment in efficient and effective public transport to improve a community's connectivity, productivity and quality of life.

The Project supports two of the plan's overarching themes. These are:

- Transport shapes communities, so we must build, operate and maintain transport infrastructure that supports the places we want to live, work, play, visit and invest in
- Journeys for individuals should be reliable, predictable and affordable, wherever they live and whatever their mobility needs.

3.2.2 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:

- Canberra: A Statement of Ambition, 2017
- 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 3-4, with details discussed further below.

Figure 3-4 The Territory's strategic context for the Project

3.2.2.1 Canberra: A Statement of Ambition, 2017

One of the world's most liveable and competitive cities is the Chief Minister's vision for the ACT.

Building a light rail network is recognised as a key task to achieve the Ministers vision. Light rail is envisaged to support the densification of the urban centre, while also connecting the suburbs and improving the quality of life for Canberra's communities. Canberra's planned light rail network would help to maintain the short commutes and journeys currently experienced in Canberra, by managing congestion through a connected and integrated land-use and transport network.A(A

3.2.2.2 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 West Basin and the City Hill Precincts:

- The City Hill precinct is to be the transport and pedestrian hub for the whole city – the Project is to provide a new public transport corridor along London Circuit, with specific design considerations for pedestrians
- The City Centre is to be walkable and pedestrian friendly that is connected to urban areas and surrounds – the Project aims to improve pedestrian facilities within the study area and to improve connectivity between the City West precinct and the waterfront and surrounds
- West Basin precinct is to be connected with the Lake and Australian National University (ANU) - the Project would help to better connect future development in the West Basin precinct with the city and the nearby ANU.

3.2.2.3 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 - *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 3-5 shows conceptually the different functions that streets play in terms of movement and place.

Figure 3-5 The movement and place framework conceptual overview (ACT Planning Strategy, 2018)

The Project would align with the ACT Planning Strategy by:

- Encouraging urban renewal and intensification along its alignment, allowing for integrated transport and land-use outcomes
- Delivering improved walking and cycling outcomes
- Delivering urban streets and placemaking opportunities
- Providing greater public transport connectivity for communities along its alignment.

3.2.2.4 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. Light Rail to Woden is identified as a key transport priority for the next five years, as it would connect the Central Business District (CBD) with major town centres to the south, such as Woden via an emission-free transport option.

Specifically, the Project is acknowledged as a valuable project in its own right, as it connects key destinations and urban renewal precincts, such as the planned mixed-use developments along London Circuit and future development in the West Basin precinct, as discussed further in Section 3.4.

3.2.2.5 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 3-6.

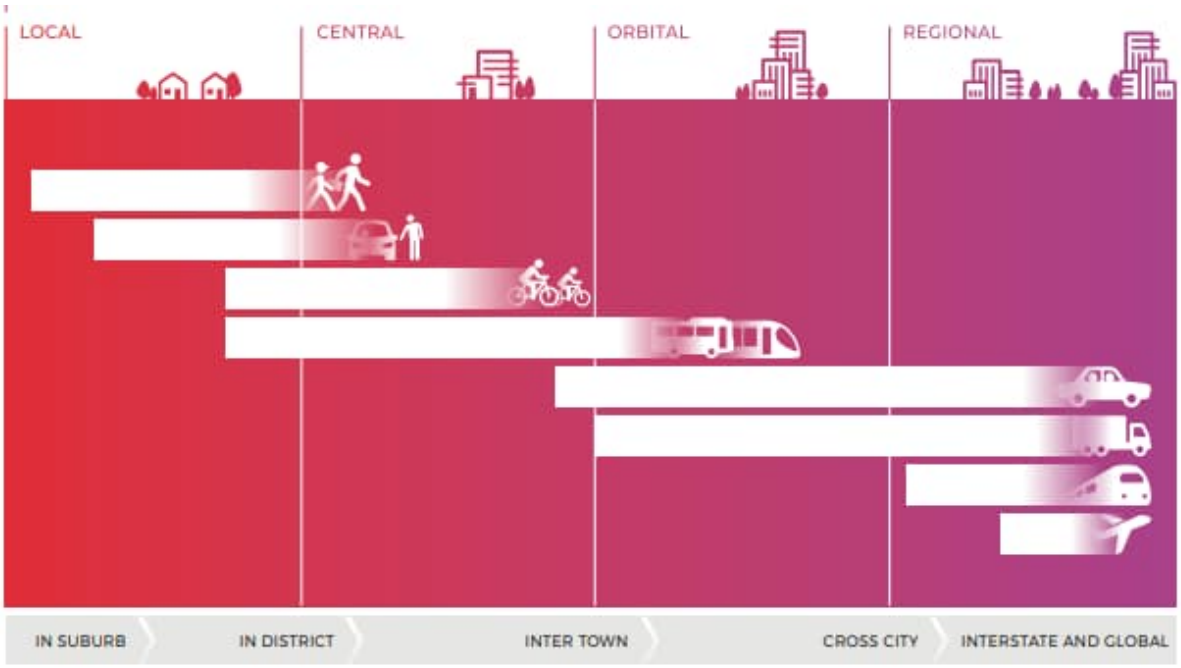


Figure 3-6 Future transport network structure (ACT Transport Strategy, 2020)

Figure 3-7 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.

The strategy also discusses the importance of Canberra's future light rail network in providing the high-capacity public transport mode needed to achieve the compact, walkable and liveable city.

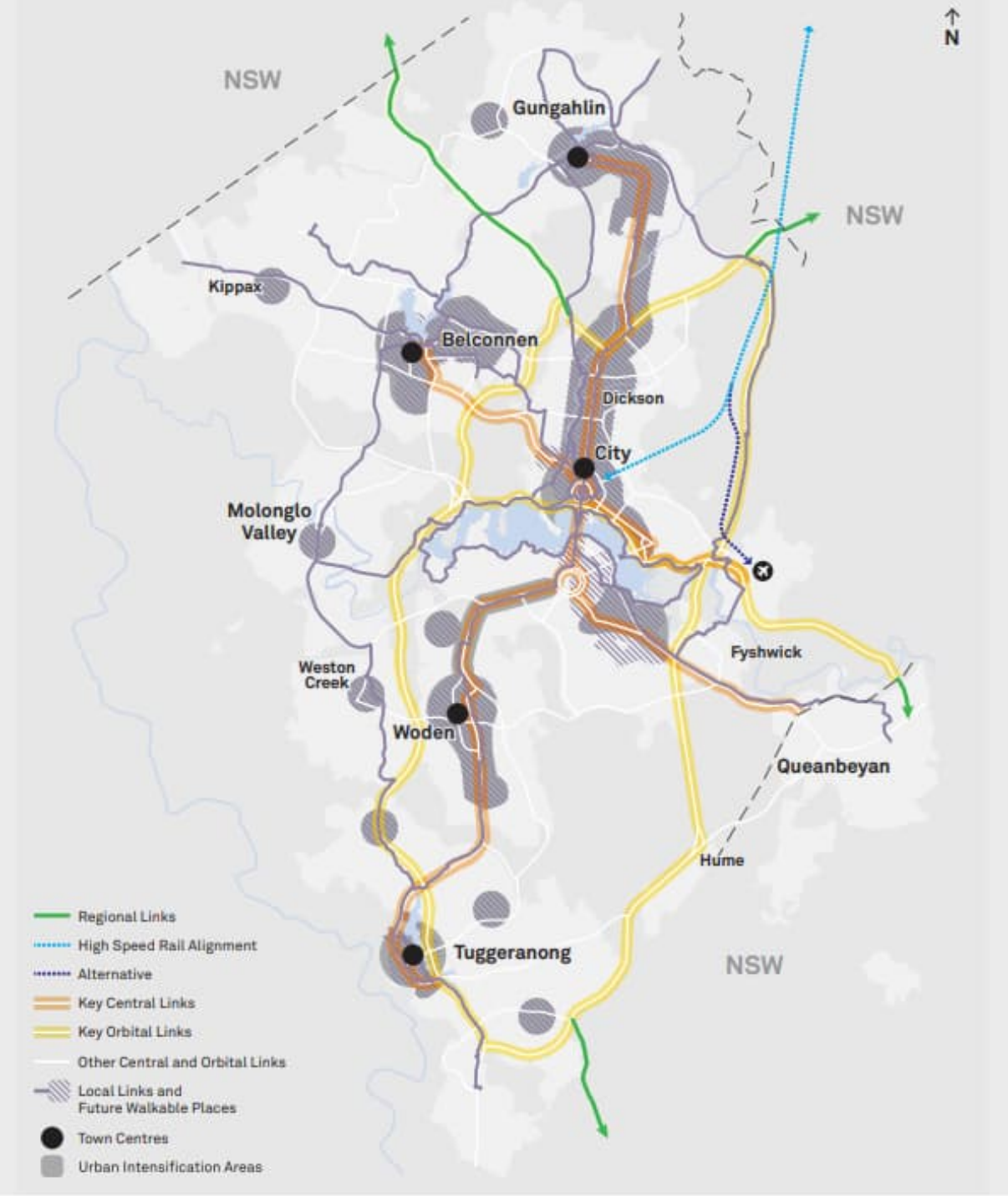


Figure 3-7 Future conceptual transport network in 2045 (ACT Transport Strategy, 2020)

3.2.2.6 ACT Climate Change Strategy, 2019-2025

The ACT Climate Change Strategy, 2019-2025 outlines the next steps Canberra would take to reduce the Territory's greenhouse gas emissions by 60 per cent by 2025 and eventually reaching the net zero emissions target by 2045. Prioritising improved public transport including light rail 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.

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 70 km/h to 60 km/h
- Promoting active modes and by giving priority to cyclists and pedestrians and/or providing improved facilities at intersections
- Adding new signalised intersections
- Replacing on and off ramps with more conventional urban intersections
- Removing slip lanes and dedicated turn lanes and providing shared turn and through lanes
- Providing new public transport stops near intersections and providing 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

3.4.1 Key projects

The following major projects that are also considered key for this assessment are planned in or near the study area:

- Block 40, Section 100 development
- Blocks 10 and 11, Section 100 development
- Block 20, Section 63 development
- Raising London Circuit
- Parkes Way Upgrade
- West Basin Precinct (Acton Waterfront)
- Commonwealth Avenue Bridge Renewal
- Light Rail to Woden

Figure 3-8 shows the location of these projects which are discussed further in following sections.

If any of the above 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 3-8 Location of nearby planned developments

3.4.1.1 Raising London Circuit

The Raising London Circuit (RLC) project would create an at-grade signalised intersection with Commonwealth Avenue and London Circuit.

Raising London Circuit to be at-grade with Commonwealth Avenue will change the road network in the City. In doing so, RLC will 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.

The RLC project involves removing the north-west and south-west cloverleaf ramps and adjoining slip lanes which currently accommodate movements between Commonwealth Avenue and London Circuit. All existing movements would be permitted via the new signalised intersection, except the northbound movement between Commonwealth Avenue and Parkes Way, which is currently catered for by the south-west cloverleaf. The alternative route for this movement would be via London Circuit and Constitution Avenue.

An overview of the RLC project is shown in Figure 3-9. The RLC main works commenced in mid-2022 and construction would be completed prior to construction of the Project. Therefore, the RLC project has been incorporated into the 2026 and 2036 with and without Project modelling discussed in this report.

Figure 3-9 Raising London Circuit layout

3.4.1.2 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.

CLR1 between Gungahlin and the City is already operating. This Project forms Stage 2A City to Commonwealth Park, which would be an extension from the existing light rail terminus in the City to Commonwealth Park. Stage 2B Commonwealth Park to Woden would include a nine kilometre extension from Commonwealth Park to Woden in the southern suburbs of Canberra via the Parliamentary Triangle in doing so, connecting defined activity centres from Gungahlin to Woden including Barton, Deakin and Woden. The Stage 2B Commonwealth Park to Woden would cross the Lake using a new bridge between the existing Commonwealth Avenue Bridges.

For the purpose of this assessment, Stage 2B Commonwealth Park to Woden has not been included in any traffic modelling scenarios discussed in this report.

3.4.1.3 Coranderrk Street and Parkes Way traffic signals

Construction is currently underway to install traffic signals at the roundabout intersection of Coranderrk Street and Parkes Way. The traffic signals are proposed to control the westbound right turn from Parkes

Way into Coranderrk Street which would help to regulate traffic flow and improve the operation of the intersection.

For the purpose of this assessment, the signals at the intersection of Coranderrk Street and Parkes Way intersection have been incorporated into the 2026 and 2036 with and without Project modelling discussed in this report.

3.4.1.4 Parkes Way upgrade

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

The Parkes Way upgrade is not yet committed but could include changes to intersection operation, and additional lanes.

For the purpose of this assessment, the Parkes Way upgrade has not been included in any traffic modelling scenarios discussed in this report.

3.4.1.5 Commonwealth Avenue Bridge renewal

The NCA is undertaking a major asset renewal project for Commonwealth Bridge. On 27 January 2021 the Australian Government announced a $137m investment to upgrade Commonwealth Avenue Bridge over the Lake, 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.

For the purpose of this assessment, the Commonwealth Avenue Bridge upgrade has not been included in any traffic modelling scenarios discussed in this report.

3.4.1.6 Morris Property Group, Blocks 10 and 11, Section 100, City

The Blocks 10 and 11, Section 100 commercial development is planned between London Circuit and Vernon Circle, to the north of Edinburgh Avenue. The initial stage of the development is currently under construction. However, details regarding future stages of the development are not currently available.

For the purpose of this assessment, the Blocks 10 and 11, Section 100 development has been assumed to be complete in the 2026 and 2036 with and without Project scenarios, including the following assumptions:

- 70,000 m^2 of commercial (office) uses
- Extension of Knowles Place to Edinburgh Avenue (completed in late 2020) with an intersection that would allow all movements to turn in, except right turns out of Knowles Place would not be permitted
- Vehicle access via the Knowles Place extension and Gordon Street
- Around 2,000 private parking spaces and replacement of the existing public car parking would be provided in a basement car park.

3.4.1.7 City Renewal Authority Land Release, Block 40, Section 100

The Block 40, Section 100 commercial development is planned between London Circuit and Vernon Circle, to the north of Knowles Place.

For the purpose of this assessment, the Block 40, Section 100 development has been assumed to be complete in the 2026 and 2036 with and without Project scenarios, including 70,000 m^2 of commercial (office) use.

3.4.1.8 City Renewal Authority Land Release, Block 20, Section 63

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

For the purpose of this assessment, the Block 20, Section 63 development has been assumed to be complete in the 2036 with and without Project scenarios, including the following assumptions:

- 680 residential dwellings
- Approximately 21,500 m^2 of commercial (office) uses
- Approximately 3,400 m^2 of retail uses.

3.4.1.9 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.

For the purpose of this assessment, the Acton Waterfront development has been assumed to be 80 per cent complete in the 2036 with and without Project scenarios. It has been assumed that the complete Acton Waterfront development would include the following:

- 1,000 residential dwellings
- Approximately 3,800 m^2 of retail uses
- Approximately 6,800 m^2 of commercial (office) uses.

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. However, West Road is not expected to be constructed until after 2036.

3.4.2 Other nearby projects

Several other developments are planned in the nearby area, as summarised in Table 3-1. All of these developments, except for the UNSW City Campus development, have not been specifically included in the traffic modelling presented in this report.

Refer to Chapter 19 of the Environmental Assessment for more information relating to each of these developments and projects.

Table 3-1 Other nearby developments and projects

Project	Description	Anticipated timing
HTI Group Hotel Development, 13 London Circuit	This demolition of an existing building and construction of a new 16 storey commercial accommodation building. A Development Application for the site has been approved.	Commence in 2022
Geocon Development, 70 Allara Street	The demolition of existing structures and the construction of three mixed use buildings. Construction is anticipated to be complete in 2024, prior to commencement of the Project.	Complete in 2024
Canberra Theatre and Canberra Civic and Cultural Precinct Block 20, Section 19 and Block 23, Section 19	The Canberra Civic and Cultural District is undergoing redevelopment. Plans for the Canberra Theatre would 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.	Construction planned to commence in 2026
UNSW Canberra City	The development of landmark university campus	Construction

Project	Description	Anticipated timing
Campus	facility on Constitution Avenue near Parkes Way. Master planning for the site is ongoing, with timeframes for construction at the site unknown.	planned to commence in 2026
CRA Land Release, Block 38, Section 19	Located in the Canberra Civic and Culture District	Identified on the Indicative Land Release Program in the financial year 2024 – 2025
Anzac Park East and West developments	Approximately 70, 0000 m2 of mixed use located on Anzac Parade near and Parkes Way	Planned to be complete by 2036

4.0 Methodology

4.1 Methodology overview

This section documents the multi-modal assessment methodology undertaken to determine the traffic and transport impacts during construction, operation and the cumulative impacts of the Project with other agreed network improvements being planned and delivered in the vicinity of the study area.

The framework of the assessment methodology is presented in Figure 4-1 and includes:

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

As illustrated in Figure 4-1, the assessment methodology considered several components that required identification and assessment of traffic and transport impacts during the construction and operational stages of the Project.

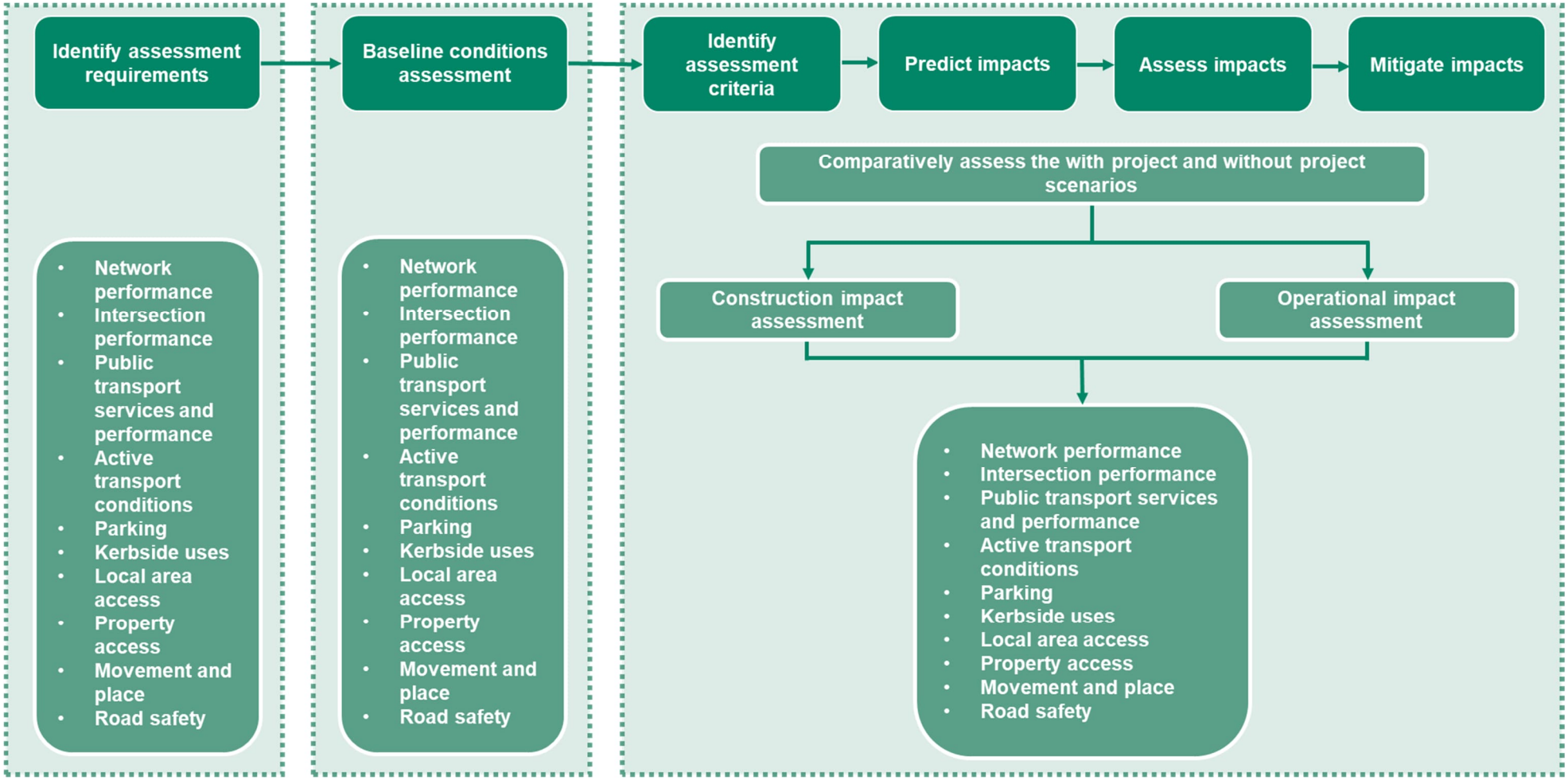


Figure 4-1 Transport impact assessment methodology overview

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 4-2. 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 4-1)
- Description of consequence of impact on environmental value (assume no mitigation or controls applied) (Table 4-2)
- Calculate risk level (Table 4-3)
- Identify mitigation and management measures:
    - Apply industry standard management measures to relevant impacts (such as 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 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.

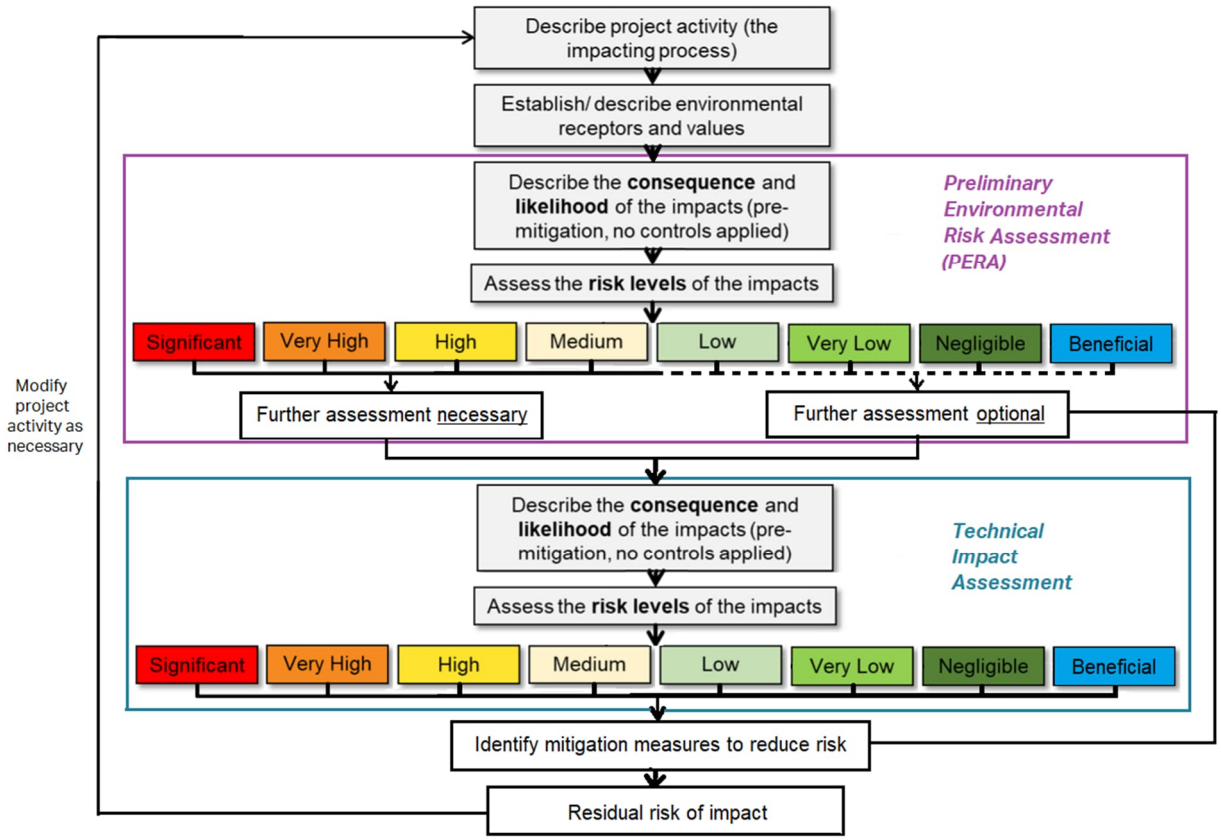


Figure 4-2 Risk assessment approach

Table 4-1 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 4-2 Consequence descriptors

Descriptor	Environment	Economic	Social
Beneficial	Enhancing, improving, or positively impacting the environment, economy and/or society.		
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

Descriptor	Environment	Economic	Social
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 4-3 Risk matrix

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

4.3 Transport modelling approach

A tiered, multi-modal transport modelling approach was adopted to assess the traffic and transport impacts of the Project including road network performance, public transport impacts (buses and light rail) and pedestrian performance at light rail stops and crossings.

The following traffic modelling tools have been used:

- The Zenith strategic model was used to generate the future year travel demand including traffic and light rail patronage based upon employment and population distribution and determine mode choice
- An Aimsun mesoscopic model was used to assign forecast traffic volumes across the broader transport network and to determine network performance at a high-level
- A VISSIM microsimulation model was used to provide a more detailed understanding of the forecast road network performance and light rail performance.

An overview of how these models have been used is illustrated in Figure 4-3 and discussed below.

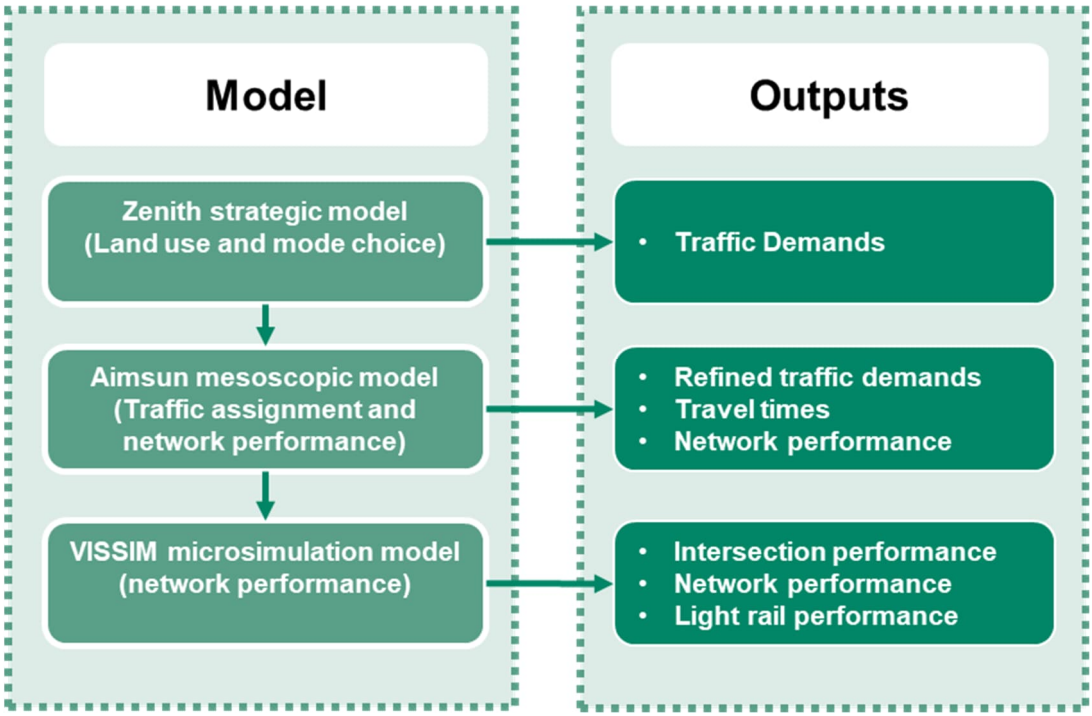


Figure 4-3 Traffic modelling framework

4.3.1 Zenith strategic traffic model

The Zenith is a four-stage model based on trip generation, distribution, mode split and assignment. The Zenith model uses information relating to land use to forecast travel demand, considering demographic parameters of population, employment, educational status to synthesise travel demand that is distributed across the model extent. The land use data inputs to the Zenith model are drawn from the Canberra Strategic Transport Model (CSTM), an ACT government owned model, which is disaggregated to smaller sub-zones to provide a more detailed representation of land use in Zenith.

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 and 2036.

4.3.2 Aimsun mesoscopic model

An Aimsun mesoscopic model was developed in the earlier phases of the CLR program with the purpose of supporting 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. This model has subsequently been recalibrated to a more onerous and rigorous set of calibration criteria, incorporating additional traffic survey data collected to provide a more robust assessment for supporting design development.

The mesoscopic traffic model demands were taken from the Zenith model.

4.3.3 VISSIM microsimulation model

VISSIM microsimulation models have the ability to reflect in greater detail key network features such as traffic signal operations (including different levels of light rail priority), merging and weaving, and other detailed vehicle interactions based on individual vehicles and movements at specific times on the road network.

A VISSIM microsimulation model has been developed for the Project. The microsimulation traffic model demands were extracted from the Aimsun mesoscopic model.

4.4 Road network and intersection assessment

4.4.1 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 construction
- 2026 with construction (including six specific construction scenarios)
- 2026 without Project
- 2026 with Project (operation)
- 2036 without Project
- 2036 with Project (operation).

Table 4-4 provides a summary of the scenarios modelled to assess the construction and operational impacts of the Project on the surrounding road network. These are discussed further in the subsequent sections.

Table 4-4 Operational traffic modelling scenarios

Year	Scenario	Key features							
		Existing road network	Background traffic growth (Zenith)	CLR Stage 1 (completed)	Raising London Circuit (RLC)	Planned network improvements	Additional road network modifications	Project (construction)	Project (operations)
2017	Base case	X							
2026	Without construction	X	X	X	X	X			
	With construction	X	X	X	X	X		X	
	Without Project	X	X	X	X	X	X		
	With Project (operations)	X	X	X	X	X	X	X	X
2036	Without Project	X	X	X	X	X	X		
	With Project	X	X	X	X	X	X	X	X

4.4.1.1 Base case

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. Base case traffic models need to represent existing volumes and traffic behaviour. For this project, the calibrated base case scenario reflects existing observed traffic conditions in 2017.

4.4.1.2 Without Project and without construction scenarios

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.

For the without Project scenarios, future year networks and traffic demand were developed for 2026 (year of opening) and 2036 (year of opening plus 10 years) to assess future traffic network performance. Future performance was assessed for the AM peak hour (8:00am to 9:00am) and PM peak hour (5:00pm to 6:00pm). For the without construction scenario a future year network and traffic demand was developed for 2026.

The without Project and without construction scenarios reflect the future business-as-usual road network conditions that would occur if the Project was not built. However, it includes other notable approved road infrastructure projects (e.g., RLC) which are planned to be constructed by the modelled future year that would impact on existing road network operation in the study area. As such, this scenario serves a reference to which all other future scenarios are compared to.

Further information relating to the traffic demand (total number of trips) and road network assumptions for these scenarios is discussed in the following sections.

4.4.1.3 With Project scenarios

The with Project scenarios reflect the road network conditions once the Project is built, both on its own and in conjunction with other projects that directly and indirectly connect, consistent with the assumptions in the without Project scenario.

The purpose of modelling each of these scenarios is to determine the changes in traffic flows and performance in the study area over time, as population and employment increases for each of the proposed network arrangements associated with the Project.

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

4.4.1.4 With construction scenarios

Six scenarios were modelled to assess the road network impacts of the Project's construction using the Aimsun mesoscopic model. Each of the assessed scenarios represent a point in time, or stage, based on the indicative construction staging. The construction scenarios include varying combinations of block and intersection closures.

Each of the construction scenarios uses the same traffic demand as the without construction scenario, with network changes to reflect the proposed construction operations.

A summary of the block, intersection and lane closures that were included in each of the assessed construction scenarios is shown in Table 4-5.

Table 4-5 Construction traffic modelling scenarios

Scenario	London Circuit block closure	Lane closure (one lane per direction)	Intersection closure
Scenario 1	• Between Edinburgh Avenue and Commonwealth Avenue • Between Knowles Place North and Edinburgh Avenue	• Northbourne Avenue • Parkes Way	• None
Scenario 2	• Between Knowles Place North and Edinburgh Avenue	• Northbourne Avenue • Commonwealth Avenue • Parkes Way	• Commonwealth Avenue and London Circuit intersection (partial closure)
Scenario 3	• Between Knowles Place North and Edinburgh Avenue	• Commonwealth Avenue	• Northbourne Avenue and Alinga Street intersection (partial closure)
Scenario 4	• None	• Commonwealth Avenue	• Northbourne Avenue and Alinga Street intersection
Scenario 5	• Between West Row and Knowles Place North	• Commonwealth Avenue	• London Circuit and Gordon Street intersection • Northbourne Avenue and London Circuit intersection (partial closure)
Scenario 6	• Between East Row and West Row	• Commonwealth Avenue	• None

4.4.2 Network assumptions

The 2026 and 2036 with and without Project scenarios typically includes all committed transport infrastructure schemes to serve as a future baseline against which the Project can be assessed. The planned road network improvements included in the 2026 and 2036 with and without Project scenarios were agreed with Transport Canberra and City Services (TCCS) and are summarised in Table 4-6. Some of the road network changes listed are currently operating. These were not included in the 2017 base year but have been included in the 2026 and 2036 future year models.

Additional road network modifications within the study area have also been included, as summarised in Table 4-6. These were identified as being required to address capacity, access and safety issues largely as due to planned land use changes in the study area and the associated traffic flow changes. These modifications are required irrespective of the Project and have therefore been included in both the with Project and without Project Scenarios for 2026 and 2036.

Additional road network upgrades near the study area would be required by 2036, irrespective of the Project. For example, a possible additional southbound traffic lane on Marcus Clarke between Alinga Street and Allsop Street would increase the capacity of the network. However, this road network change has not been included in the 2026 or 2036 scenarios.

Table 4-6 Road network assumptions

Road network changes included in traffic modelling	2026	2036
Horse Park Drive duplication between Federal Highway and Roden Cutler Drive	X	X
CLR1 [1]	X	X

Road network changes included in traffic modelling	2026	2036
Gundaroo Drive duplication stage 1 and stage 2	X	X
Dickson Group Centre intersection upgrade	X	X
Launceston Street and Irving Street signalisation	X	X
Construction of Majura link road (Spitfire Avenue)	X	X
Barry Drive and Kingsley Street intersection modifications to facilitate bus layover	X	X
Nudurr Drive extension	X	X
Old Well Station Road upgrade	X	X
Pialligo Avenue duplication		X
Kent Street and Novar Street interchange upgrades	X	X
Horse Street Drive duplication between Cutler Drive to Clarrie Hermes Drive		X
Callam Street closed to general traffic for Woden Bus Interchange	X	X
Mouat Street public transport jump lane and road duplication	X	X
Gungahlin Drive duplication		X
Commonwealth Avenue and Corkhill Street intersection signalisation		X
Morisset Road extension		X
Edinburgh Avenue extension to Vernon Circle including pedestrian crossing [1]	X	X
Commonwealth Avenue and London Circuit at-grade signalised intersection and removal of cloverleaf ramps (RLC)	X	X
Grade separation of Barton Highway and Gundaroo Drive		X
Commonwealth Avenue and Albert Street signalisation		X
New west facing ramps at the Parkes Way and Clunies Ross Street interchange		X
Clunies Ross Street duplication		X
Acton Waterfront access roads (excluding future West Road)		X
Monaro Highway, Newcastle Street and Dairy Road intersection upgrade		X
North Curtin diplomatic estate		X
Well Station Drive duplication		X
Alinga Street bus only zones	X	X
Pialligo Avenue and Fairbairn Avenue grade separation		X
Fairbairn Avenue additional westbound lane		X
Additional network modifications [2]	**2026**	**2036**
Modifications to the Marcus Clarke Street and Edinburgh Avenue intersection	X	X
Signalisation of Marcus Clarke Street and Gordon Street intersection	X	X
Left slip lane from Northbourne Avenue northbound into the Block 40 site	X	X
Closure of U-turn facility on Northbourne Avenue north of Vernon Circle	X	X

[1] Projects have been completed since 2017 and are therefore not included in the base year model but are included in the future year models
[2] Additional network modifications not included in the with or without construction modelling scenarios

4.4.3 Traffic demand development

Traffic demands for 2026 and 2046 were provided by MPC, originally derived from the 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 the 2017, 2026 and 2036 scenarios are summarised in Table 4-7. The same demands are adopted in the respective with Project and without Project scenarios.

The traffic demand growth between 2017 and 2026 is approximately 20 per cent and 26 per cent, respectively. The traffic demand growth between 2017 and 2036 is approximately 39 per cent and 45 per cent, respectively. This represents approximately 2-2.9 per cent traffic growth per year.

Table 4-7 Modelled AM and PM trips and growth percentage

Year	AM peak hour (8:00-9:00am)		PM peak hour (5:00- 6:00pm)	
	Number of trips	Growth from 2017	Number of trips	Growth from 2017
2017 base case	86,349	-	77,747	-
2026 without Project	103,408	20%	97,819	26%
2036 without Project	120,058	39%	112,783	45%

4.5 Road network performance assessment criteria

Traffic modelling has been used to quantify the impacts of the Project on the surrounding road network and forecast performance during the construction and operational stages of the Project. Both the Aimsun mesoscopic and VISSIM microsimulation models were used to assess the following assessment criteria:

- At a network level, the following statistics and metrics were considered: total demand, total distance travelled, total travel time, average speed and unreleased vehicles for all vehicle types (operational assessment only)
- At a corridor level, travel times were reported for selected routes for general traffic, buses and light rail across the study network (operational and construction assessment)
- Flow – Density plots across selected routes and corridor to show the concentration of traffic within a section of lane, carriageway or road for a given period (operational and construction assessment)
- At an intersection level: level of service (operational assessment only).

Further details on each of the assessment criteria is provided below.

4.5.1 Traffic volume changes

Traffic volume changes and patterns have been assessed across the wider network as well as the local study area by comparing the change in traffic volumes between the future 2026 and 2036 conditions with and without the Project. Traffic volume difference plots from the Aimsun mesoscopic model have been used to show the difference in the weekday AM and PM peak hour traffic volumes.

4.5.2 Network performance statistics

Table 4-8 displays the network statistics that were adopted for the operational assessment and a description of each statistic.

Table 4-8 Network performance statistics with descriptions

Network Performance statistic	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 (latent demand)	The number (or percentage of vehicles) that could not enter the model due to congestion within the network

4.5.3 Vehicle travel times

Vehicle travel times along key routes in each modelled area have been used to determine the relative impacts or benefits of the Project and its construction. Travel times are expressed in minutes.

The following eight travel time routes have been adopted for the operational and construction assessment:

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

The travel time routes are illustrated in Figure 4-4.

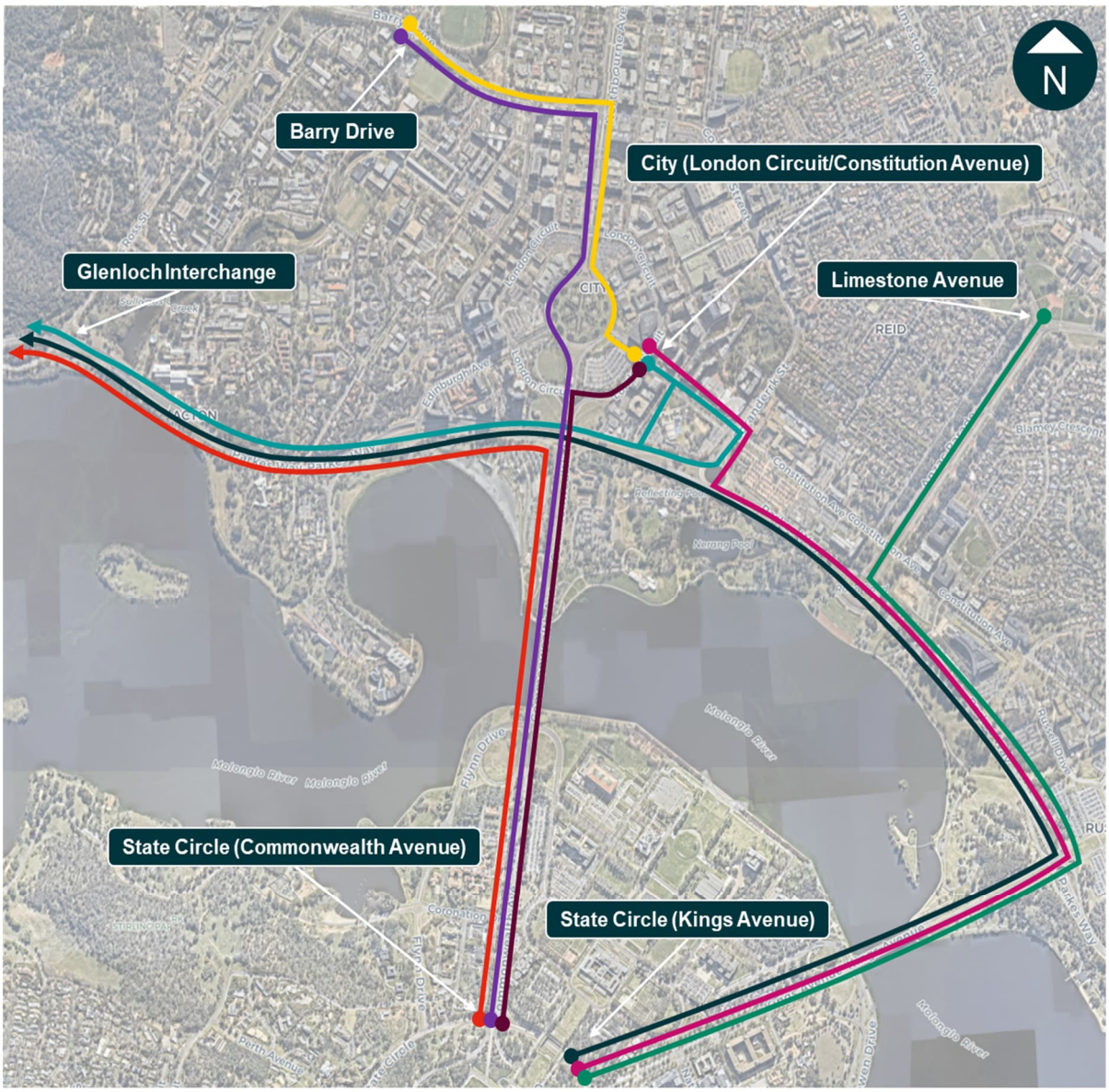


Figure 4-4 Assessed general traffic travel time routes

4.5.4 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 USA Transportation Research Board 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. The Aimsun software uses a passenger car unit (PCU) conversion factor of 1.9 for trucks. Therefore, the unit of density adopted in this report is PCU per lane per kilometre.

Density has been used to assess the construction and operational impacts of Project.

4.5.5 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 adopted criteria categories the average intersection delay into six bands of delay per vehicle (seconds per vehicle), as summarised in Table 4-9.

Table 4-9 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	Good operation	Good operation
B	15 to 28	Good operation with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, incidents at signals will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Source: Roads and Maritime Services Guide to Trip Generating Development (version 2.2, October 2002)

Level of service is measured on a scale from A to F, with A representing optimal operating conditions and F representing worst operating conditions. Typically, assessment of a roadway or intersection is generally required when conditions fall below level of service D or E, however in general, drivers in metropolitan cities experience level of service E and level of service F frequently during the AM and PM peak hours.

Figure 4-5 shows the intersections that were assessed for the operational assessment. The average delay at each intersection was extracted from the VISSIM microsimulation model for each of the assessment scenarios.

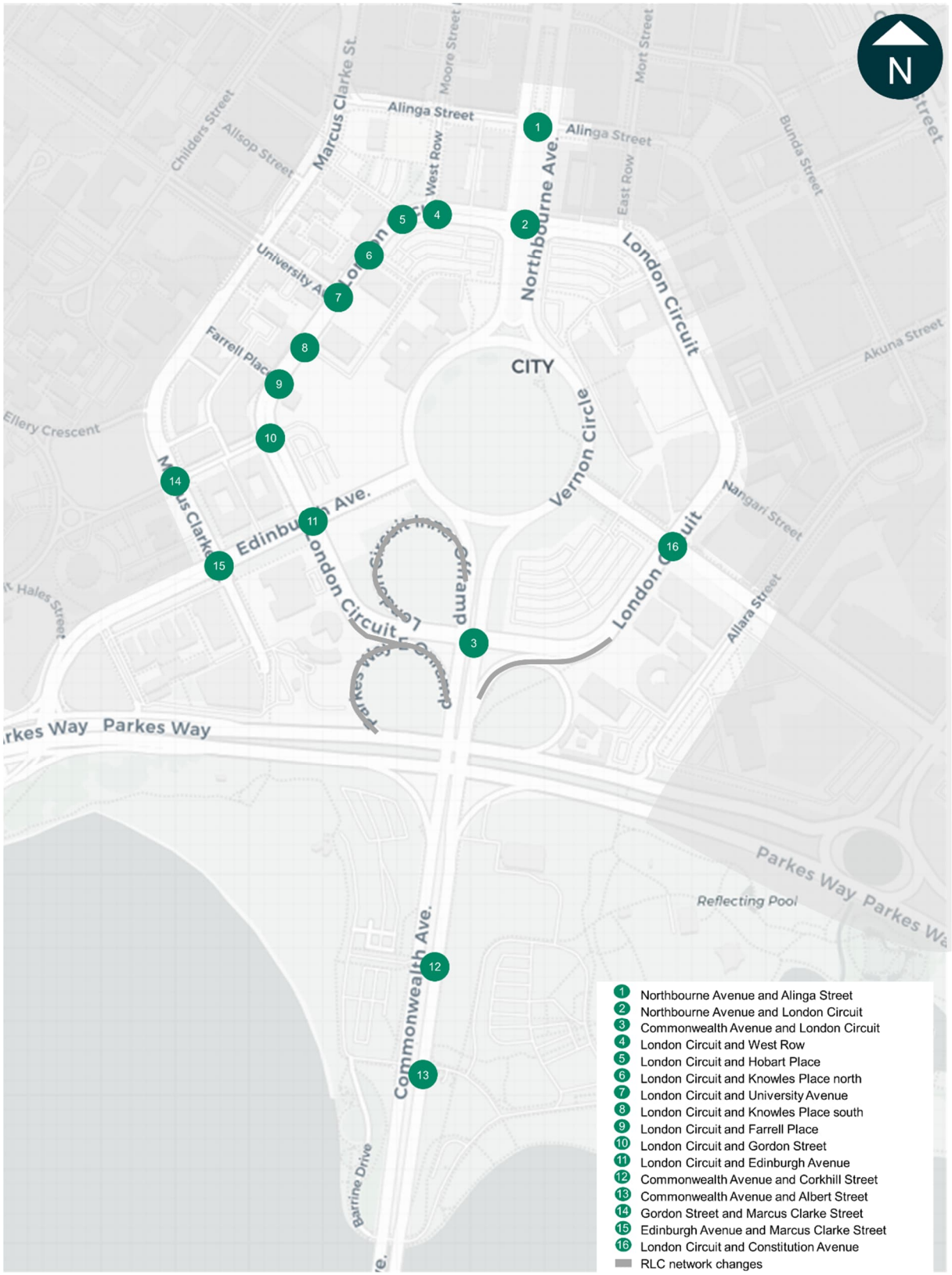


Figure 4-5 Assessed intersections for operational assessment

4.6 Public transport assessment

The public transport assessment includes assessing the construction and operational impacts of the Project on public transport services. The primary public transport modes identified for assessment were buses.

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 and permanent changes to current services, bus stops or bus routes during operations and construction, if any
- Changes in travel times along bus service routes during operations and construction.

AM and PM peak hour bus travel times for the available sections (restricted by the extent of the model area) along the following rapid bus routes were assessed using the Aimsun mesoscopic model:

- R2: between Fyshwick and Aranda
- R4: between Woden and Aranda.

These bus routes travel on the parts of the network that would be impacted by the Project's construction and associated road network changes.

The sections of the bus routes used for travel time assessments are shown in Figure 4-6.

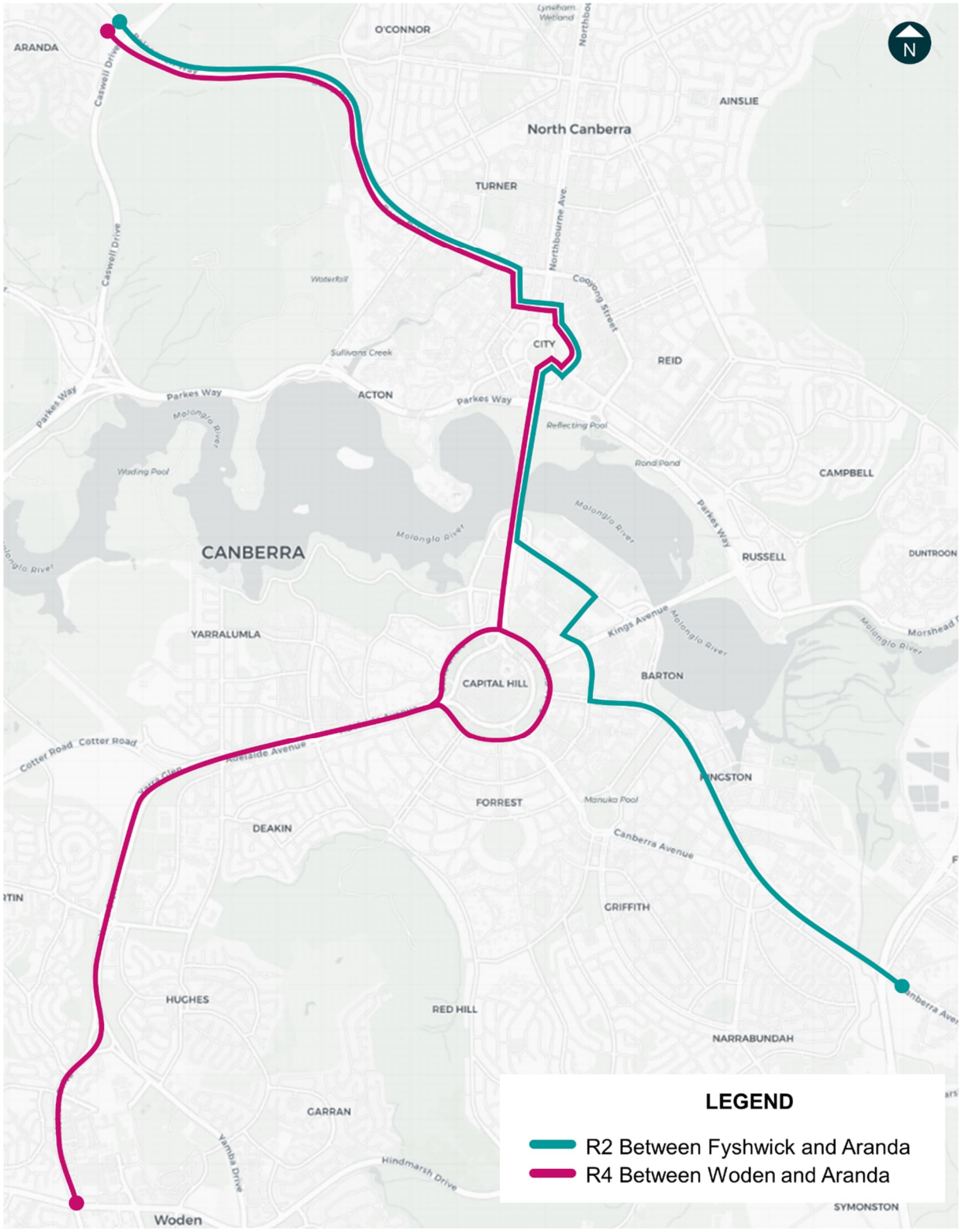


Figure 4-6 Assessed bus travel time routes

4.7 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 cycling paths 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 cycling 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 paths and changes in walking and cycling distances
- ☐ Quality, suitability and legibility of proposed pedestrian and cycling infrastructure
- ☐ Opportunities to improve current safety issues.

4.8 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.

4.9 Movement and place

4.9.1 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 routes for efficient movement on the other
- Manage the transport 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.

4.9.2 Area of assessment

For the purpose of the movement and place assessment, the Project study area can be divided into eight relatively homogenous sections as shown in Figure 4-7. The locations reflect sections where it has been determined that the Project would likely have an impact on the movement or place function of the existing environment.

The eight sections include:

- Section 1 – Northbourne Avenue between Alinga Street and London Circuit
- Section 2 – Vernon Circle including approaches to London Circuit
- Section 3 – Commonwealth Avenue between London Circuit and north edge of the Lake
- Section 4 – London Circuit West between Northbourne Avenue and Edinburgh Avenue
- Section 5 – London Circuit West between Edinburgh Avenue and Commonwealth Avenue
- Section 6 – London Circuit East between Constitution Avenue and Commonwealth Avenue
- Section 7 – Edinburgh Avenue between Parkes Way and Vernon Circle
- Section 8 – Marcus Clarke Street between Alinga Street and Kendall Lane.

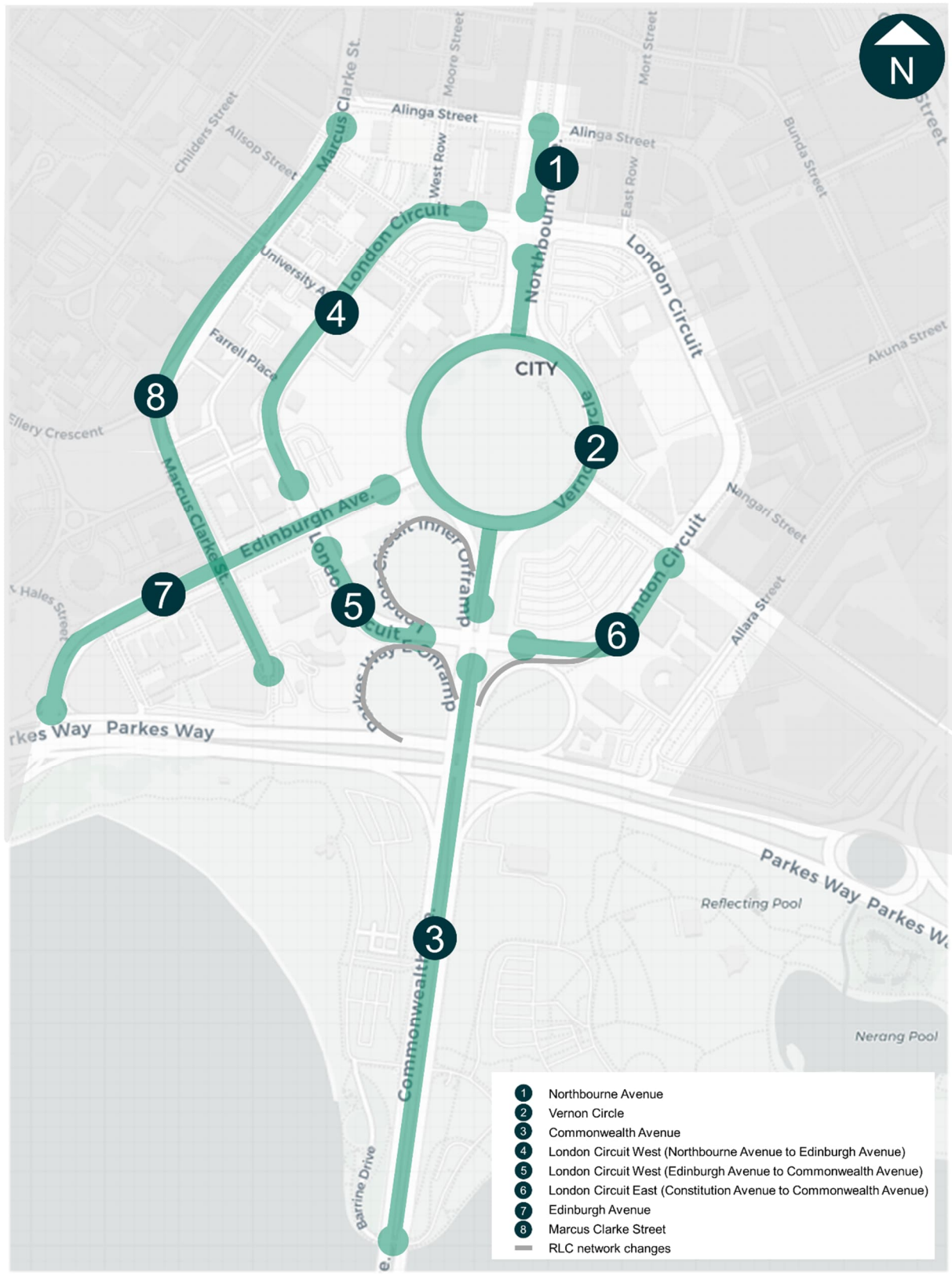


Figure 4-7 Movement and place assessment areas

4.9.3 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, potential types of intervention measures and informed by the surrounding context.

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[2] and Auckland Transport[3] movement and place frameworks could be referenced for guidance and the following core criteria should be measured:

- Movement and reliability
- 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 4-10, where information was available. Subsequently, the Project's impact on the criteria was assessed.

Table 4-10 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 provide additional opportunities for analysis. Baselining and measuring the growth in economic activity enables	• 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

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

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

Core criteria	Description	Measurables
	the quantification of the efficacy of current and proposed functions.	• 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 of understanding how well the place function meets the needs of the various types of users of the facilities provided.	• Dwellable street space – footpath width (per cent of total road reserve e.g., shared space being 100 per cent). This excludes developed/developable area outside the road reserve • 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 would 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	Both quantitative and qualitative. Observations and measurements of physical infrastructure can be a good indication of how accessible or connected places are for all users.	• 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?

4.9.4 Classification

As discussed in Section 3.2.2.5, 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 4-8 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).

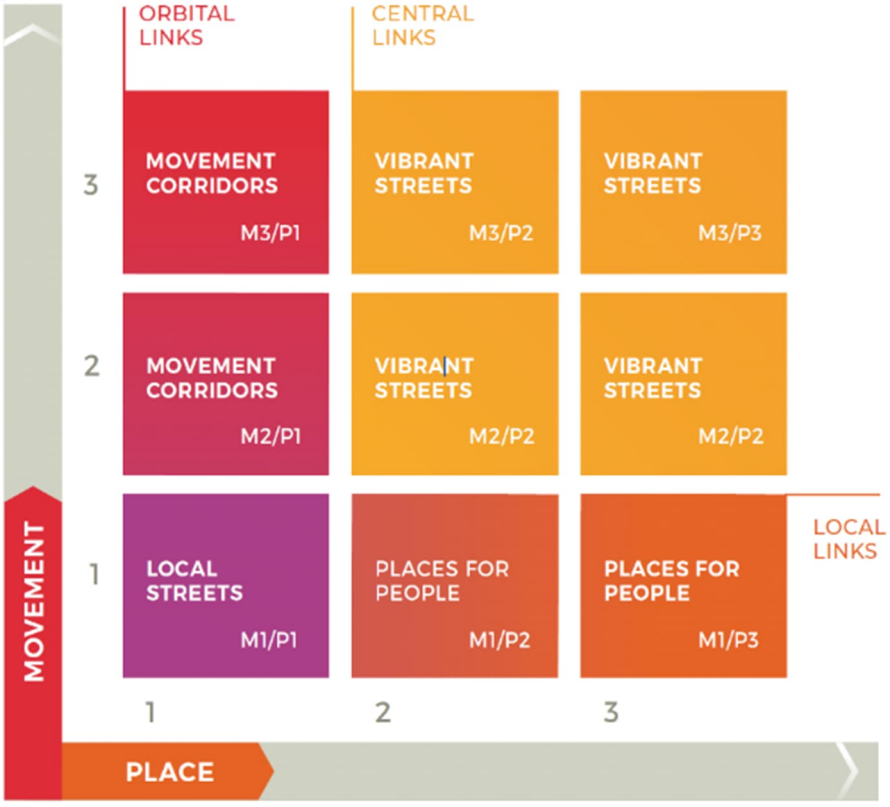


Figure 4-8 ACT movement and place framework

4.10 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 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

This section discusses the existing traffic and transport environment within the study area. The baseline environment includes changes to the study area that are proposed to be delivered as part of the RLC project. These upgrades and changes are detailed in this chapter and are expected to be operational prior to the opening of the Project.

5.1 Overview of existing transport environment

Figure 5-1 gives an overview of the existing and post-RLC baseline traffic and transport features within the study area, which are also summarised below. Further details are provided in the subsequent sections.

The Project study area includes the arterial roads of Northbourne Avenue between London Circuit and Alinga Street, Vernon Circle, Commonwealth Avenue between London Circuit and the Lake, and Parkes Way between Edinburgh Avenue and Allara Street. The study area also includes London Circuit East between Petrie Plaza and Northbourne Avenue, London Circuit West between Northbourne Avenue and Commonwealth Avenue as well as the streets and land uses adjacent to London Circuit and between London Circuit and Marcus Clarke Street.

The study area also includes construction compound sites on Marcus Clarke Street, Acton Waterfront Central and Southern car parks, Parkes Way and south-west cloverleaf, and Constitution Avenue car park. The construction compounds and broader study area are shown in Figure 2-2

The Project study area is located within the Civic Statistical Area, which has a residential night-time population of 4,276 people and generates approximately 32,500 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 employees who travelled to Civic for work mostly drive to work (66 per cent) with 21 per cent using public transport modes and 13 per cent using active transport modes.

The ABS Census 2021 Journey to Work data showed a very similar mode share for employees who travelled to Civic for work. However approximately 10,500 people (25 per cent) who listed Civic as their place of work worked at home.

The land uses within the study area and its surrounds generally include commercial office blocks with ground floor retail or dining, at-grade car parking, hotels, governance buildings including Canberra Police Station and the Supreme Court, and areas for outdoor recreation. Several new developments are also planned in the area, including the Blocks 10 and 11, Section 100 commercial development, the Block 40, Section 100 future development, the Block 20, Section 63 mixed-use development and the Acton Waterfront Renewal developments, as discussed in Section 5.2.

The RLC project is planned to alter the road network within the study area. RLC includes the removal of the grade separation between Commonwealth Avenue and London Circuit, replacing it with a signalised intersection. Additionally, the north-west cloverleaf and south-west cloverleaf are to be removed, as well as both slip lanes connecting Commonwealth Avenue and London Circuit. In addition to the road upgrades and modifications, the active transport infrastructure would be improved.

Traffic counts in the study area were conducted in 2017 and 2019. The traffic surveys highlight that Northbourne Avenue and Commonwealth Avenue carry the highest traffic volumes in the study area, with approximately 2,800 vehicles per hour and 7,000 vehicles per hour using Northbourne Avenue and Commonwealth Avenue in the AM peak hour in 2019, respectively. Along London Circuit, traffic volumes are highest at the southern end, where vehicles generally arrive and depart the area via Commonwealth Avenue, London Circuit East and Edinburgh Avenue.

The City Interchange is partially within the study area and caters for much of the CBD's public transport activity. Transport Canberra bus services travelling to/from the south generally use Commonwealth Avenue (six rapid routes and five local routes) or Constitution Avenue (one rapid route and five local routes) and London Circuit East to access the City Interchange. Additionally, several bus services travelling from Belconnen and other locations in the inner north access the City Interchange via Marcus Clarke Street (three rapid routes and three local routes).

With regards to active travel, London Circuit is endorsed as a local community route, although on road 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 5.7.3.2), given the lack of facilities and connectivity provided. West Row, East Row and University Avenue are also endorsed local community routes. These routes currently do not have bike lanes within the study area.

Commonwealth Avenue combined with Vernon Circle and Northbourne Avenue form a future principal community route. Northbourne Avenue has off-road cycling paths in both directions between Alinga Street and London Circuit. Nearly 100 cyclists were recorded on Commonwealth Avenue during a one-hour AM peak hour and 90 cyclists during the PM peak hour in 2019 (based on survey data provided by TCCS).

Pedestrian activity within the study area is highest at the intersection of Northbourne Avenue and Alinga Street. Pedestrian activity is lowest where there is limited land use activity fronting the street, in particular the intersection of London Circuit and Edinburgh Avenue and along Vernon Circle (see Section 5.7.3.1).

Parking within the study area is largely accommodated by off-street car parks, however main and local streets within the study area have some on-street parking and provision for other kerbside uses such as loading and taxis (See Section 5.10).

In terms of movement and place, all streets within study area have high movement functions and low to medium place value. They generally facilitate movement between places, but many streets have limited desirable and dwellable area available. There are streets in the study area, such as Northbourne Avenue and the northern sections of London Circuit where there is a higher place value due to the adjacent land uses. However, the cross sections of the streets are biased towards the movement functions.

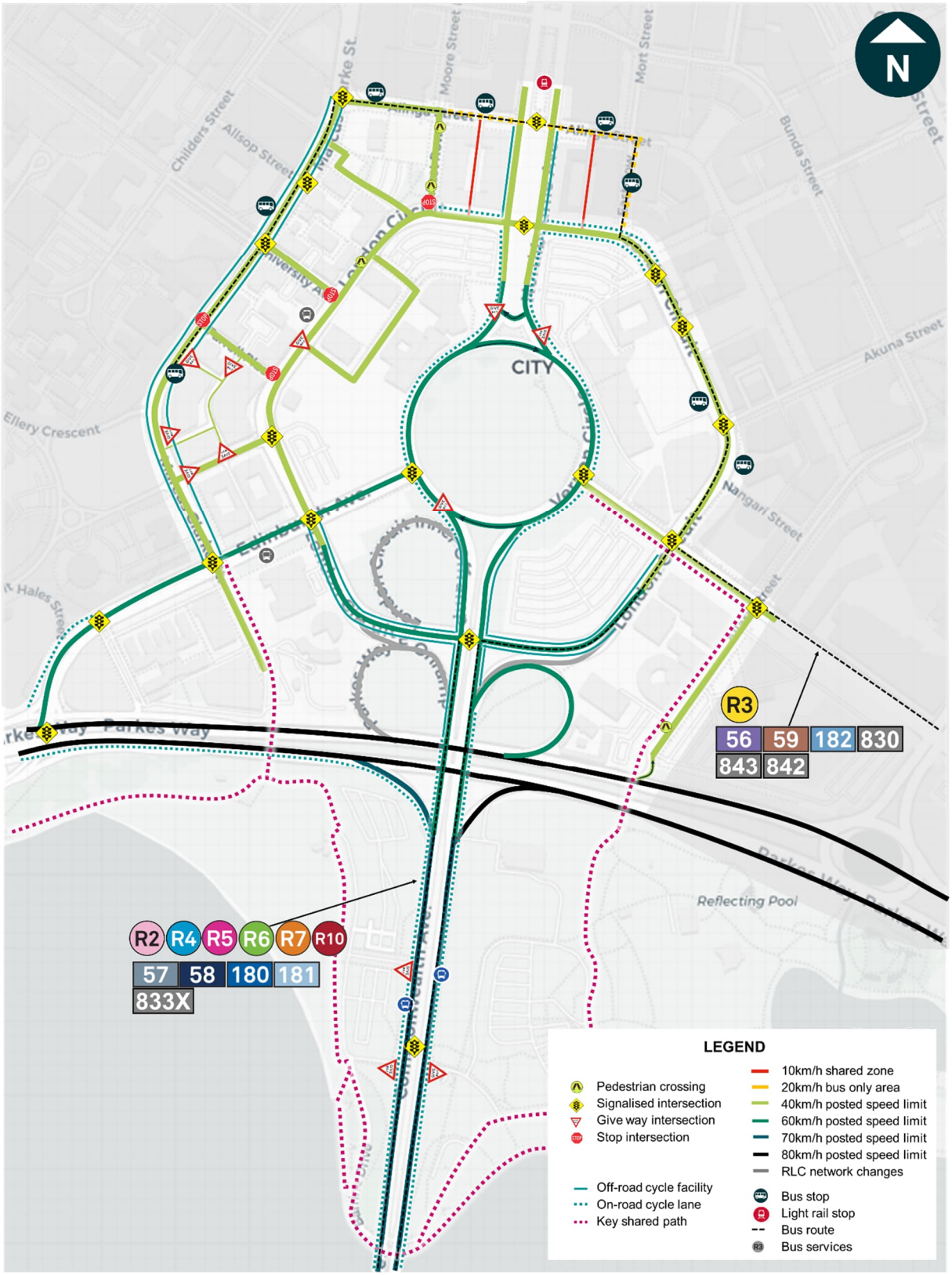


Figure 5-1 Existing transport conditions for the study area

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 Project 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 approximately 54 per cent. 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 5-2 and include:

Commonwealth Avenue

The key land uses on Commonwealth Avenue include:

- ***Car parking***, predominately at-grade car parks on each side
- ***Outdoor recreation*** at Commonwealth Park, which hosts Floriade annually
- ***Future development*** at West Basin.

London Circuit East

The key land uses on London Circuit East include:

- ***Accommodation*** including A by Adina, Nesuto, Quest, and The Sebel
- ***Car parking***, predominately at-grade car parks on each side
- ***Creative arts*** including Canberra Museum and Gallery, and Canberra Theatre Centre
- ***Commercial/business***, primarily large office buildings on the western side
- ***Dining*** including restaurants, bars and cafes near the intersection with Northbourne Avenue
- ***Governance*** including Department of Foreign Affairs and Trade on the eastern side
- ***Retail,*** particularly small-scale convenience stores, south of Alinga Street
- ***Points of interest*** including the ACT Memorial and Civic Square.

London Circuit West

The key land uses on London Circuit West include:

- ***Accommodation*** including Capital Tower; Metropolitan; QT Hotel
- ***Car parking***, predominately at-grade car parks on each side
- ***Commercial/business***, primarily large office buildings on the eastern side
- ***Dining*** including restaurants, bars and cafes near the intersection with Northbourne Avenue
- ***Education*** including ANU and University of Canberra (UC College)
- ***Future development*** at Blocks 10 and 11, Section 100, currently under construction
- ***Governance*** including Canberra Police Station, Supreme Court of ACT and Magistrates Court
- ***Retail,*** particularly small-scale convenience stores, south of Alinga Street.

Northbourne Avenue

The key land uses on Northbourne Avenue include:

- ***Dining*** including restaurants, bars and cafes near the intersection with London Circuit, with significant outdoor amenity in the Sydney and Melbourne Buildings' colonnades
- ***Retail,*** particularly small-scale convenience stores on the western side.

Marcus Clarke Street

The key land uses on Marcus Clarke Street include:

- ***Governance*** including the Department of Agriculture, Australian Competition and Consumer Commission
- ***Education***, as the street running adjacent to the ANU campus
- ***Accommodation*** including residential buildings such as The Mews and hotels such as Metropolitan and QT Hotel
- ***Commercial/business***, primarily large office buildings on the eastern side.

Alinga Street

The key land uses on Alinga Street include

- ***Dining*** including restaurants, bars and cafes with significant outdoor amenity in the Sydney and Melbourne Buildings' colonnades
- ***Retail*** including small scale convenience stores, a pharmacy and post office
- ***Commercial*** particularly office building along the north side of the street
- ***Accommodation*** primarily private residential apartments that do not have frontage along the street
- ***Transport Interchange*** the eastern half of the street is restricted to buses only and comprises part of the City Bus Interchange.

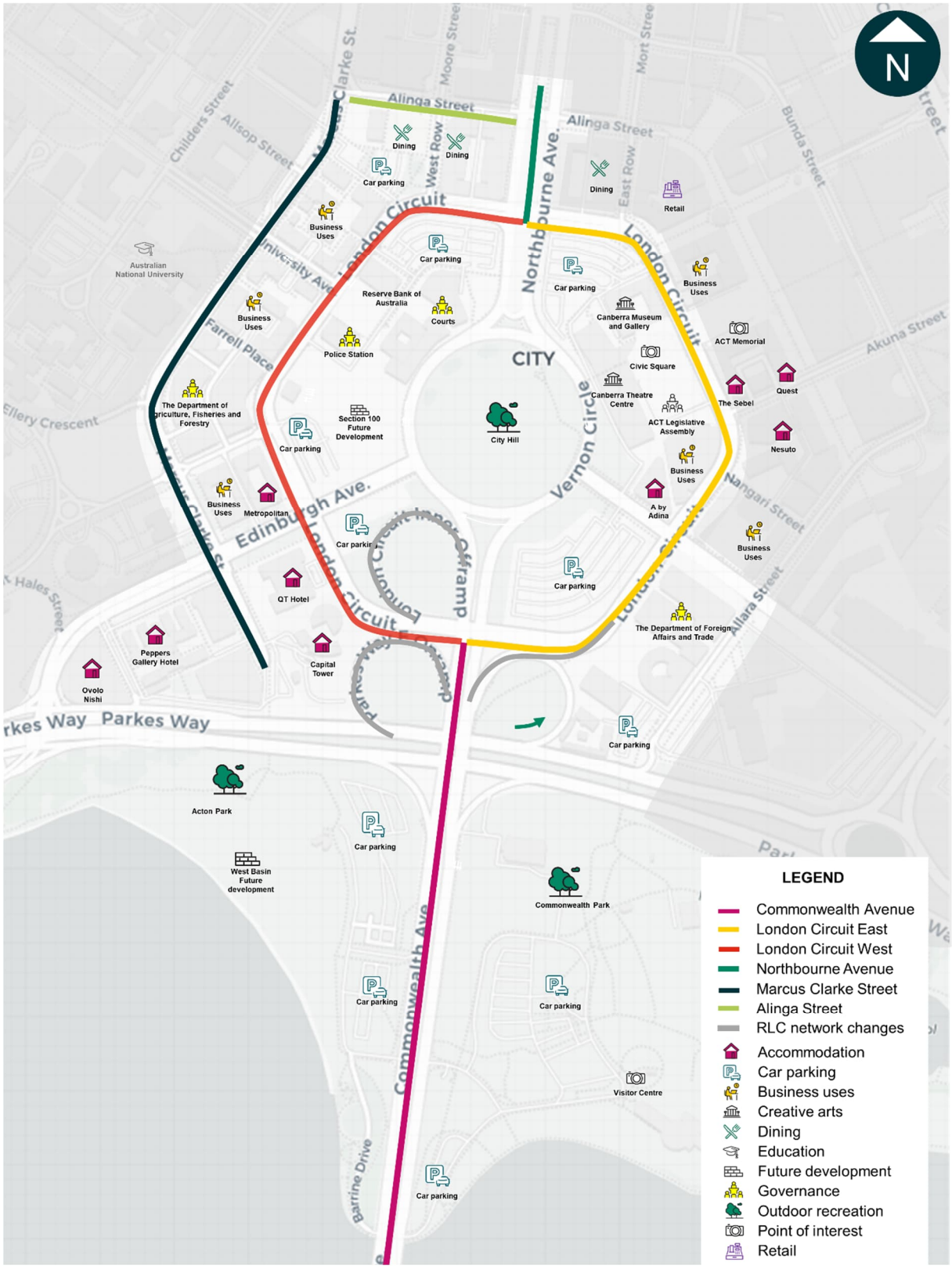


Figure 5-2 Key land uses within and surrounding the study area

5.3 Existing transport mode share

The ABS Census 2016 Journey to Work data indicates that approximately 2,000 and 30,500 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 5-3.
- Residents largely use active transport modes (45 per cent) or drive to work (40 per cent), see Figure 5-4.

The ABS Census 2021 was undertaken during the COVID-19 pandemic response and approximately 10,500 people (25 per cent) who listed Civic as their place of work worked at home. Despite this the mode share for both residents and employees of Civic was similar to 2016. Of those who travelled to work, residents of the area largely use active transport modes (42 per cent) or drive to work (40 per cent). Employees who travelled to Civic for work, mostly drive to work (65 per cent) with 21 per cent using public transport and 13 per cent using active transport modes.

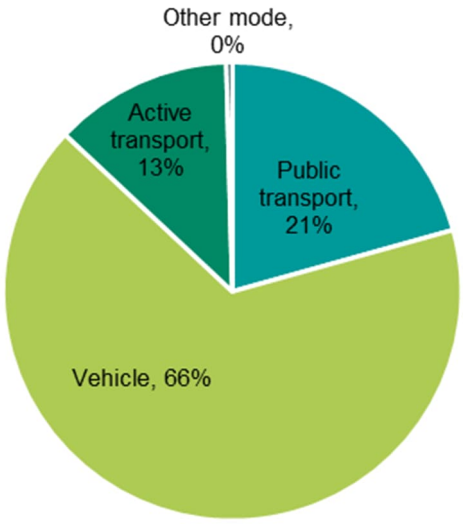


Figure 5-3 2016 journey to work mode share for non-resident employees

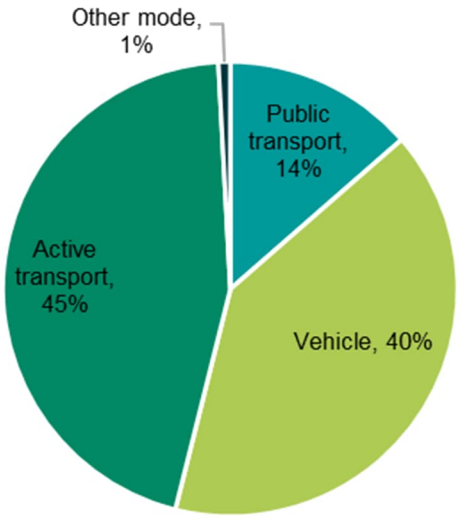


Figure 5-4 2016 journey to work mode share for residents

5.4 Crash history

Crash data for the ACT is publicly available for the five-year period between December 2016 and November 2021. A diagram of road crashes within the study area is shown in Figure 5-5.

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

- Approximately 800 crashes occurred within the study area in the five-year period
- Around 95 per cent of these crashes resulted in property damage only, with nearly 10 per cent resulting in personal injury and one collision resulting in a fatality (see Figure 5-6)
- Around 50 per cent of crashes were at intersections (see Figure 5-7)
- Approximately 10 per cent (63) of crashes occurred at the intersection of Northbourne Avenue and London Circuit, with nearly 50 per cent of these crashes involving vehicles travelling the southbound direction
- Five per cent (38) of crashes occurred at the eastbound merge from Commonwealth Avenue to Parkes Way. This cloverleaf and merge point are proposed to be removed as part of RLC.

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 December 2016 and November 2021 indicates are shown in Figure 5-8 and Figure 5-9 respectively.

In the study area, 21 crashes involved pedestrians, including:

- Four on London Circuit East
- Two on London Circuit West
- Two at the intersection of Northbourne Avenue and London Circuit
- Two at the intersection of Northbourne Avenue and Alinga Street
- Six on Marcus Clarke Street.

Approximately 57 per cent of crashes involving pedestrians resulted in an injury.

In the study area, 50 crashes involved cyclists, including:

- Three on London Circuit East
- Three on London Circuit West
- Three at the intersection of Northbourne Avenue and London Circuit
- Three at the intersection of Northbourne Avenue and Alinga Street
- Twenty six on or at intersections with Marcus Clarke Street
- Five at the northern end of Commonwealth Avenue, immediately south of Parkes Way
- One on the Commonwealth Avenue off-ramp onto London Circuit West.

Approximately 38 per cent of crashes involving cyclists resulted in an injury.

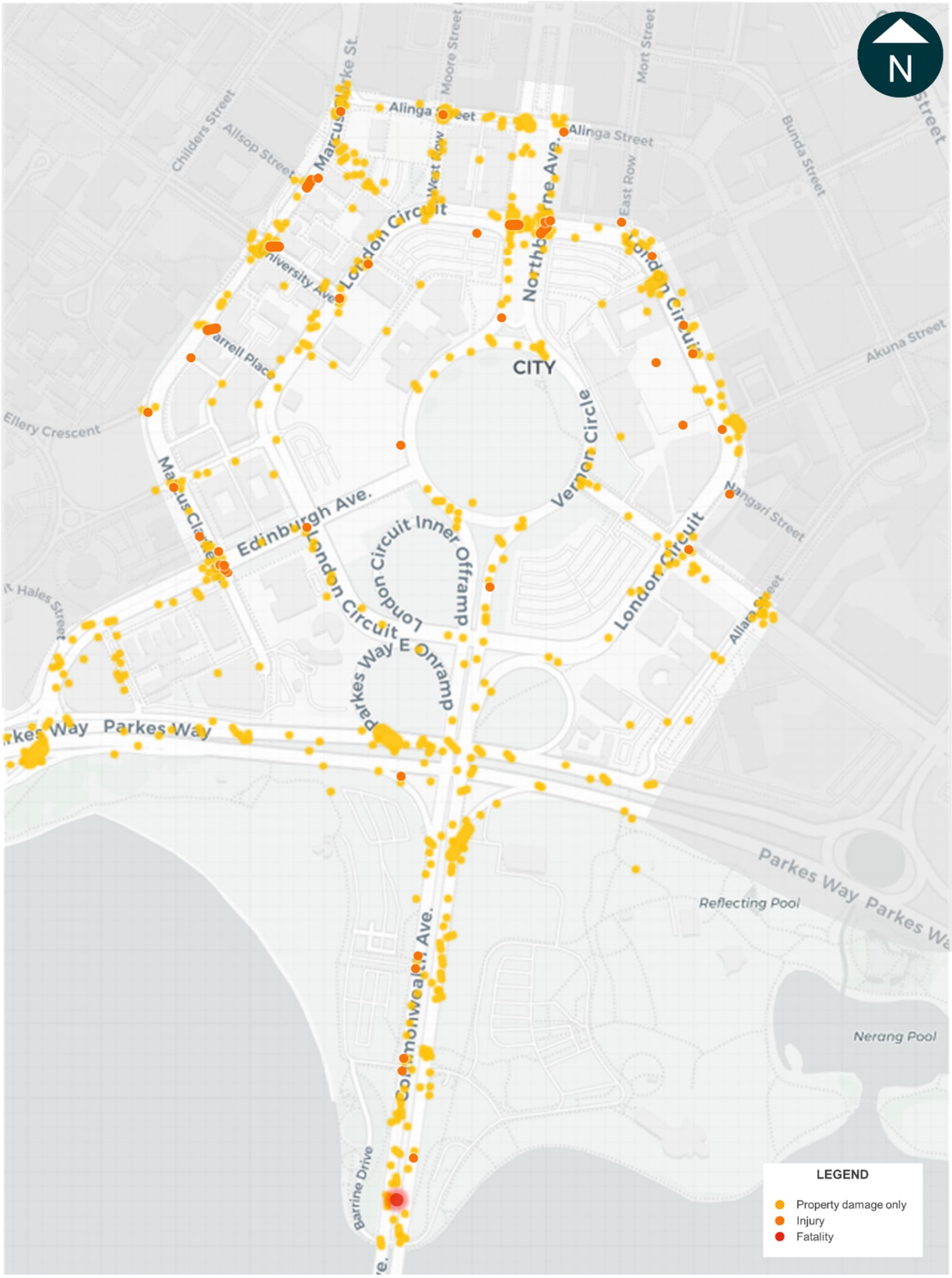


Figure 5-5 ACT vehicle crash data 2016-2021 (ACT Open Data Portal, 2022)

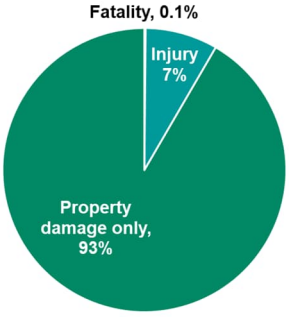


Figure 5-6 Crash type (ACT Open Data Portal, 2022)

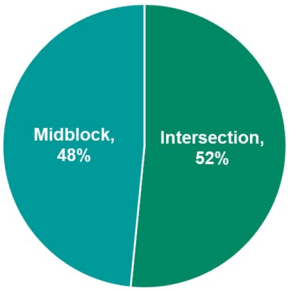


Figure 5-7 Crash locations (ACT Open Data Portal, 2022)

Figure 5-8 ACT cyclist crash data 2016-2021 (ACT Open Data Portal, 2022)

Figure 5-9 ACT pedestrian crash data 2016-2021 (ACT Open Data Portal, 2022)

5.5 Road network

The road network within and surrounding the study area transitions from a low speed (40-60 km/h) urban road network within the city centre to a high-speed arterial road network (70- 90 km/h) along Commonwealth Avenue and Parkes Way.

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 is considered the gateway to the CBD from the south and similarly Northbourne Avenue is considered a gateway to and from the north
- Parkes Way is an east-west arterial traffic route that traverses the northern side of the Lake. Access to the major north-south route, Commonwealth Avenue is provided via a cloverleaf road
- London Circuit, which is a radial major collector road provides access between adjoining properties in Civic with surrounding arterial corridors
- Edinburgh Avenue, which is an arterial traffic route connecting Parkes Way to Marcus Clarke Street, and Vernon Circle. The extension of Edinburgh Avenue between Marcus Clarke Street and Vernon Circle was completed in December 2020[4]
- West Row, Gordon Street, University Avenue and Farrell Street, which are local access streets providing access to local land uses via connections to London Circuit and Marcus Clarke Street
- Knowles Places a one-way (generally) local access street providing access to the adjacent courts and police station. Knowles Place was extended in 2022 to intersect with Edinburgh Avenue. Additionally, it was upgraded in 2022 to a two-way road between the southern intersection with London Circuit and the new intersection with Edinburgh Avenue[5]
- Marcus Clarke Street, which is a major collector road that connects the arterials of Edinburgh Avenue and Barry Drive in the north, and provides access to the land uses in the west of the City, such as ANU
- Constitution Avenue, which is an arterial road providing connectivity between the east of the City area and Vernon Circle, London Circuit and Canberra CBD.

Commonwealth Avenue and London Circuit 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. However, as discussed in Section 3.4.1.1, two of the cloverleaf ramps would be removed as part of the RLC project.

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 summary of the key roads within the study area and its immediate surrounds are summarised in Table 5-1.

[4] 2017 base model does not include the Edinburgh Avenue extension
[5] 2017 base model does not include the Knowles Place upgrades

Table 5-1 Overview of roads relevant to study area

Classification	Road	Direction	Configuration	Speed limit
Arterial	Northbourne Avenue	Two-way	Three lanes in each direction	40 km/h
	Vernon Circle	One-way clockwise	Three lanes	60 km/h
	Edinburgh Avenue	Two-way	Two lanes in each direction	40 km/h
	Commonwealth Avenue	Two-way	Three lanes northbound and two-three lanes southbound	70 km/h, 60 km/h north of Parkes Way bridge
	Parkes Way	Two-way	Two lanes in each direction	80 km/h
	Constitution Avenue	Two-ways	One/two lanes in each direction	40 km/h
Major collector	London Circuit	Two-way	Two lanes in each direction	40 km/h
	Marcus Clarke Street	Two-way	One/two lanes in each direction	40 km/h
Minor collector	Alinga Street	Two-way	One lane in each direction	20 km/h
	University Avenue	Two-way	One lane in each direction	40 km/h
Local access street	East Row	Two-way	One lane in each direction	20 km/h
	Verity Lane	One-way	One lane northbound	10 km/h
	West Row	Two-way	One lane in each direction	40 km/h
	Odgers Lane	One-way	One lane northbound	10 km/h
	Hobart Place	Two-way	One shared lane	40 km/h
	Knowles Place	On-way with two-way extension	One lane	40 km/h
	Farrell Place	Two-way	One lane in each direction	40 km/h
	Gordon Street	Two-way	One lane in each direction	40 km/h

5.5.1 Traffic volumes

Traffic counts in the study area were conducted in 2017 and 2019. Figure 5-10 shows the total number of vehicles that were surveyed at midblock locations during the AM and PM peak hours, in 2017 and 2019 (where available).

Peak hour traffic volumes were similar in 2017 and 2019 at all locations except Northbourne Avenue. Southbound traffic volumes on Northbourne Avenue were approximately 900 vehicles higher in the 2017 PM peak hour when compared with the 2019 PM peak hour. The traffic volume reduction was likely due to the opening on the CLR1 in 2019.

The traffic surveys show that within the study area, the highest traffic demand occurs along Northbourne Avenue and Commonwealth Avenue, with approximately 2,800 vehicles and 7,000 vehicles observed in 2019 during the AM peak hour, respectively. Traffic volumes are similar in the PM peak hour, with approximately 2,400 and nearly 6,700 vehicles along Northbourne Avenue and Commonwealth Avenue in the PM peak per hour in 2019, respectively.

Along London Circuit, traffic volumes are highest at the southern end, where vehicles generally arrive and depart the area via Commonwealth Avenue, London Circuit East and Edinburgh Avenue. The two-way traffic volumes on London Circuit peak to the north of Edinburgh Avenue, with more than 1,000 vehicles during the AM peak hour and 900 vehicles during the PM peak hour.

Along Marcus Clarke Street the traffic volumes are highest at the northern end of the study area, at the Alinga Street intersection. The two-way traffic volumes on Marcus Clarke Street are more than 1,200 in the AM peak hour and 1,100 in the PM peak hour. At the Edinburgh Avenue and Marcus Clarke intersection the traffic volumes are lower in the AM peak hour with 450 vehicles.

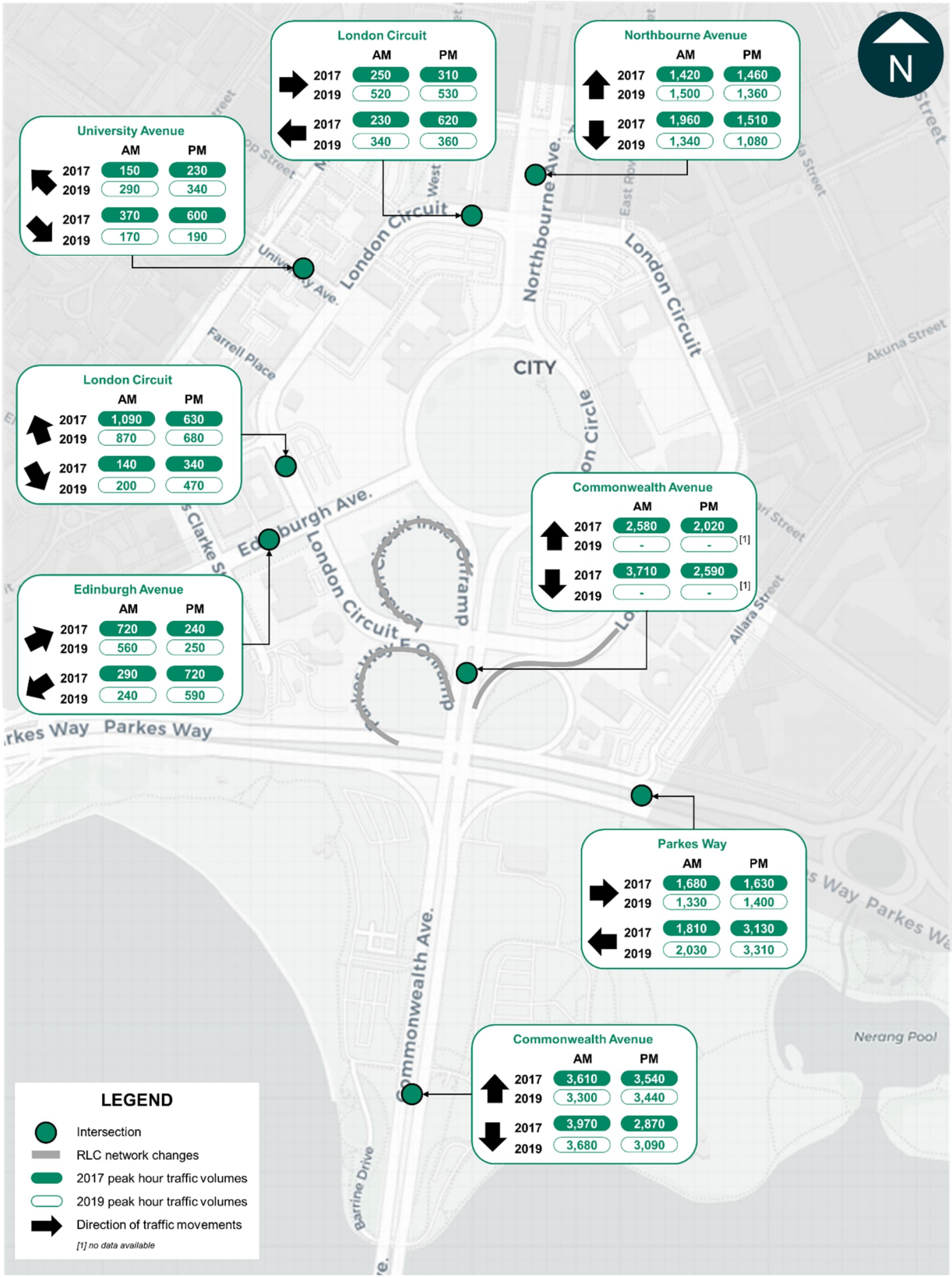


Figure 5-10 **2017 and 2019 two-way surveyed midblock traffic volumes during a weekday AM and PM peak hours**

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 5-11:

- 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 5-11 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 lower than the peak hour traffic volumes.

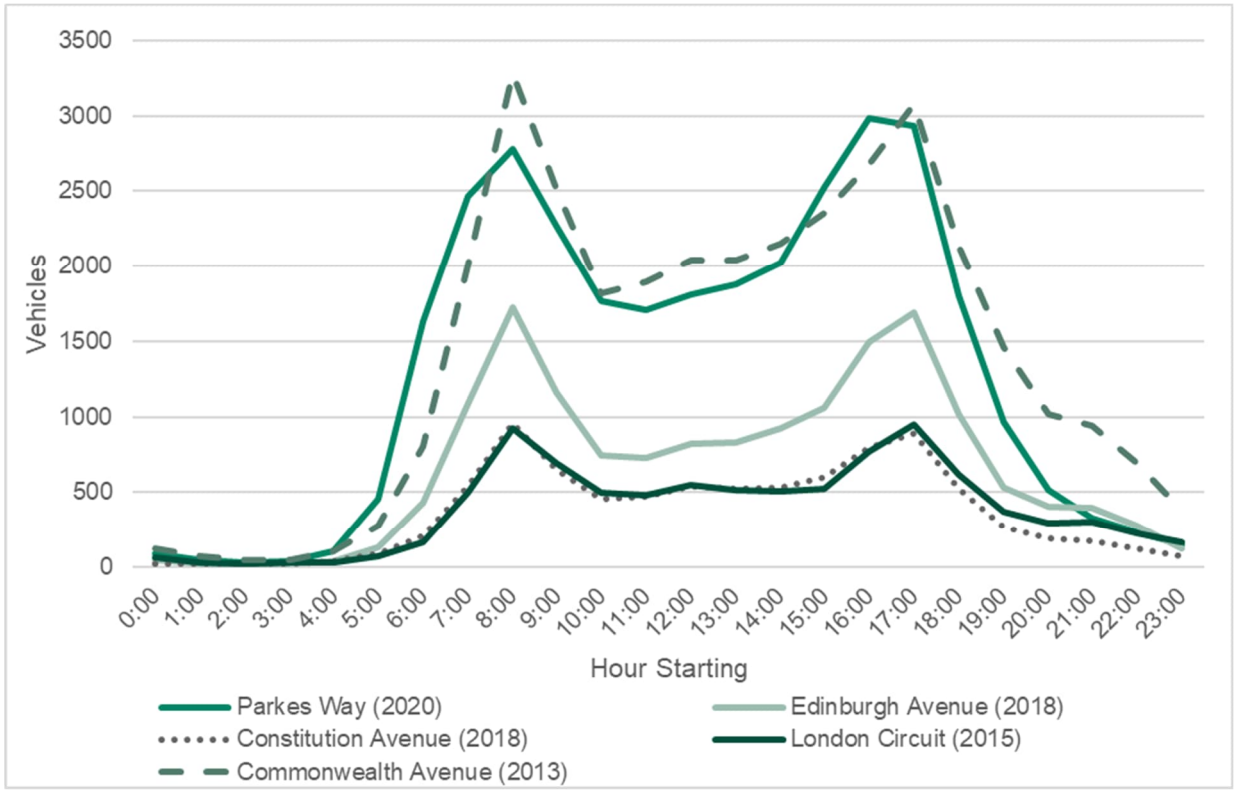


Figure 5-11 Weekday average daily traffic volume profiles on key roads surrounding the study area

5.5.2 Intersection performance

The location of existing key intersections and their type is shown in Figure 5-12.

The existing operation of the intersections in the study area have been assessed, using the Project's VISSIM microscopic model, as discussed in Section 4.5.5. The existing performance of the assessed intersections are shown in Figure 5-13. The 2017 base case model does not include the London Circuit and Commonwealth Avenue intersection that would be constructed as part of the RLC project and therefore the intersection performance is not reported on.

Figure 5-13 indicates that most of the assessed intersections operated satisfactorily in 2017, with a level of service C or better. The exception to this is the intersection and Northbourne Avenue and Alinga Street which operated at a level of service E in 2017.

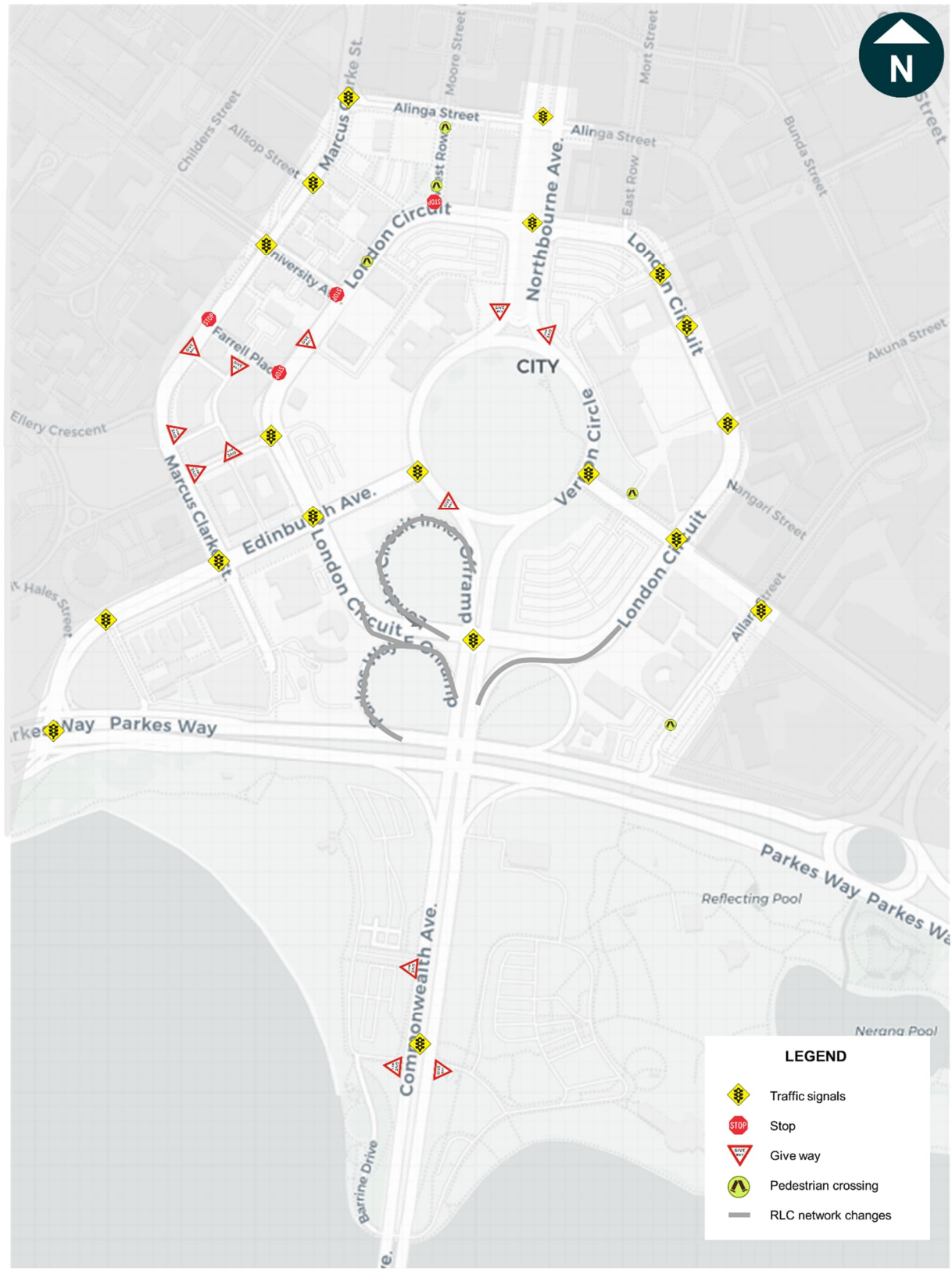


Figure 5-12 Overview of intersection types in the study area

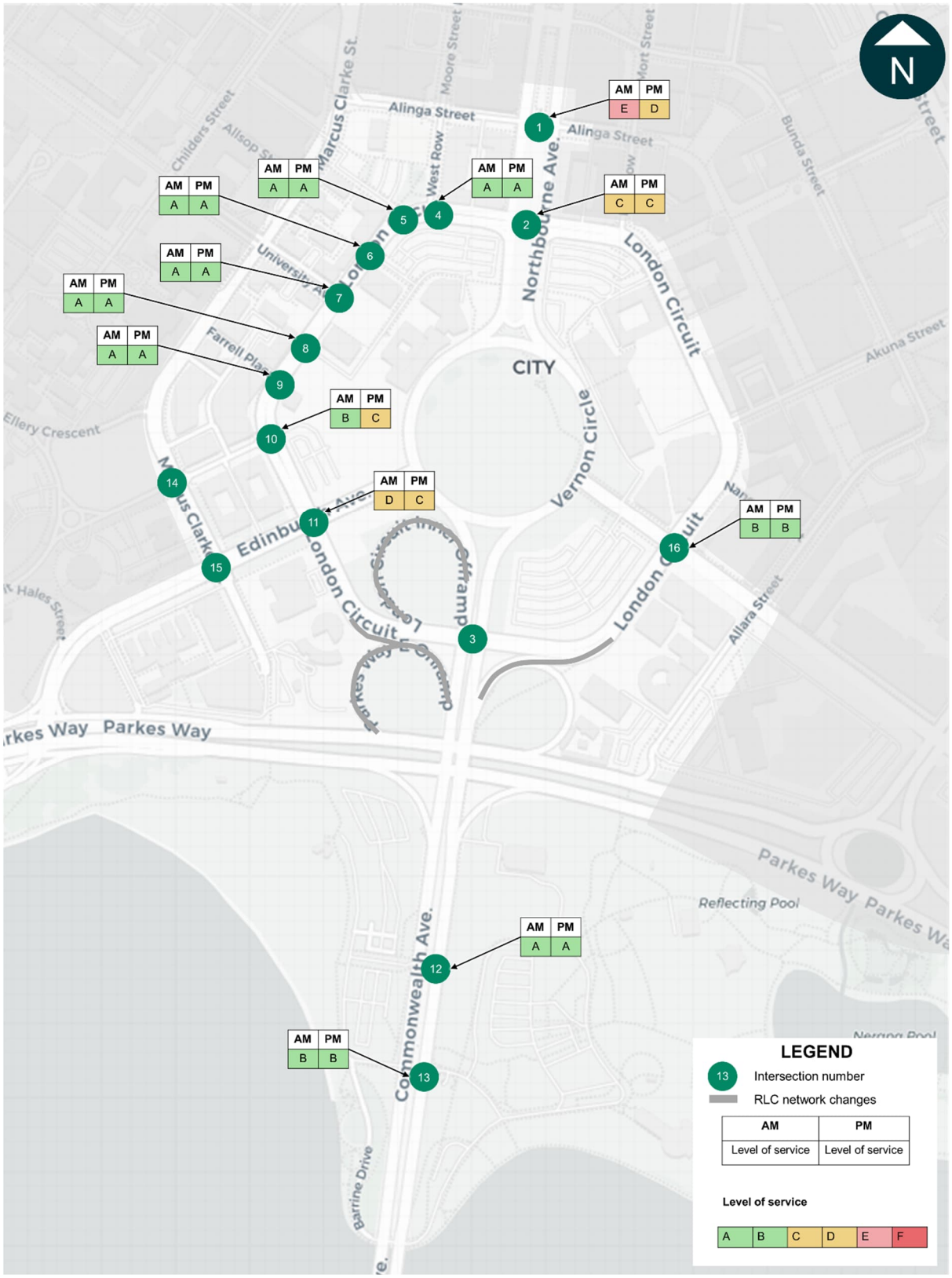


Figure 5-13 Existing intersection operation during the weekday AM and PM peak hours

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 stop is currently the southern terminus of the existing Gungahlin to City light rail service. The light rail alignment extends north along Northbourne Avenue towards Canberra's north. The existing light rail service runs at a frequency of five to six minutes in the peak hours and 10 – 15 minutes in the off-peak periods.

Bus services in the area are operated by Transport Canberra. Bus services travelling to/from the south generally use Commonwealth Avenue (10 routes) or Constitution Avenue (five routes) and London Circuit East to access the City Interchange, as shown in Figure 5-14. More information on these routes is included in Table 5-2.

The Commonwealth Avenue bus routes currently use the north-west cloverleaf to access London Circuit East from Commonwealth Avenue south. However, once RLC is completed, these routes would instead use the Commonwealth Avenue and London Circuit signalised intersection.

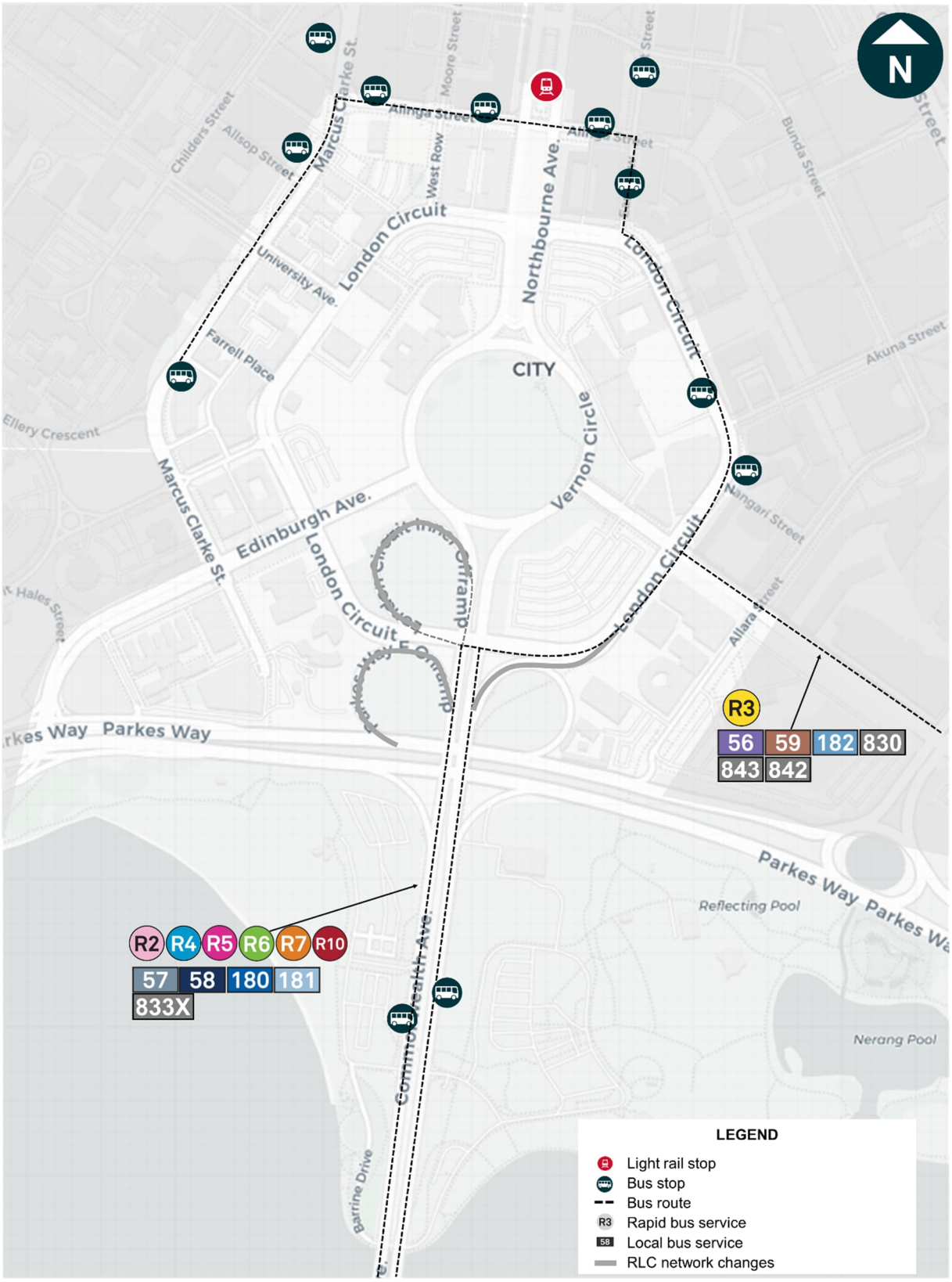


Figure 5-14 Bus services in the study area

Table 5-2 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 to Fyshwick	7	10	6	10	15
R3	Spence to Airport	4	15	4	15	15
R4	Belconnen to Tuggeranong	11	5	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	2	20-25	2	20-25	30
57	Woden to City	3	20-25	3	20-25	30
58	Woden to City	2	30	2	30	30
59	Woden to City	4	15	4	15	15
180	Lanyon Valley to City	1	20-30	1	20-30	Peak period only services
181	Lanyon Valley to City	1	20-30	1	20-30	
181	Lanyon Valley to City	1	30	1	30	
830	Queanbeyan to Canberra City	3	25-30	2	10-20	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

5.6.1 Public transport patronage

Public transport patronage data was provided by TCCS for bus services within the study area and the Alinga Street light rail stop. The daily boardings for both bus services within the study area and the Alinga Street light rail stop between 2017 and 2022 are shown in Figure 5-15.

There was decrease in the number of bus boardings between 2018 and 2019, which could be attributed to the opening of CLR1. However, the number of public transport (total of bus and light rail) boardings increased in the study area in 2019 when compared to 2018 and 2017.

The data shows around 45 per cent decrease in the number of bus boardings per day and a 40 per cent decrease in light rail boardings at Alinga Street between December 2019 and December 2021. This decrease can largely be attributed to the impacts of COVID-19, including lockdowns within the ACT and associated changed travel behaviour.

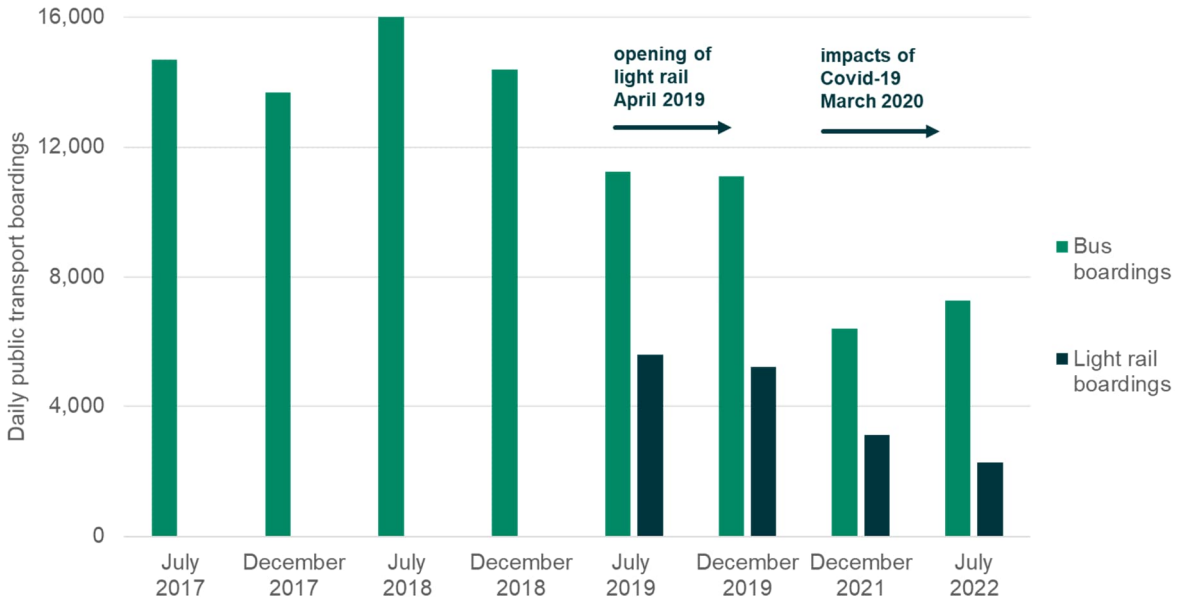


Figure 5-15 Daily public transport boardings in study area

The number of daily bus boardings in 2019 at each stop in the study area is shown in Figure 5-16. The City Interchange experienced the highest number of boardings is within the study area. This is because all bus routes in the study area either begin in or pass through the City Interchange. A large number of boardings also occurred on Marcus Clarke Street, which is adjacent to ANU.

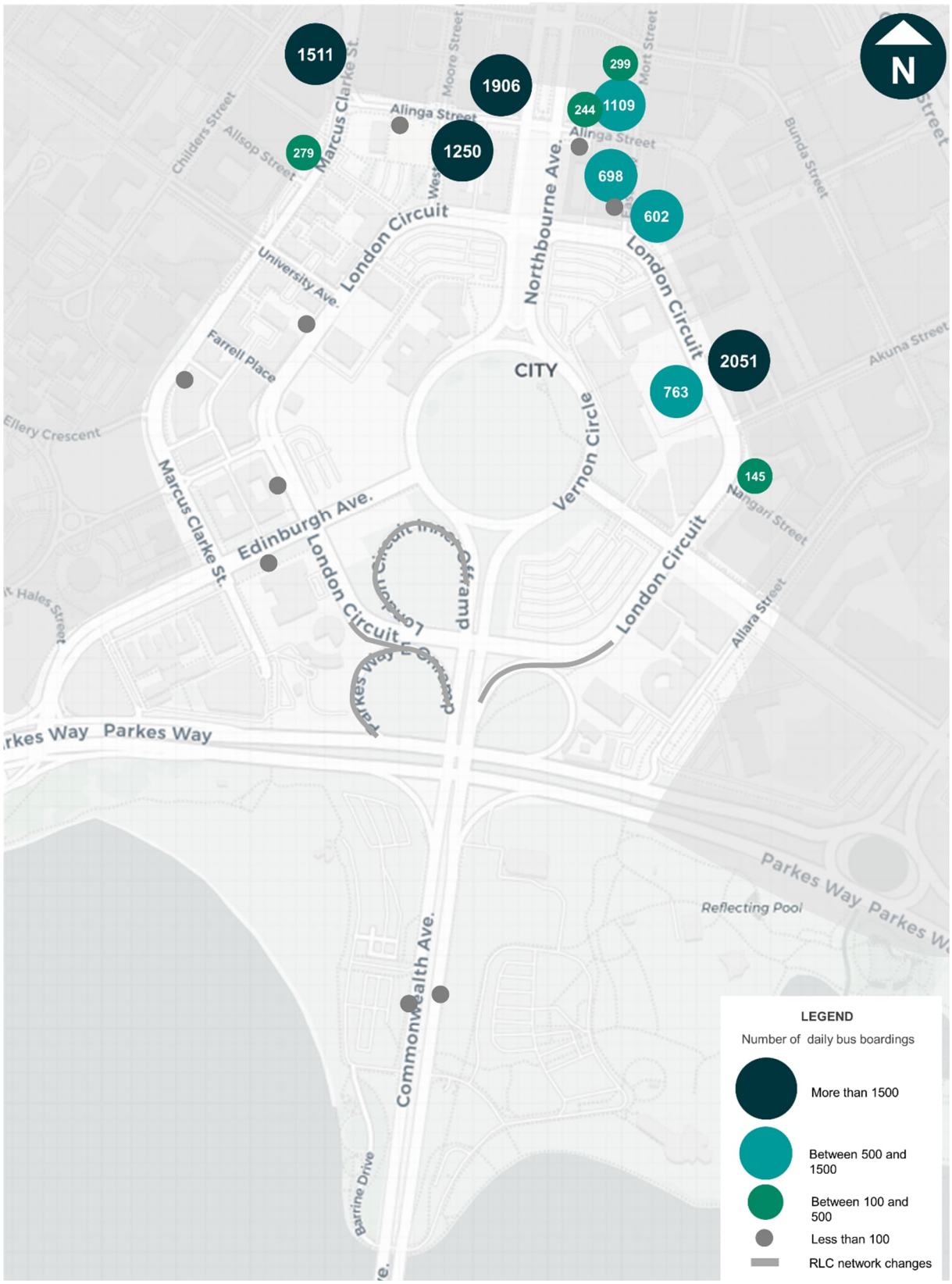


Figure 5-16 2019 daily bus boardings in study area

5.7 Active transport

5.7.1 Strategic cycling paths and routes

The Canberra cycling paths is formed by the following community routes:

- Principal community routes - to connect each of the ACT districts with the City, town centres and other major destinations. Principal community routes have a designated routes number and are a subset of the Main community routes.
- Main community routes - to connect group centres and major destinations. All main community routes within the study area are classified as principal community routes.
- Local community routes – to link the principal and main routes to local centres and destinations such as schools and shops.
- Access community routes – to provide safe and attractive connections for the ‘last kilometre’ at the beginning and ending of transport trips.

The strategic cycling paths in and surrounding the study area are shown in Figure 5-17.

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 community route, as it connects key employment areas and links the CBD with other surrounding principal community routes and main and local community 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 connects with the Lake Circuit principal community route to the south of the study area.

Northbourne Avenue, Vernon Circle and Commonwealth Avenue are also designated as a Principal community route. This route does not have a designated route number. Off-road cycling paths are provided on both sides of Northbourne Avenue between Alinga Street and London Circuit. Vernon Circle and Commonwealth Avenue have on-road cycle lanes. These roads comprise a key north-south route between north Canberra, south Canberra and Canberra CBD. Commonwealth Avenue is of particularly importance, as it is one of the only routes for cyclists to cross the Lake.

Edinburgh Avenue between Parkes Way and London Circuit is also designated as a Principal community route. Cycle lanes and an off-road shared path are provided on the north side of Edinburgh Avenue between Parkes Way and Marcus Clarke Street.

London Circuit is endorsed as a local community 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.

Upgrades to the cycling paths planned as part of the RLC project are discussed in Section 5.7.2.2. It is expected that the addition of off-road cycleways within the RLC project boundary will strengthen the east-west cycling connections within the study area between Constitution Avenue and Edinburgh Avenue.

It is also noted that cyclists are permitted to ride on footpaths in the ACT, which is considered appropriate for local access between properties and the community route network.

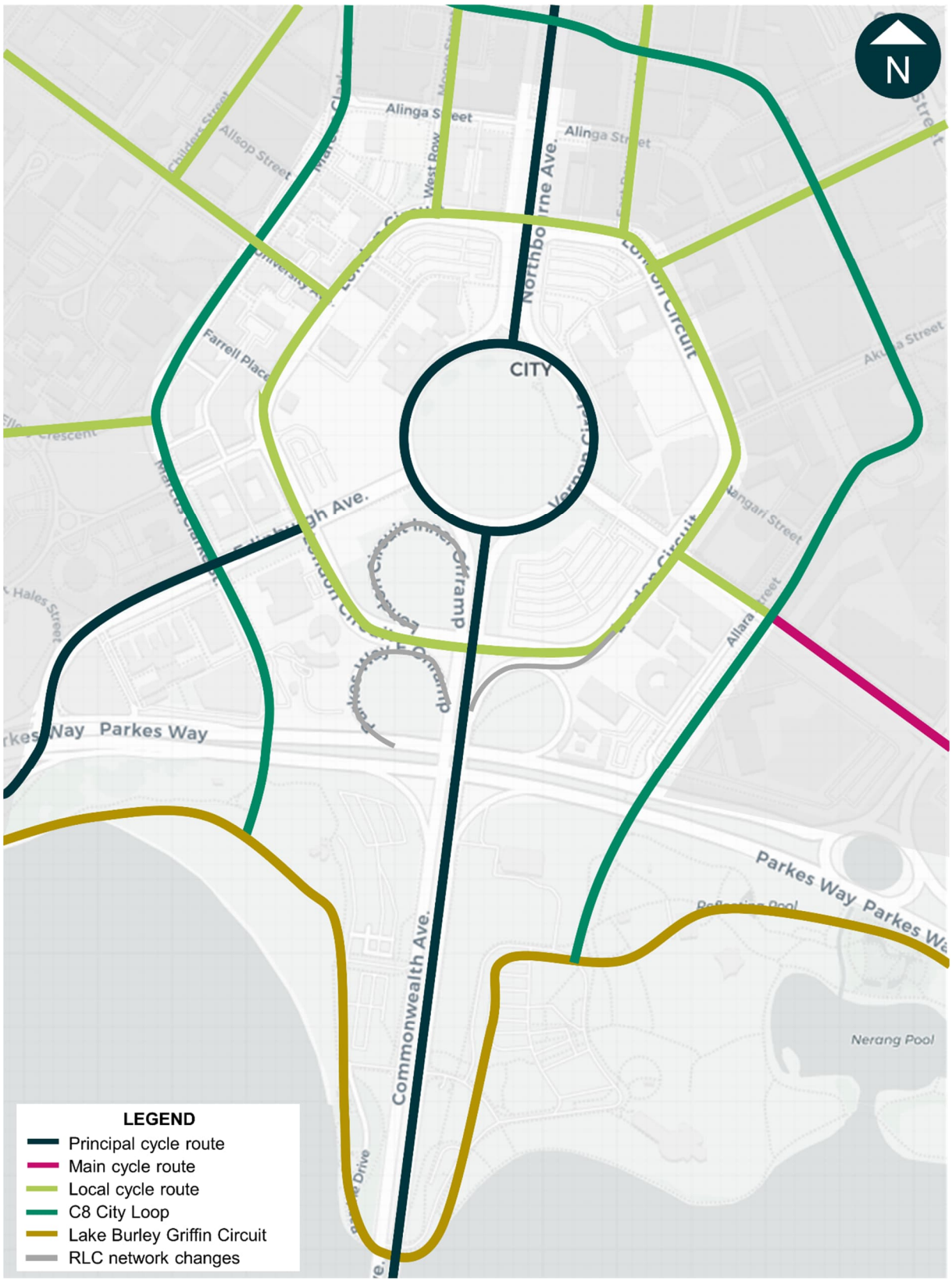


Figure 5-17 Strategic active travel routes

5.7.2 Facilities and infrastructure

5.7.2.1 2022 existing conditions

Footpaths are provided on both sides of most roads within the study area, including Northbourne Avenue, London Circuit, Vernon Circle and Commonwealth Avenue, as shown in Figure 5-18. Although this infrastructure is provided, many sections are narrow. However, at locations of higher pedestrian activity (northern half of London Circuit East and West, and Northbourne Avenue), wider footpaths are provided. One zebra pedestrian crossing is located on London Circuit between Knowles Place and University Avenue. There are limited other formal crossing points for pedestrians.

As illustrated in Figure 5-18, pedestrian amenity and/or safety is compromised the following locations:

- London Circuit, on the eastern side at Gordon Street
- Pedestrian crossings at on/off ramps between London Circuit and Parkes Way
- Commonwealth Avenue bridges across Parkes Way and London Circuit.

Cyclist infrastructure within the study area is generally limited to on-road cyclist lanes. In addition, cyclists are legally permitted to ride on footpaths in the ACT, though footpaths are generally not of sufficient width to accommodate cyclists and pedestrians comfortably, particularly when travelling in opposing directions. Generally, the paths cannot accommodate above local access cyclist activity. Planned improvements due to the RLC project are discussed below in Section 5.7.2.2.

The existing cycling infrastructure is shown in Figure 5-19, including:

- North-south on-road cycle lanes on Vernon Circle and Commonwealth Avenue and connecting to facilities in the north on Northbourne Avenue
- An eastbound on-road cycle lane along London Circuit between the north-west cloverleaf merges with London Circuit about 80 m south of Constitution Avenue
- A westbound on-road cycle lane 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.

The cloverleaf ramps are a key 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 5-18. A more direct pedestrian desire line through the cloverleaf ramps is evident by the dirt tracks that have been formed.

Cycle lanes or paths are not 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 lanes on Commonwealth Avenue and Vernon Circle, to access London Circuit via Edinburgh Avenue or Constitution Avenue.

5.7.2.2 Planned changes due to RLC

RLC would provide 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 active transport infrastructure planned as part of RLC includes:

- 2.0 m wide off-road cycling 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
- 2.5 m wide footpaths along both sides of Commonwealth Avenue
- Continuous 3.0 m to 3.5 m wide footpaths along both sides of London Circuit between Edinburgh Avenue and near Constitution Avenue at the eastern extent of works
- 1.8 m wide off-road separated cycling paths on both sides of London Circuit between Edinburgh Avenue and near Constitution Avenue
- Signalised pedestrian and cyclist crossings on all legs of the proposed Commonwealth Avenue and London Circuit intersection.

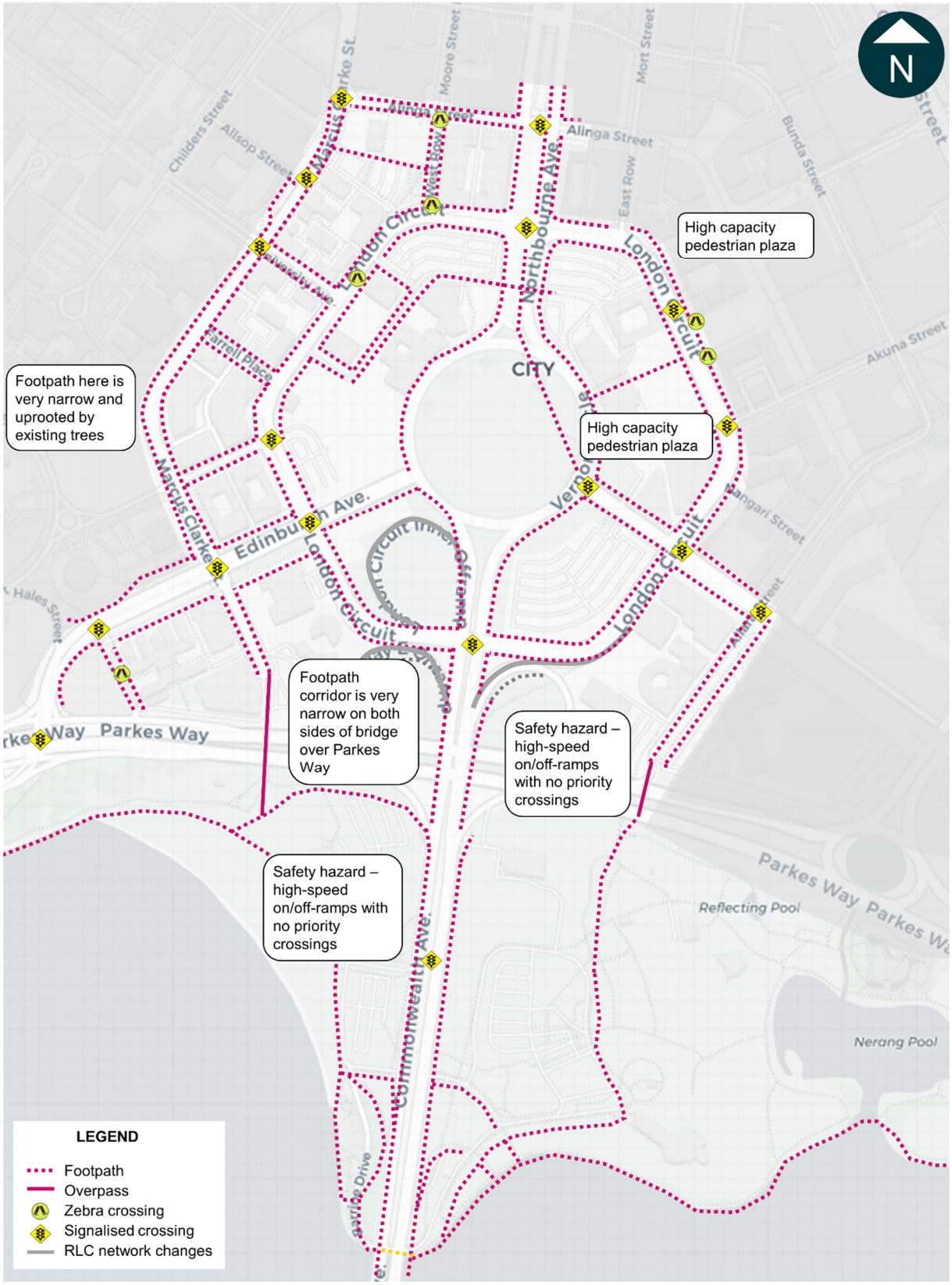


Figure 5-18 Existing pedestrian infrastructure (including planned changes due to RLC)

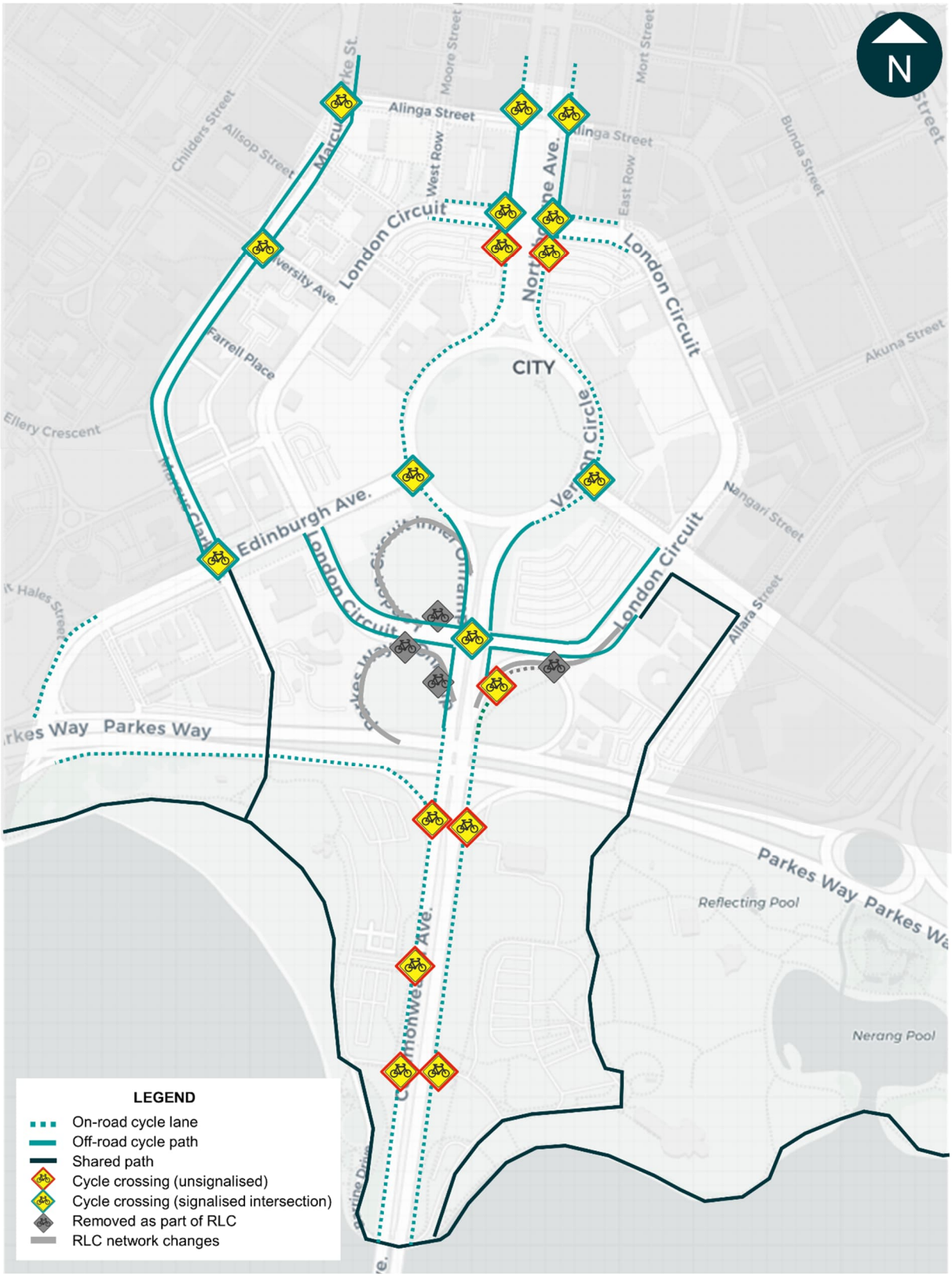


Figure 5-19 Existing cycling infrastructure (including planned changes due to RLC)

5.7.3 Active transport demand and activity

Pedestrian and cyclist count data from December 2019 was provided by TCCS. The AM and PM peak hour two-way counts at key locations within the study area are summarised in Figure 5-20.

5.7.3.1 Pedestrians

The highest pedestrian crossing activity within the study area occurred at the intersection of Northbourne Avenue and Alinga Street, which experienced nearly 1,800 pedestrian crossing movements in the AM peak hour and 2,570 movements in the PM peak hour. This crossing activity includes a large portion of people moving to/from and within the City Interchange including the Alinga Street stop.

Pedestrian crossing activity in the north section of London Circuit was higher than the south section, with up to 310 crossing movements recorded at the Northbourne Avenue and London Circuit intersection during the AM peak hour and 510 pedestrians recorded during the PM peak hour. Whereas 70 pedestrians were recorded crossing at the intersection of London Circuit and Edinburgh Avenue during each of the AM and PM peak hours.

The pedestrian movements on London Circuit East were high at both the intersections at Akuna Street and Constitution Avenue.

Pedestrian crossing activity across Commonwealth Avenue is typically low. However, the pedestrian crossing demands increase when major events are held in Commonwealth Park particularly at the available signalised crossing near Albert Street. For example, pedestrian demand at this location increases around September/October when the Floriade event is held.

5.7.3.2 Cyclists

In the study area cyclist activity was highest along Northbourne Avenue, Marcus Clarke Street and Commonwealth Avenue. Separated cycling paths are provided on Northbourne Avenue south of Alinga Street and along all of Marcus Clarke Street within the study area. At the intersection of Northbourne Avenue and London Circuit 85 - 90 cyclists were observed in the AM and PM peak hours.

Sixty cyclists were observed on Vernon Circle in the AM peak hour. While Vernon Circuit only has on-road cycle lanes, the demands suggest that Vernon Circle is considered a direct connection between Northbourne Avenue and Commonwealth Avenue.

On Commonwealth Avenue, 100 cyclists were observed in the AM peak hour and 90 cyclists were observed in the PM peak hour. Additional data provided by TCCS demonstrated that these counts were consistent with observations made in 2022.

The intersection of Marcus Clarke Street and University Avenue forms part of the C8 principal cycling route. At this location, 170 and 140 cyclists were observed in the AM and PM peak hours, respectively.

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 5-21, shows the following:

- The Marcus Clarke Street cycleway is the most frequently used north-south route by Strava users
- Vernon Circle is also a key desire line for cyclists
- London Circuit West caters for much less cycling than the adjacent Marcus Clarke Street
- London Circuit East caters for much less cycling then the adjacent Allara Street.

It is also noted that there is currently low demand for cyclists moving between Commonwealth Avenue and London Circuit. This could be reflective of the gaps in the cycling facilities provided along London Circuit and also the north-south barriers created by the current grade separation of London Circuit and Commonwealth Avenue. It is expected that demand on these sections would increase after RLC is constructed.

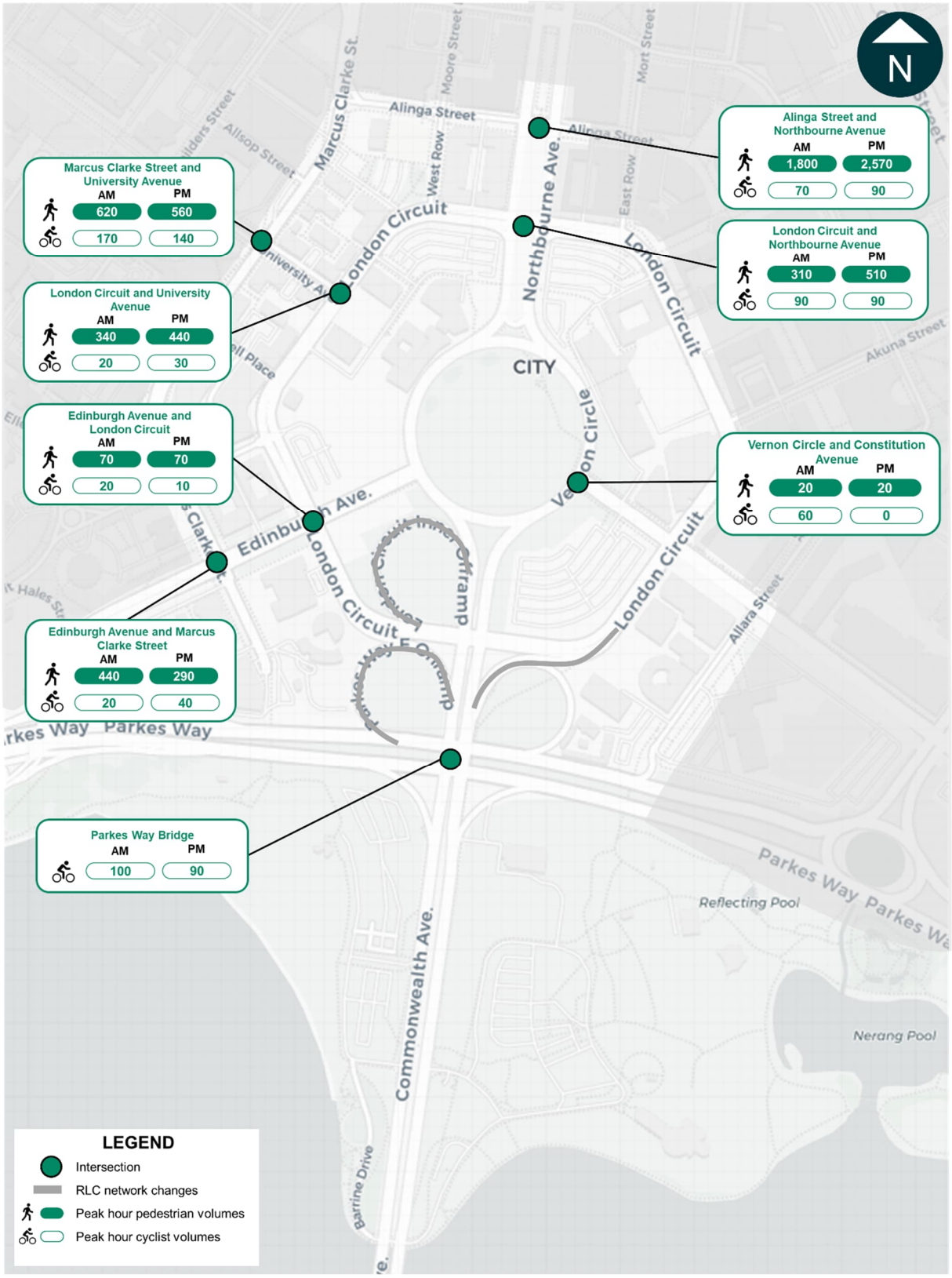


Figure 5-20 2019 active transport two-way volumes

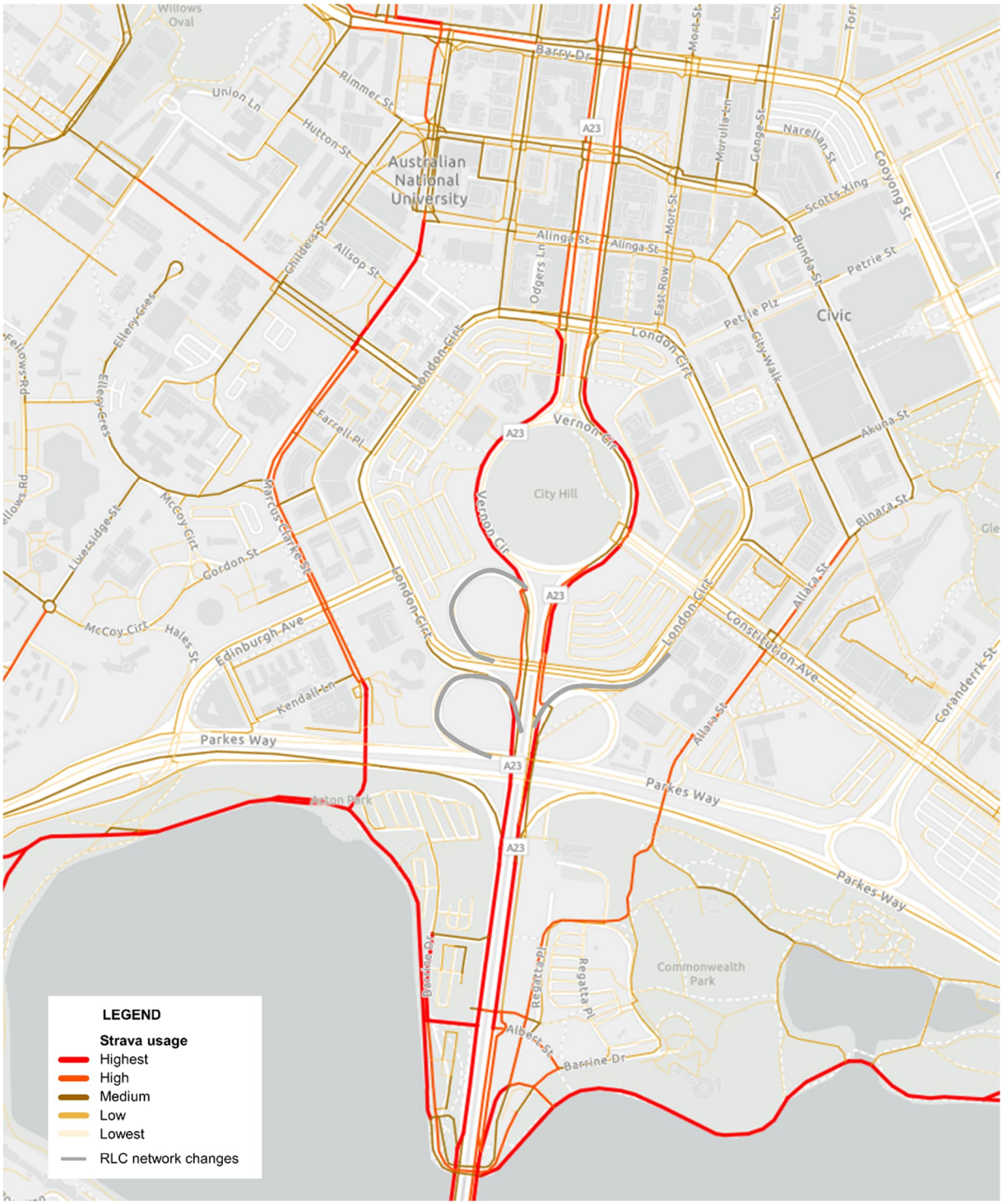


Figure 5-21 2017 STRAVA cycling in the study area (TCCS, 2022)

5.8 Coach operations

Coach services arrive and depart from two locations within and adjacent the study area, at West Row and at the Jolimont Centre. These services include privately operated coaches, which operate between Canberra and Sydney, Melbourne or Thredbo, in addition to the following services:

- Route 701/703: Queanbeyan Bus Interchange to Wagga Wagga
- Route 702/704: Wagga Wagga to Queanbeyan Bus Interchange
- Route 771: Canberra Hospital to Eden
- Route 775: Canberra Civic to Bombala
- Route 783: Goulburn to Canberra
- Route 784: Canberra to Goulburn.

Coach services arrive at the West Row coach stop via London Circuit and depart via Alinga Street. Services that arrive at the Jolimont centre arrive via Northbourne Avenue and Rudd Street and depart via Moore Street and Alinga Street. The inbound and outbound routes that coaches use to access the stops at West Row and the Jolimont Centre are shown in Figure 5-22.

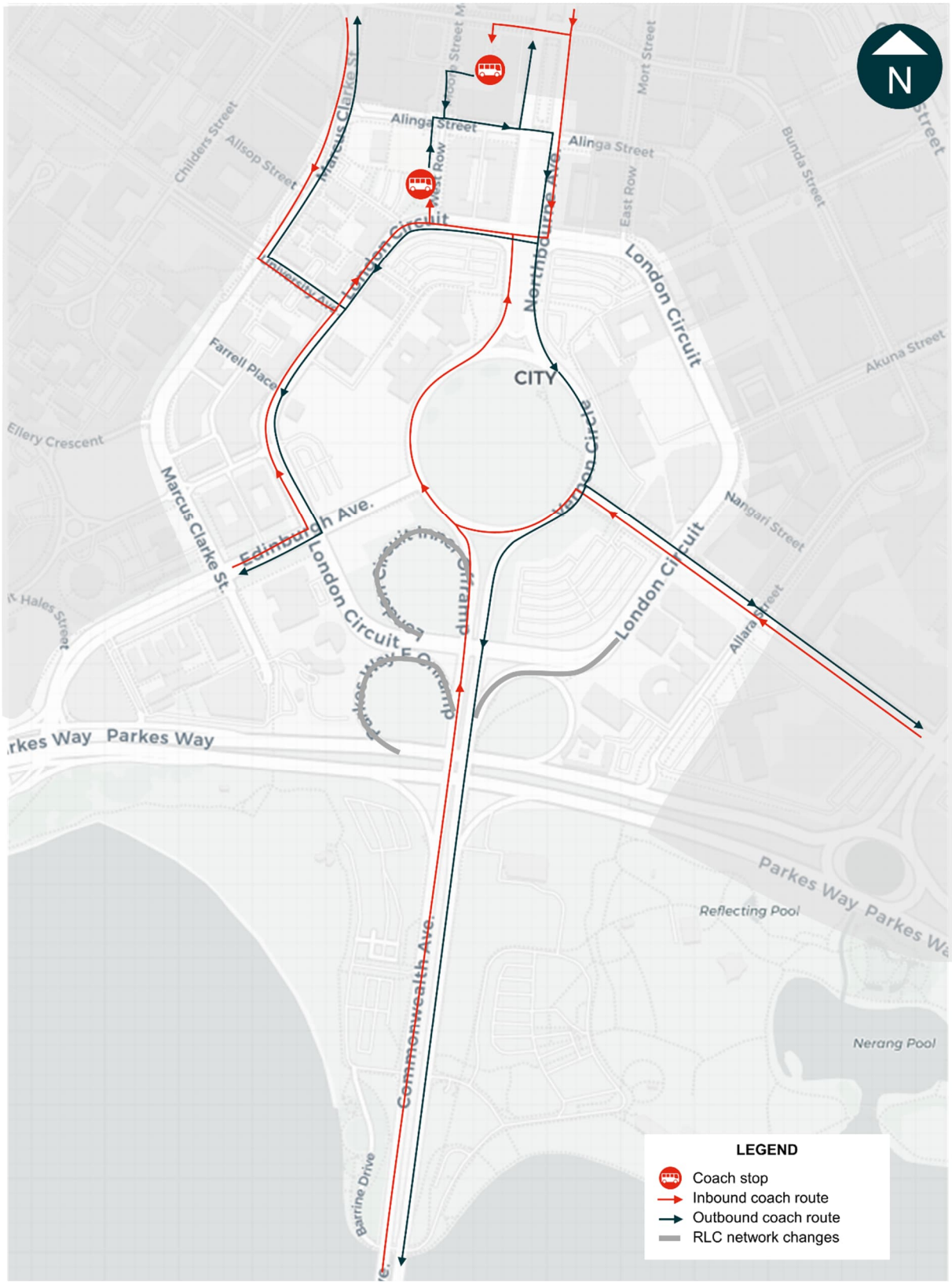


Figure 5-22 Inbound and outbound coach routes

5.9 Micromobility

5.9.1 Facilities and infrastructure

There are several dockless shared micromobility operations that operate within the ACT and the study area including e-scooters and e-bikes. These devices are located at locations in the study area and are accessed by users who locate and pay for the hire through a mobile phone app.

Specific parking sites have been identified in central Canberra based on anticipated demand. When rebalancing their fleet, private operators are encouraged to use these designated parking areas. Geofencing is used to enforce the appropriate use of the micromobility devices. This includes the prevention of device parking in certain areas, restrictions on speed and prevention of travel.

Users of e-scooters must not ride on the road unless paths are not available, or it is not practical to use the path.

5.10 Car parking, kerbside uses and access

5.10.1 Kerbside uses

The existing kerbside parking and other uses within the study area are summarised in Table 5-3 and the kerbside uses along the Project's alignment are shown in Figure 5-23. Locations that do not have any kerbside uses (such as Vernon Circle) have been excluded.

Table 5-3 Existing kerbside uses in the study area

Location	Summary of kerbside uses
London Circuit West	• Ten Police only bays outside the City Police Station (temporarily relocated to this location due to Blocks 10 and 11, Section 100 construction works) • Seven loading zone spaces located south of West Row (1/2P loading zone 7:30am – 6:00pm) • Three short-term parking spaces located south of Knowles Place North (1/2P Monday – Friday 8:30am – 5:30pm) • Three bus zone with space for nine buses, which are only used for bus layover since bus network changes were introduced in 2020 • Two pick-up and set-down spaces located north of Knowles Place South • One No Stopping (emergency vehicles excepted) space located outside of the City police station
London Circuit East	• Loading zone with capacity for four vehicles on the east side, south of East Row with 15-minute parking permitted outside hours of loading zone operation • Taxi zone with capacity for approximately three vehicles • Additional loading zone with capacity for approximately five vehicles on the east side, north of Ainslie Place with a taxi zone outside hours of loading zone operation • Several bus zones on the east and west sides, south of Ainslie Place • Set-down and pick-up bay for one vehicle, adjacent to the Department of Foreign Affairs and Trade building
West Row	• A coach stop on the west side • 30-minute loading zone on both sides with a total capacity for approximately five vehicles • Eight 30-minute spaces located on the west side
University Avenue	• Eight 30-minute spaces located across both sides • One five minute space located between the entrance and exit to Darwin Place • Three 30-minute spaces to the east of Darwin Place. These spaces become a taxi zone outside of the signed hours (8:30am – 5pm

Location	Summary of kerbside uses
	Monday to Thursday, 8:30am – 9pm Friday, 8:30 am – 12 noon Saturday)
Farrell Place	• Six one hour spaces located on the south side • Four 30-minute spaces located on the north side • 30-minute loading zone on the north side with space for approximately three vehicles • One five minute parking space immediately east of London Circuit on the north side
Gordon Street	• A row of 90 degrees parking spaces on the south side, comprised of 20 two hour spaces and two accessible spaces • A row of 90 degrees parking spaces on the north side, comprised of 11 two hour spaces and two loading zones
Edinburgh Avenue between Vernon Circle and Marcus Clarke Street	• Three two hour indented bays on the south side, immediately to the east of Vernon Circle • Shared bus and taxi zone on the south side • Five two hour indented bays on the north side
Marcus Clarke Street between Kendall Lane and Edinburgh Avenue	• Motorcycle parking bay for approximately six motorbikes • A row of 90-degree parking spaces comprising two accessible spaces, four one hour spaces and eight 15-minutes spaces

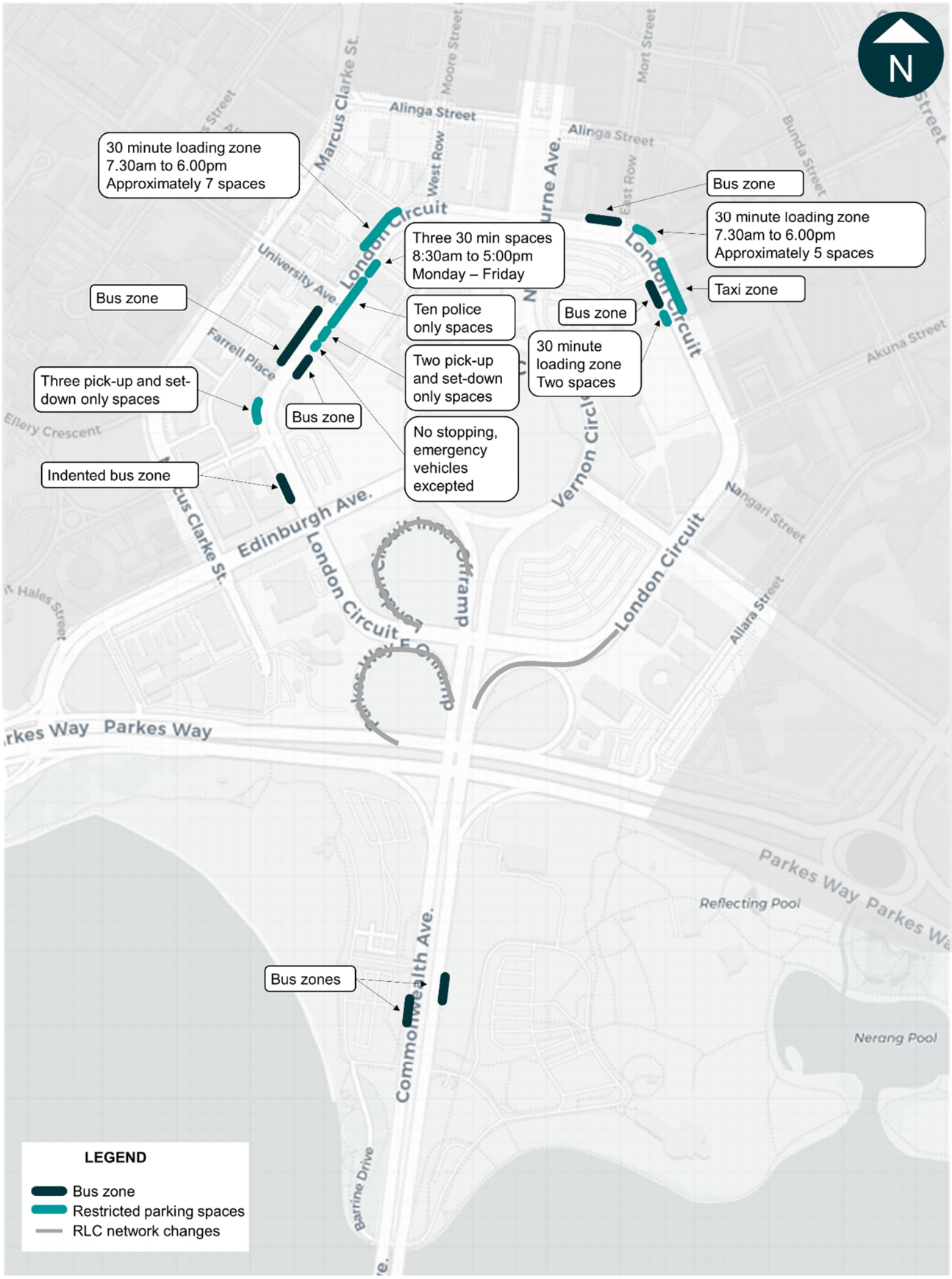


Figure 5-23 On-street parking and kerbside uses along the proposed alignment

5.10.2 Off-street parking

Most buildings in the study area have dedicated basement car parking, which are generally accessed via local access roads within the study area. 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 3,840 parking spaces, as shown in Figure 5-24.

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 car parks at Constitution Avenue, which was 75 per cent occupied, Allara Street, which was 60 per cent occupied, and Acton Park South which was less than 5 per cent occupied. Based on aerial imagery, it appears that the nearby Commonwealth Park car parks also typically have some spare capacity on a weekday. The Constitution Avenue car park is also frequently used by visitors to the adjacent Canberra Theatre, typically on weekends and weekday evenings.

As part of RLC, approximately 70 parking spaces would be permanently removed from the Section 116 long-stay car park. Further, the Section 63 car park, which has approximately 90 spaces, would be removed permanently as part of RLC.

In addition, car parking would be temporarily lost in the following car parks because of the planned RLC construction compounds:

- Constitution Avenue car park – loss of approximately 255 public long-stay parking spaces
- Marcus Clarke Street car park – loss of approximately 190 public long-stay car parking spaces
- Acton Waterfront Central car park – loss of approximately 80 long-stay parking spaces in the Acton Park carpark.

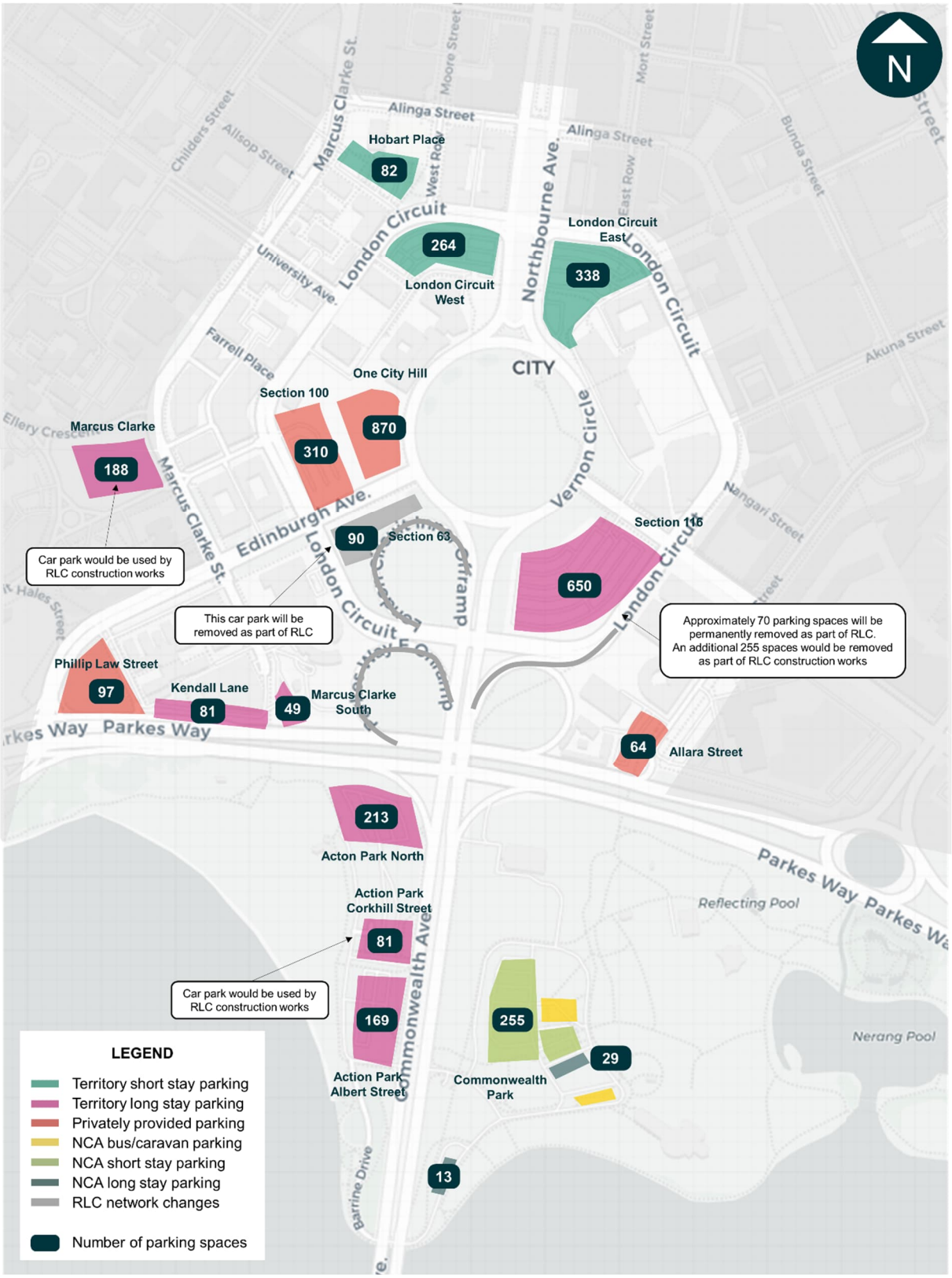


Figure 5-24 Off-street car parking locations and approximate parking supply

5.10.3 Property access

Minimal property access is directly provided along the Project's alignment including Northbourne Avenue, London Circuit and Commonwealth Avenue. Properties within and surrounding the study area are primarily accommodated via the roads adjoining London Circuit and the connecting access road network. For example, access to the residential building The Mews is provided via Gordon Street and Edinburgh Avenue.

Property access to a number of government and civic buildings is provided via London Circuit and Knowles Place, including the Reserve Bank Australia (RBA), the Magistrates Courts, Canberra City Police Station, Australian Federal Police (AFP) and the Supreme Court of the ACT.

The QT Hotel fronts London Circuit to the south-east of Edinburgh Avenue and is the only property with a driveway access along the Project alignment. The QT Hotel access caters for the hotel porte-cochere and some car parking. The QT Hotel porte-cochere access on London Circuit would be restricted to left-in/left-out as part of RLC.

Access to the Melbourne and Sydney buildings is provided from London Circuit via Odgers Lane and Verity Lane, respectively.

In addition, a privately operated at-grade car park has a driveway access along London Circuit, directly opposite the QT Hotel driveway access. The Section 63 car park would be removed as part of RLC. It would be used as an RLC construction compound.

Vehicular access to Commonwealth Park and Acton Park car parks are provided by Corkhill Street (exit only) and Albert Street which intersect with Commonwealth Avenue.

5.11 Movement and place assessment

Adopting the functional class matrix in Figure 4-8, the study area streets have been classified in terms of their baseline movement and place functions (post-RLC). For these parts of the network both the existing classification and the baseline classification (post RLC) have been identified.

A summary of the movement and place assessment, and classifications for the study area streets are provided in Table 5-4. The resultant typologies are shown visually in Figure 5-25.

Overall, most 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 activated dwellable areas.

Table 5-4 Existing conditions movement and place assessment

Section number	Section extent	Classification		Typology	Key contributing features
		Movement	Place		
1	Northbourne Avenue between Alinga Street and London Circuit	M3	P3	Vibrant Street	• Multi-modal corridor with high volumes for all modes • Carries B-doubles and freight movements • Minimal vehicular property access or parking • Pedestrian plaza with seating, landscaping and park space • Active and sheltered frontages including dining • 40 km/h low speed environment
2	Vernon Circle including approaches to London Circuit	M3	P1	Movement Corridor	• High traffic and cyclist volumes and low pedestrian activity • Carries B-doubles and freight movements • City Hill is a landscaped park with seating, picnic tables, trees and poor pedestrian connectivity due to the roadway • 60 km/h medium speed environment
3	Commonwealth Avenue between London Circuit and north edge of the Lake	M3	P1	Movement Corridor	• High traffic and cyclist volumes and low pedestrian activity • Carries B-doubles and freight movements • Narrow footpaths • Trees provided on both side • Adjacent to significant value parkland • 70 km/h high speed environment
4	London Circuit West between Northbourne Avenue and Edinburgh Avenue	M2	P2	Vibrant Street	• Medium traffic volumes and pedestrian activity and low cyclist volumes • Some activated land uses such as restaurants and cafes • Some parking and loading activity and vehicular property access • Varying footpath widths with some shade and landscaping • 40 km/h low speed environment
5	London Circuit West between Edinburgh Avenue and	M2	P1	Movement Corridor	• Medium-high traffic volumes and low pedestrian and cyclist activity • Limited parking and loading activity and vehicular property access • Varying footpath widths with limited shade and landscaping

Section number	Section extent	Classification		Typology	Key contributing features
		Movement	Place		
	Commonwealth Avenue				• The RLC project would provide some tree planting, wider footpaths and formal crossing facilities • Dwellable area provided is considered very low • Inactivated adjacent land-uses • 40 km/h low speed environment
6	London Circuit East between Constitution Avenue and Commonwealth Avenue	M2	P1	Movement Corridor	• Multi-modal corridor with medium-high traffic and bus volumes, and low pedestrian and cyclist activity • Limited parking and loading activity and vehicular property access • Varying footpath widths with limited shade and landscaping • The RLC project would provide some tree planting • Dwellable area provided is considered very low • Inactivated adjacent land-uses • 40 km/h low speed environment
7	Edinburgh Avenue between Parkes Way and Vernon Circle	M3	P1	Movement Corridor	• High traffic volumes and low cyclist and pedestrian activity • Carries B-doubles and freight movements • Limited property vehicular access but some on-street parking is provided • Varying footpath widths with some shade and landscaping • Dwellable area provided is considered very low • Inactivated adjacent land-uses • 40 km/h low speed environment
8	Marcus Clarke Street between Alinga Street and Kendall Lane	M2	P2	Vibrant Street	• Multi-modal corridor with medium-high traffic and cyclist volumes, some bus activity and low pedestrian volumes • Carries B-doubles and freight movements • Provides access to ANU • Varying footpath widths with some shade and landscaping • Inactivated adjacent land-uses on the western side • Retail and dining on eastern side • 40 km/h low speed environment

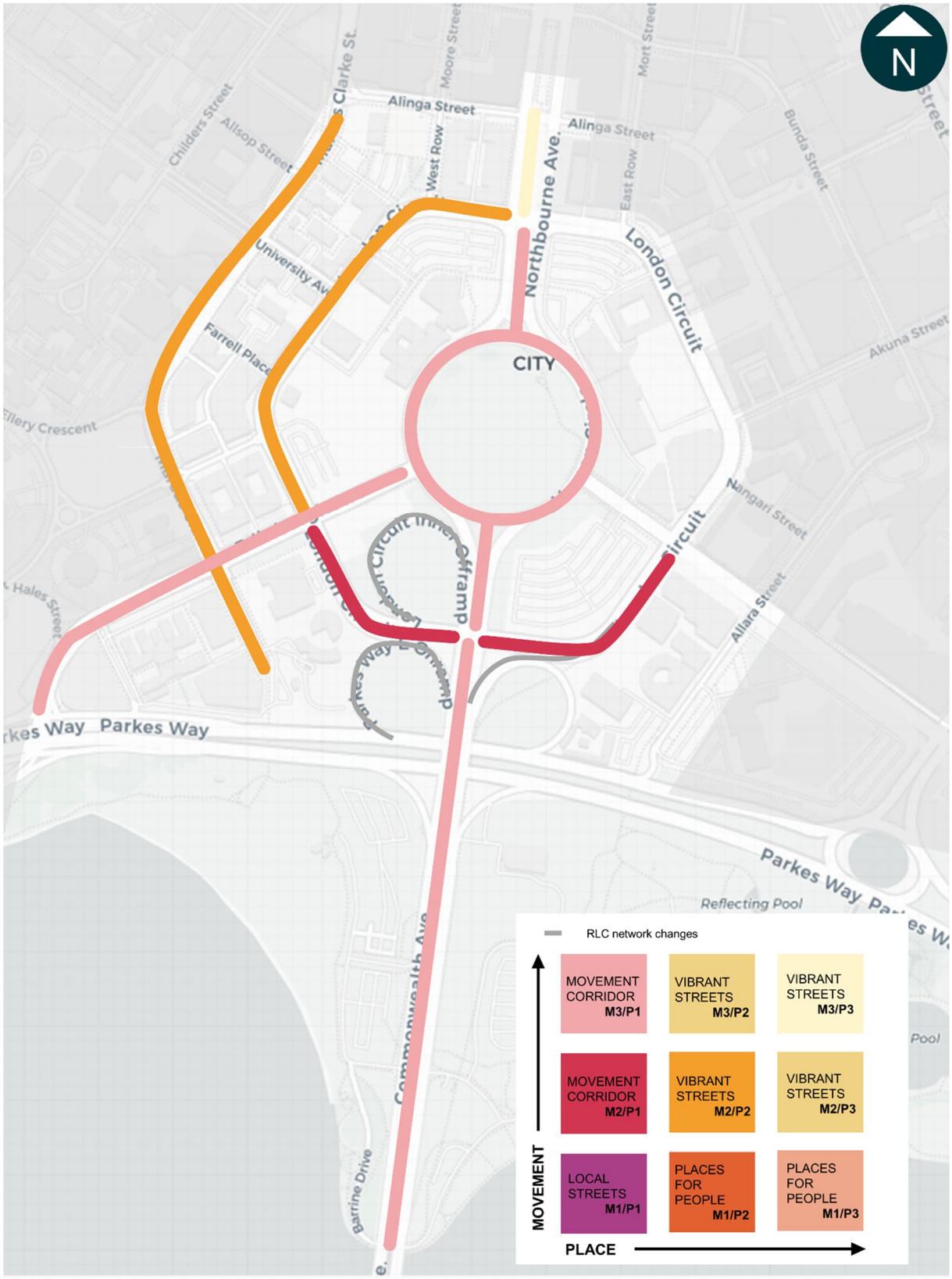


Figure 5-25 Existing movement and place typologies

6.0 Construction impact assessment

6.1 Summary of impacts

A summary of the construction related transport impacts are included in Table 6-1 and discussed in the following sections of this report.

Table 6-1 Summary of unmitigated construction related impacts of the Project

Category	Construction transport impact	Likelihood	Consequence	Rating
Road network	Increased congestion on local roads during road and lane closures including on Parkes Way, Marcus Clarke Street, Commonwealth Avenue and Northbourne Avenue.	Likely	Moderate	High
	Increased travel times on Commonwealth Avenue of between two and three minutes in the AM peak hour when Commonwealth Avenue would be reduced from three lanes to two lanes.	Likely	Moderate	High
	Additional construction related light and heavy vehicles using the local road network.	Likely	Minor	Medium
Public transport	Bus travel time increases of between one and four minutes for bus routes in the study area in the AM and PM peak hours.	Likely	Moderate	High
	Bus route and temporary stop relocations and detours required during intersection closures.	Possible	Minor	Low
Coach operations	Coaches may not be able to access the West Row during some construction works requiring temporary relocation of stop location.	Likely	Minor	Medium
Pedestrians	Short pedestrian detours during block and intersection closures.	Likely	Insignificant	Low
Cyclists	Short cyclist detours during block and intersection closures.	Likely	Minor	Low
Kerbside uses	All parking, loading and other kerbside uses would be removed along London Circuit West.	Likely	Insignificant	Low
Property access	All property access maintained but some alternative routes may be required during block and intersection closures.	Likely	Minor	Medium
Off-street parking	Temporary loss of approximately 700 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 3 of the Environmental Assessment report describes an indicative approach to the Project construction. It outlines the proposed construction activities, working hours, construction compound locations and traffic management staging. A summary of the Project's construction works is also discussed in the Project description included in Section2.0.

Reference has been made to Chapter 3 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). Occasionally, 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 Construction methodology overview

Construction of the Project is anticipated to commence in 2024 and be complete in 2026, with works carried out in blocks to minimise disruption to residents, businesses and existing transport operations in the local vicinity. Additional time may be required for testing and commissioning.

The Project's construction works can be separated into three key types:

- Alignment, including light rail stop works which would be undertaken on a block-by-block basis adopting block closures
- Intersection works
- Parkes Way bridge works.

The three key types of construction works would have different implications for the road network, which are discussed in the subsequent sections.

6.2.3 Indicative construction program

Works along the alignment are not planned to occur sequentially, and therefore activities could occur at several locations concurrently. An indicative construction program is shown in Figure 6-1. It is noted that the construction program only includes main works and does not include site establishment activities or testing and commissioning.

The construction program provided is indicative only and based on the current level of design. The program is high-level and by quarter. However, each activity described might not take the entire quarter shown.

Works location	Construction type	Indicative construction program								
		2024	2025				2026			
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
London Circuit between Edinburgh Avenue and Commonwealth Avenue	Block									
Northbourne Avenue between Alinga Street and London Circuit	Block									
London Circuit between Gordon Street and Edinburgh Avenue	Block									
London Circuit between Knowles Place North and Gordon Street	Block									
Parkes Way Bridge	Bridge									
Commonwealth Avenue and London Circuit intersection	Intersection									
London Circuit and Edinburgh Avenue intersection	Intersection									
Northbourne Avenue and Alinga Street intersection	Intersection									
Northbourne Avenue and London Circuit intersection	Intersection									
London Circuit and Gordon Street intersection	Intersection									
London Circuit between West Row and Knowles Place North	Block									
Commonwealth Avenue between London Circuit and Parkes Way Bridge	Block									
Commonwealth Avenue between Parkes Way Bridge and Albert Street	Block									
London Circuit between Northbourne Avenue and West Row	Block									
London Circuit between Petrie Plaza and Northbourne Avenue	Block									

Figure 6-1 Indicative construction program

6.2.3.1 Alignment and stop works (block closures)

The alignment and stop works along London Circuit would occur using block closures. During each block closure, the full London Circuit carriageway would be closed to traffic. However, emergency vehicles, rubbish collection vehicles and some delivery vehicles that require access to the respective blocks would be permitted, using vehicle escorts under coordination by the Project contractor.

A minimum of two traffic lanes, in each direction, would be maintained during peak periods, while alignment and stop works occur on Commonwealth Avenue and Northbourne Avenue.

The Project alignment has been split into nine blocks, as shown in Figure 6-2.

Construction works and block closures are likely to occur for multiple blocks concurrently. However, the proposed block closure sequencing aims to minimise cumulative impacts and maintain adjacent property access, as much as practical. For example, the block closure on London Circuit between Knowles Place North and Gordon Street is planned to occur before the block closure on London Circuit between West Row and Knowles Place North.

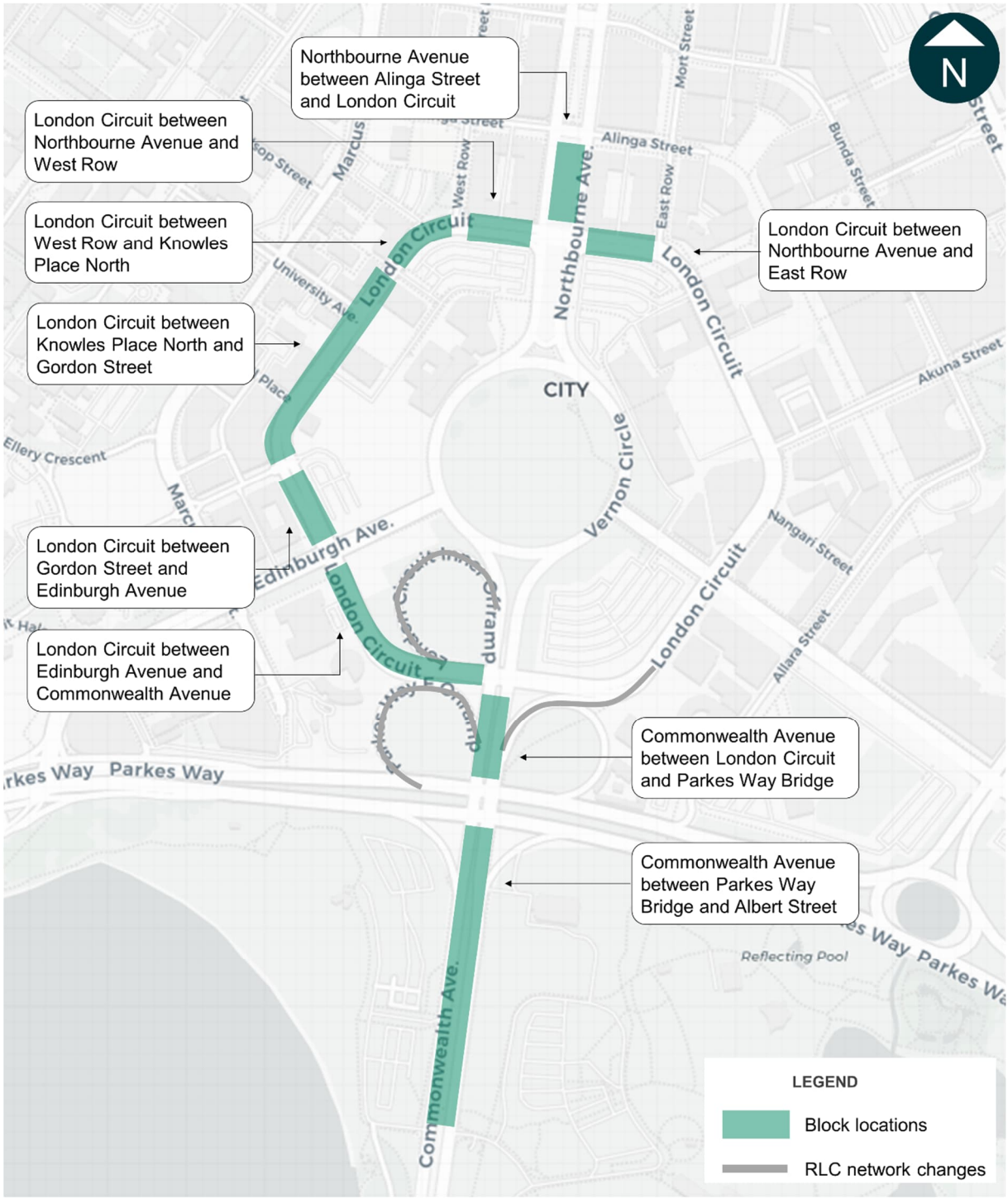


Figure 6-2 Indicative block closures

6.2.3.2 Intersection works

Wherever possible, construction works at major intersections would be carried out during normal working hours, within the confines of a protected worksite. Traffic management would be in place to safely manage vehicles, pedestrians, and cyclists around the worksites, while maintaining access.

Short-term full intersection closures would occur over weekend periods. Typical closures would be for a period of 56 hour (typically from Friday 10:00pm to Monday 6:00am).

During construction of track slab, intersection closures would be required for a continuous 80 hour period to allow the concrete slab to be strong enough to support traffic.

The preferred option for construction works each intersection including the respective changes to the road network are summarised in Table 6-2.

Table 6-2 Proposed road network changes during intersection works

Intersection	Indicative road network changes
Northbourne Avenue and Alinga Street	• Full closure of the intersection would occur on weekends only, including a minimum of four closures with a duration 56 hours each • One full closure of the intersection would be required for a duration of 80 hours for track slab construction • Two through traffic lanes in each direction would be maintained on Northbourne Avenue except during full closures • One through traffic lane in each direction would be maintained on Alinga Street except during full closures • Full intersection closures would not occur concurrently with full closures at the Northbourne Avenue and London Circuit intersection
Northbourne Avenue and London Circuit	• Full closures would occur on weekends only including a minimum of four with a duration 56 hours each • One full closure of the intersection would be required for a duration of 80 hours for track slab construction • Two through traffic lanes in each direction would be maintained on Northbourne Avenue except during full closures • A reduction to one traffic lane in each direction on Northbourne Avenue during off-peak periods, may be permitted subject to Territory Representative approval • Full intersection closures would not occur concurrently with full closures at the Northbourne Avenue and Alinga Street intersection or full closure at the London Circuit and Edinburgh Avenue intersection
London Circuit and Gordon Street	• Access to Blocks 10 and 11, Section 100 would be maintained throughout construction with a minimum of one lane in and one lane out of the property • Full closure of Gordon Street through movements would occur on weekends only, with a duration 56 hours each • One full closure of the intersection would be required for a duration of 80 hours for track slab construction • Full intersection closures would not occur concurrently with full closures at the London Circuit and Edinburgh Avenue intersection
London Circuit and Edinburgh Avenue	• Full closures would occur on weekends only, including a minimum of four closures with a duration 56 hours each. • One full closure of the intersection would be required for a duration of 80 hours for track slab construction • One through traffic lane in each direction would be maintained on Edinburgh Avenue except during full closures • Access to and from the QT hotel would be maintained throughout construction • Access to The Mews would be maintained at all times

Intersection	Indicative road network changes
	• Full intersection closures would not occur concurrently with the block closures on London Circuit between Gordon Street and Edinburgh Avenue and between Edinburgh Avenue and Commonwealth Avenue or during any closures on Parkes Way
Commonwealth Avenue and London Circuit	• Closure of the northbound carriageway would occur on weekends only, including a minimum of four closures with a duration 56 hours each • A one-time closure of the northbound carriageway would be required for a duration of 80 hours for track slab construction • There would be a one lane contraflow arrangement on the Commonwealth Avenue southbound carriage away for up to two weeks • Two through traffic lanes in each direction would be maintained on Commonwealth Avenue at other times • Access to London Circuit East and London Circuit West to be maintained at all other times • Full closure of this intersection would not occur concurrently with any intersection closure at London Circuit and Edinburgh Avenue

6.2.3.3 Parkes Way bridge

To facilitate construction of the Project's alignment along Commonwealth Avenue a new bridge would be constructed between the two existing bridges across Parkes Way. The proposed traffic changes to the Parkes Way carriageway during construction of the Parkes Way bridge include the following:

- In the AM peak period two eastbound and one westbound traffic lane would be maintained
- In the PM peak period two traffic lanes in each direction would be maintained
- During off-peak periods and weekends, two eastbound and one westbound traffic lane would be maintained
- Eastbound and westbound temporary carriageways would be constructed in the Parkes Way median
- Access to all on and off ramps would be maintained at all times
- Full carriageway closures would be required for some of the construction works. These closures would occur during nightshifts and weekends
- Full carriageways closures with concurrent single carriageway closure of Commonwealth Avenue would be required on nights or weekends during bridge girder installation and deck slab concreting activities
- There London Circuit and Edinburgh Avenue intersection would not be closed concurrently with lane closures on Parkes Way.

As part of a staged construction strategy, traffic lanes on Parkes Way would be temporarily diverted around construction sites to maintain at least two traffic lanes in each direction for the Parkes Way bridge works.

6.2.4 Construction compounds and access

The following four construction compounds are proposed to support the Project construction activities:

- Site compound A - Constitution Avenue car park: part of an existing at-grade car park that will be used as a compound for RLC, located on the corner of Constitution Avenue and London Circuit, with access via the main car park access on Constitution Avenue
- Site compound B - Marcus Clarke Street: an existing at-grade car park that will be used as a compound for RLC, located on the corner of Marcus Clarke Street and Gordon Street, with vehicle access via Gordon Street
- Site compound C - Parkes Way and southwest cloverleaf: an open unused space located within the existing south-west cloverleaf that is planned to be removed as part of RLC, with access via the eastbound lanes on Parkes Way
- Site compound D - Acton Waterfront Central and Southern car parks: an existing at-grade car park and unused site located within Acton Park that will partly be used as a compound for RLC, with access via Albert Street and Corkhill Street via the northbound lanes on Commonwealth Avenue.

The compounds would be used for worker/contractor parking, worker facilities and materials stockpiling and storage handling. There would be additional smaller, short-term compounds along the Project alignment to support construction activity.

6.2.5 Haulage and construction vehicle access routes

Construction vehicle access to and from the construction compounds and the Project construction site would be facilitated by the existing arterial road network including:

- To and from the north via Northbourne Avenue and Vernon Circle
- To and from the east via Parkes Way and Edinburgh Avenue.

The anticipated haulage routes to and from the construction compounds are shown in Figure 6-3 and Figure 6-4, respectively.

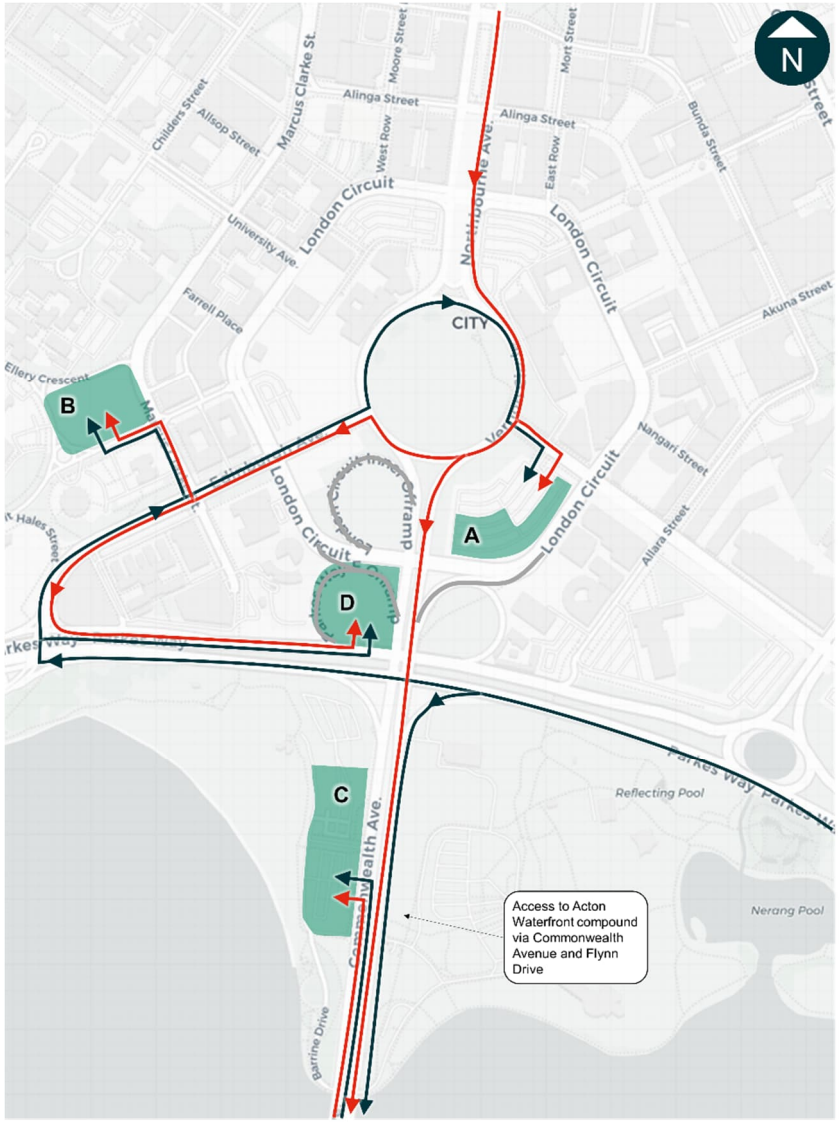


Figure 6-3 Inbound haulage routes to construction compounds

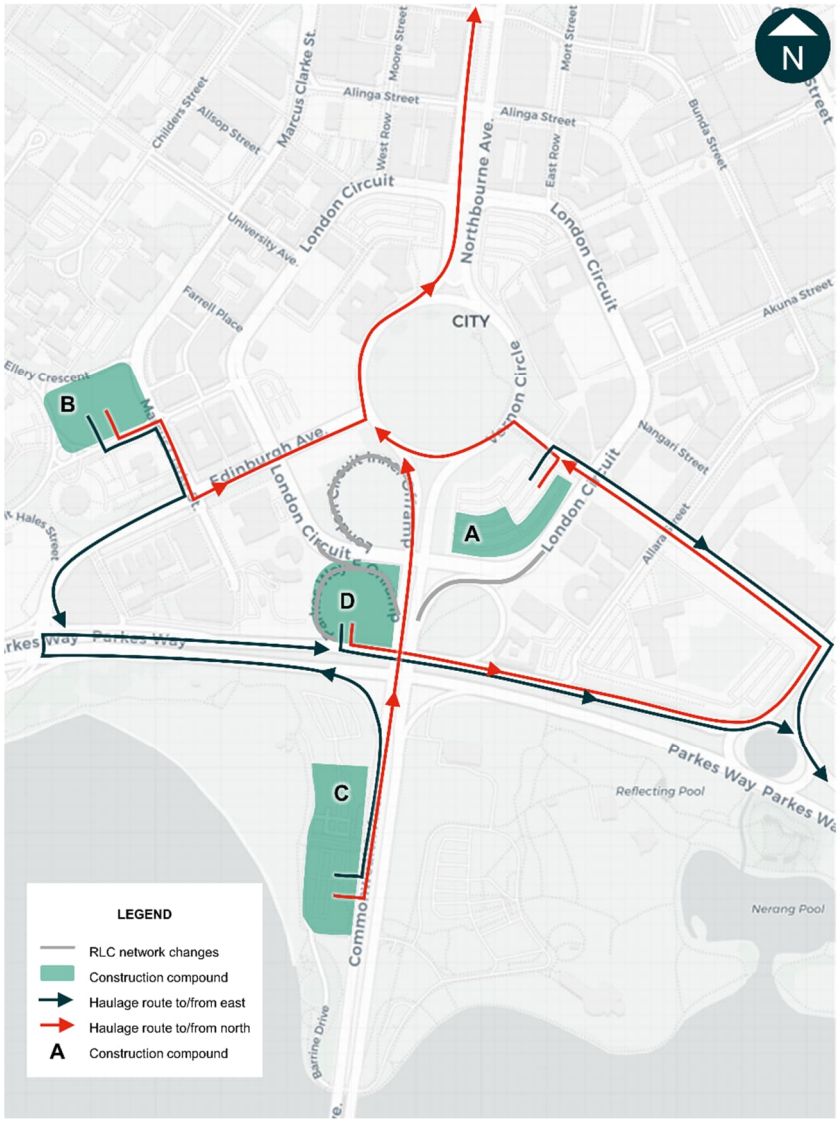


Figure 6-4 Outbound haulage routes from construction compounds

6.3 Road network performance assessment

The methodology for the assessment of the road network performance during construction is included in Section 4.3 and Section 4.4.

6.3.1 Construction traffic volumes

During the construction phase it is expected that there would be an increase in traffic volumes due to the introduction of construction traffic.

6.3.1.1 Construction heavy vehicles

The number of construction heavy vehicles generated by the works is anticipated to be up to 50 vehicles per day. This equates to about 100 two-way vehicle movements, assuming each vehicle arrives and departs the construction works once per day.

Construction heavy vehicle activity during the weekday AM and PM peak periods would be minimised as much as practical. Therefore, it is assumed that up to ten construction heavy vehicle movements (two-way) would be generated by the works during the AM and PM peak hours.

Based on this estimate, the additional construction heavy vehicle volumes would be manageable, given the existing traffic volumes and road network conditions. The impact of these construction heavy vehicle movements has been considered in the road network performance results that are discussed in the subsequent sections of this report.

6.3.1.2 Construction light vehicles

The number of construction light vehicles generated by the works would be up to 100 vehicles per day. This equates to about 200 two-way vehicle movements, 100 arriving in the morning and 100 departing the afternoon, assuming each vehicle arrives and departs the construction site once per day.

Construction workers would be the main generator of construction light vehicles for the works. It is understood that workers would typically arrive to sites earlier than the weekday AM peak hour (before 8:00am) and would largely have left the sites before the weekday PM peak hour (before 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 construction 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.

6.3.2 Vehicle travel times

Vehicle travel times were assessed during the six construction scenarios for the eight key routes detailed in Section4.5.3. These include both direct and alternative routes to or via the City to understand the relative impacts of the construction of the Project and any associated traffic reassignment in the wider network.

The modelled travel time changes for all six construction scenarios during both the AM and PM peak hours are summarised in Table 6-3 and Table 6-4, respectively.

In the AM peak hour the Project's construction would impact the following vehicle travel times:

- Travel times would decrease on some routes in the AM peak hour during the construction scenarios due to traffic redistribution across the road network
- Route 1 – between State Circle and Barry Drive via Commonwealth Avenue: two to four minute travel time increases in at least one direction during Scenario 1, Scenario 2, Scenario 3 and Scenario 6
- Route 2 – between State Circle and Glenloch Interchange via Commonwealth Avenue: two to five minute travel time increases in at least one direction during all scenarios except Scenario 1
- Route 5 – between State Circle and City via Commonwealth Avenue: three to five minute travel time increases in the northbound direction during Scenario 3 and Scenario 4
- Route 7 – Glenloch Interchange from City: three to five minute travel time increases in the westbound direction during Scenario 3, Scenario 5 and Scenario 6
- Route 8 – between Barry Drive and City via Northbourne Avenue: three minute travel time increase for southbound traffic during Scenario 2.

In the PM peak hour, Table 6-4 demonstrates that the construction of the Project would impact the vehicle travel time of key routes as follows:

- The travel time increases on most routes in the PM peak hour would be less than the AM peak hour. On Route 3 and Route 4 the increases to travel times would be larger in the PM peak hour than AM peak hour
- Travel times would decrease on multiple routes in the PM peak hour during the construction scenarios due to traffic redistribution across the road network
- Route 3 – between State Circle and Glenloch Interchange via Kings Avenue: two to four minute travel time increases in the westbound direction during Scenario 3, Scenario 4, Scenario 5 and Scenario 6
- Route 4 – State Circle to Limestone Avenue via Kings Avenue: three to four minute travel time increases in the northbound direction during Scenario 3, Scenario 4, Scenario 5 and Scenario 6
- Route 7 – Glenloch Interchange from City: two to three minute travel time increases in the westbound direction in Scenario 1 and Scenario 2.

Table 6-3 Vehicle travel time difference for each construction scenario in the AM peak hour

Scenario	Vehicle travel time difference per route (minutes:seconds)															
	Route 1		Route 2		Route 3		Route 4		Route 5		Route 6		Route 7		Route 8	
	Northbound	Southbound	Northbound	Southbound	Westbound	Eastbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Westbound	Eastbound	Northbound	Southbound
Without construction	**9:00**	**12:30**	**5:30**	**6:30**	**8:00**	**9:30**	**6:30**	**7:00**	**4:00**	**5:00**	**7:00**	**8:30**	**5:30**	**5:30**	**9:30**	**7:00**
Scenario 1	+2:00	0:00	+2:00	+0:30	+1:00	+0:30	0:00	0:00	+0:30	-0:30	0:00	+2:30	+0:30	+1:30	+1:00	0:00
Scenario 2	-0:30	+2:30	+0:30	+2:00	+1:30	+1:30	+0:30	+0:30	+2:00	+1:30	+1:30	+2:30	+0:30	+1:30	+0:30	+2:00
Scenario 3	-1:00	-2:00	-1:30	-1:00	-2:00	-1:00	-0:30	0:00	-2:30	-1:00	-1:00	+1:30	-1:00	-2:00	-1:30	-1:30
Scenario 4	-0:30	-0:30	-1:00	+2:30	0:00	+2:30	+0:30	-0:30	-0:30	0:00	0:00	-0:30	+3:30	-0:30	0:00	-0:30
Scenario 5	-1:00	-1:00	-0:30	+0:30	+0:30	+0:30	+0:30	-0:30	-0:30	0:00	+0:30	0:00	+0:30	0:00	-0:30	-1:00
Scenario 6	0:00	+2:00	0:00	-3:00	-0:30	-2:00	-0:30	+0:30	-0:30	0:00	0:00	0:00	-3:30	-0:30	0:00	+1:30

Table 6-4 Vehicle travel time difference for each construction scenario in the PM peak hour

Scenario	Vehicle travel time difference per route (minutes:seconds)															
	Route 1		Route 2		Route 3		Route 4		Route 5		Route 6		Route 7		Route 8	
	Northbound	Southbound	Northbound	Southbound	Westbound	Eastbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Westbound	Eastbound	Northbound	Southbound
Without construction	**10:00**	**10:30**	**7:30**	**6:00**	**10:00**	**10:00**	**8:30**	**7:00**	**5:00**	**4:30**	**8:30**	**8:30**	**5:00**	**6:00**	**8:00**	**6:30**
Scenario 1	-0:30	+1:30	-0:30	+0:30	+1:00	-0:30	+1:00	-0:30	-0:30	0:00	+1:00	+2:30	+0:30	+3:30	0:00	+1:30
Scenario 2	-1:00	0:00	-1:30	0:00	0:00	0:00	0:00	0:00	-0:30	0:00	-0:30	+2:30	0:00	+2:30	+0:30	0:00
Scenario 3	-1:30	-0:30	-1:30	0:00	+1:30	0:00	+1:30	0:00	-1:30	+0:30	+1:30	+1:30	0:00	+1:30	0:00	-1:00
Scenario 4	-1:00	-2:00	-1:30	0:00	+1:30	-0:30	+1:30	0:00	-1:30	0:00	+1:30	-0:30	0:00	+0:30	0:00	-2:00
Scenario 5	-1:00	+1:00	-1:00	0:00	+2:00	-0:30	+2:30	0:00	-0:30	0:00	+2:00	0:00	0:00	+1:00	-0:30	+1:00
Scenario 6	-0:30	-1:30	-1:30	0:00	+1:30	-0:30	+1:30	0:00	-1:00	0:00	+1:30	0:00	0:00	+0:30	0:00	-1:30

6.3.3 Density

Density plots of the study area and its surrounds during each construction scenario have been produced from the Aimsun mesoscopic model. 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 (higher density represents more congestion). The following are key findings relating to the expected changes to density due to the Project's construction in the AM peak hour:

- During Scenario 1 and Scenario 2 vehicle density would increase on Northbourne Avenue in the southbound direction due to the proposed loss of one traffic lane. Consequently, during Scenario 2 vehicle density would increase on West Row in the southbound direction, as some southbound traffic would use West Row instead of Northbourne Avenue
- Block closures on London Circuit are proposed in all Scenarios. As a result, vehicle density would increase on the Parkes Way westbound exit ramp as more traffic would use Edinburgh Avenue to access Marcus Clarke Street instead of London Circuit. During Scenario 2 vehicle density would also increase on Parkes Way due to the proposed loss of one lane in each direction on Parkes Way. The increased vehicle density would impact vehicles accessing Marcus Clarke Street via Parkes Way and Edinburgh Avenue
- In all scenarios except Scenario 1, vehicle density would increase on Commonwealth Avenue in both directions when one traffic lane in each direction is removed on Commonwealth Avenue. Additionally, vehicle density would increase on the Parkes Way eastbound to Commonwealth Avenue southbound cloverleaf ramp. Additionally, operating the Albert Street pedestrian crossing as a single stage crossing would increase the vehicle density on Commonwealth Avenue in both directions.

The following are key findings relating to the expected changes to density due to the Project's construction in the PM peak hour:

- During Scenario 1 vehicle density would increase on Marcus Clarke Street in the southbound direction and Alinga Street due to the proposed loss of traffic lanes on Northbourne Avenue and traffic reassignment associated with the proposed block closures on London Circuit
- The proposed block closure on London Circuit between Edinburgh Avenue and Commonwealth Avenue during Scenario 1 and Scenario 2 would result in increased vehicle density on Constitution Avenue in the eastbound direction, Coranderrk Street in the southbound direction and Parkes Way in the westbound direction due to a redistribution of traffic
- During Scenario 1 and Scenario 6 vehicle density would increase on Akuna Street in the eastbound direction and Cooyong Street in the northbound direction due to traffic reassignment associated with the proposed block closures on London Circuit
- During Scenario 2, Scenario 3, Scenario 4 and Scenario 5, vehicle density would increase on Commonwealth Avenue in both directions due to the loss of one traffic lane in each direction on Commonwealth Avenue.

6.4 Public transport impacts

6.4.1 Bus network

As discussed in Section 5.6, inbound and outbound busses currently use roads and intersections within the study area that would be impacted by the construction works. Modifications to the existing bus routes, including provision of temporary stops and signs, would be required in consultation with TCCS and ACTION.

Construction works at the following intersections would affect existing bus routes:

- Northbourne Avenue and Alinga Street intersection
- London Circuit between East Row and Northbourne Avenue
- Commonwealth Avenue and London Circuit intersection.

During construction works at the intersection of the Northbourne Avenue and Alinga Street, minor bus diversions may be required via London Circuit an Bunda Street, as shown in Figure 6-5. It is noted that works at the intersection of the Northbourne Avenue and Alinga Street would occur prior to construction works at the Northbourne Avenue and London Circuit intersection. Therefore, buses could make U-turns at the Northbourne Avenue and London Circuit intersection, if required.

The bus stops located on Alinga Street between East Row and West Row would need to be temporarily relocated to another location within the City Interchange.

If the construction works do not allow vehicles at the London Circuit and East Row intersection for periods of time, it is recommended that this occurs at night only, to minimise the impact on the bus network. This is because the intersection of London Circuit and East Row provides a primary access to the City Interchange for all of the bus routes that travel through the study area.

Following the completion of RLC, buses would use the intersection of Commonwealth Avenue and London Circuit to access London Circuit East. Therefore, while construction works occur at the Commonwealth Avenue and London Circuit intersection, buses may need to be rerouted via Vernon Circle to move between Commonwealth Avenue and London Circuit. This diversion is indicatively shown in Figure 6-6 and is planned to be used during the RLC project's construction works.

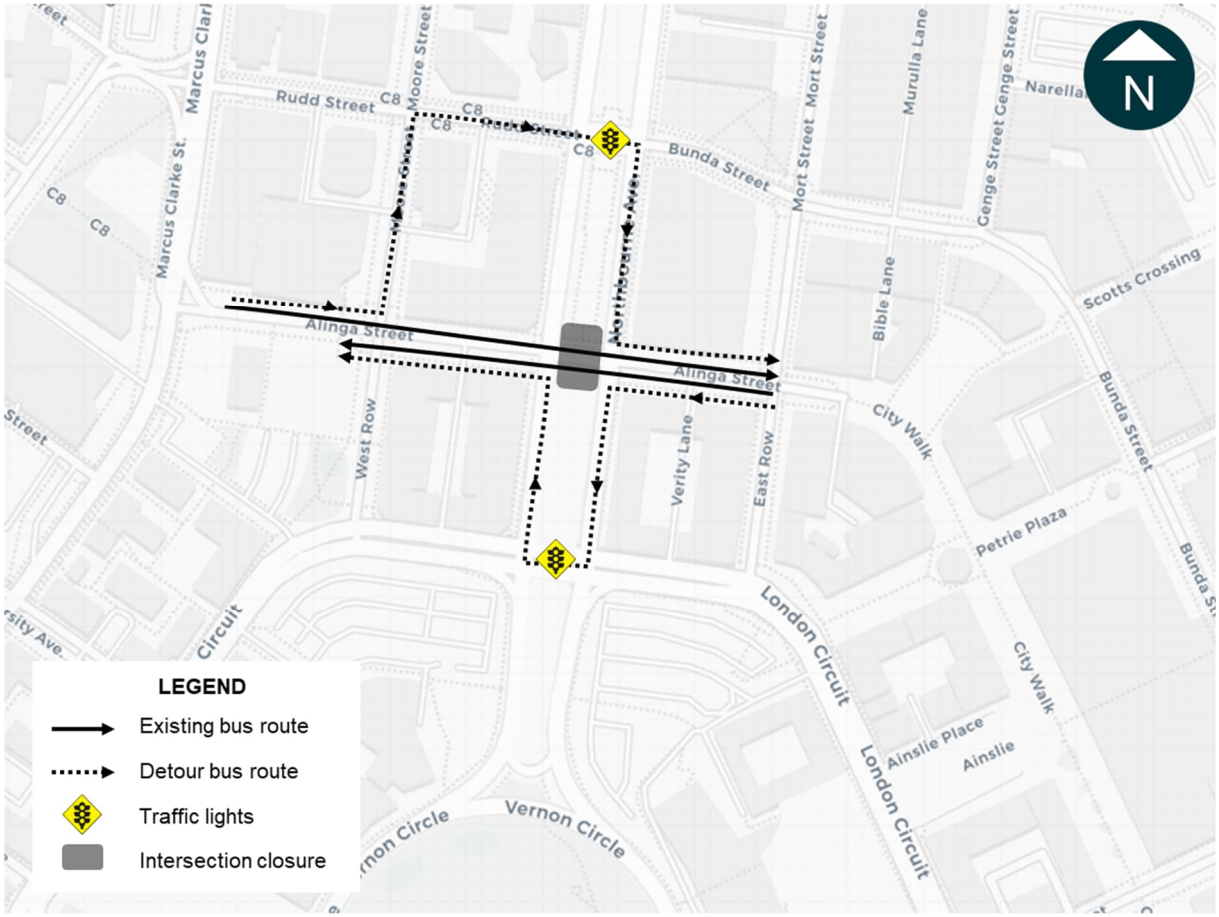


Figure 6-5 Northbourne Avenue and Alinga Street proposed bus diversions

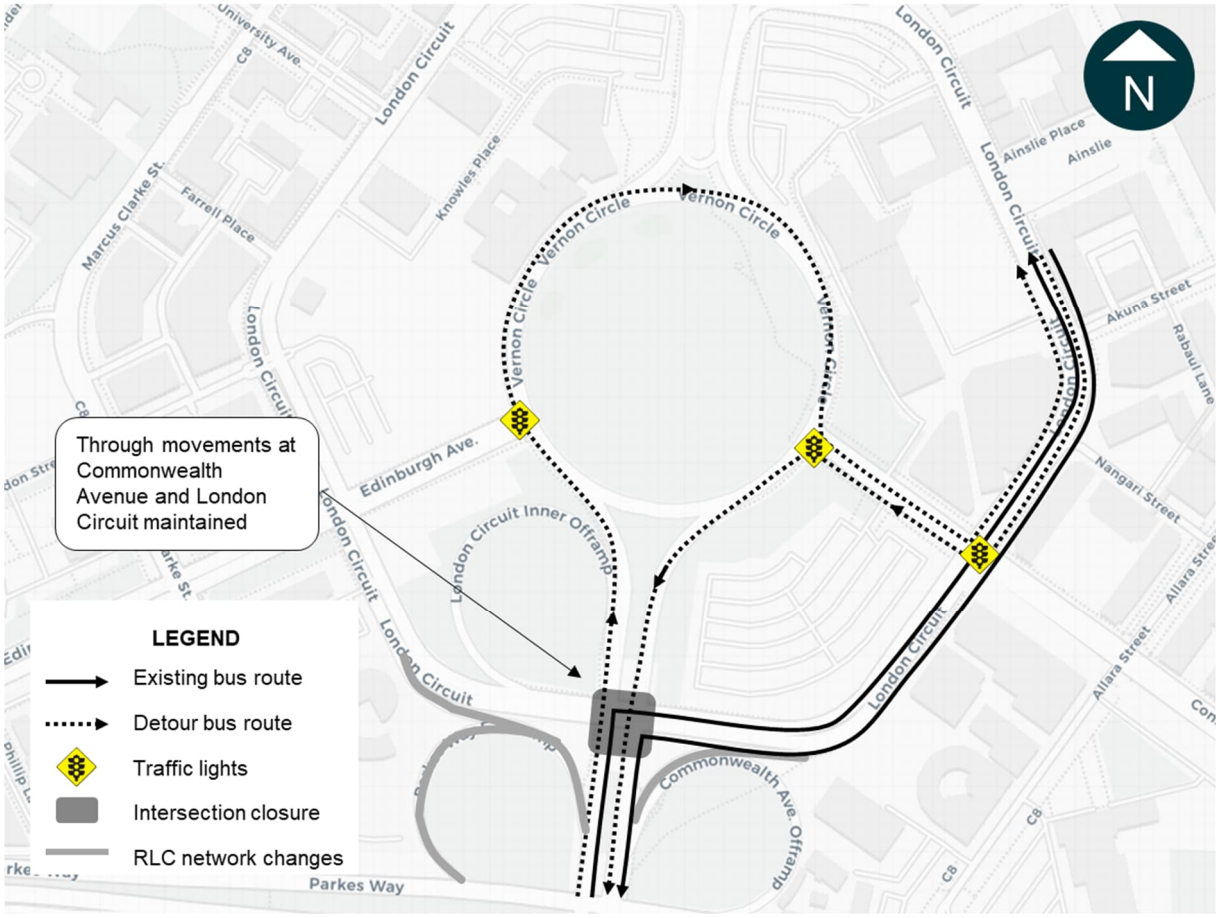


Figure 6-6 Commonwealth Avenue and London Circuit proposed bus diversions

6.4.2 Bus travel times

The travel time changes across the bus route for each of the construction scenarios compared to the without construction scenario is shown in Table 6-5.

The travel time assessment indicates that in the AM peak hour, buses would likely experience increased travel times as a result of the Project's construction due to increased congestion from the proposed road network changes and associated detours. Generally, across the six scenarios, the travel time increases would be around one and a half to three minutes, with higher travel times (approximately four minutes) on specific routes during Scenario 1 and Scenario 6.

In the PM peak hour, travel times would increase by between one and three minutes on some routes. However, due to the redistribution of traffic, travel times would decrease by up to one minute in multiple scenarios, in particular Route R4 between Aranda to Woden.

Table 6-5 Travel time difference for bus routes during each construction scenario

Scenario	Travel time differences per route (minutes:seconds)							
	AM peak hour				PM peak hour			
	R2		R4		R2		R4	
	Aranda to Fyshwick	Fyshwick to Aranda	Woden to Aranda	Aranda to Woden	Aranda to Fyshwick	Fyshwick to Aranda	Woden to Aranda	Aranda to Woden
Without construction	**31:30**	**29:30**	**27:30**	**29:00**	**31:00**	**27:30**	**25:30**	**26:30**
Scenario 1	+2:30	-1:00	+4:00	+1:00	+2:00	+0:30	+2:30	0:00
Scenario 2	+1:00	+2:30	+2:00	+1:30	0:00	+1:00	+2:30	+1:30
Scenario 3	+0:30	+0:30	+1:30	+0:30	-2:00	+0:30	-0:30	-0:30
Scenario 4	+1:30	+0:30	+1:00	-01:30	0:00	-0:30	+1:30	-0:30
Scenario 5	+2:30	+1:00	+2:30	+1:00	+1:30	0:00	+2:00	+0:30
Scenario 6	+4:30	+0:30	+4:30	+0:30	+2:30	+0:30	+1:00	-1:00

6.4.3 Light rail

The Project needs to integrate into the existing light rail network. Therefore, the Project's construction would require some short-term temporary interruptions on the existing light rail. It is anticipated that these works would occur outside the existing light rail hours of operation or during one of the planned operational shut down and maintenance periods to avoid additional service shut-down periods.

6.5 Active transport impacts

Safe routes for pedestrians and cyclists would be maintained throughout the construction works with minimal diversion from the desire line. During block closures a pedestrian path, with provisions for cyclists would be allowed for to maintain connectivity. Therefore, this Project's construction is anticipated to have minimal impact to pedestrian and cyclist movements and travel times.

6.6 Coach operation impacts

Coaches may not be able to access the West Row coach stop during the construction works at the following locations:

- Northbourne Avenue and London Circuit intersection
- On London Circuit between Northbourne Avenue and West Row
- On London Circuit between West Row and Knowles Place North.

An alternate coach stop would be temporarily required during these construction works. This would be determined in coordination with stakeholders and TCCS.

6.7 Parking and access impacts

6.7.1 Kerbside uses

On-street parking on London Circuit would be inaccessible during respective block closures. Therefore, all on-street parking and kerbside uses that would be removed as part of the operational Project would occur at the start of construction. The respective impacts are discussed in Section 7.7.1 of this report.

6.7.2 Local area and property access

Several block and lane closures are proposed during the Project's construction, as discussed in Section 6.2.2. However, throughout construction, access to Verity Lane, Odgers Lane and the QT Hotel on London Circuit would be maintained during block occupations. Additionally, access to/from Knowles Place North would also be continuously maintained, which would allow for continuous access to key land uses including; the Reserve Bank of Australia, the Magistrates Courts, Supreme Court of the ACT, Canberra City Police Station and the Australian Federal Police. This would be facilitated by the sequencing of block closures and works in the blocks adjacent to Knowles Place North would occur at different times.

Some traffic may need to use the available alternative routes via Marcus Clarke Street and Vernon Circle during the London Circuit block and intersection closures to access the adjacent street network.

Parkes Way is a key east west route that would require full closures during some nights and weekends to facilitate the construction of the Parkes Way bridge. During these closures, traffic would be diverted to use Edinburgh Avenue, Vernon Circle and Constitution Avenue as an alternate route. The full closure of the Edinburgh Avenue through lanes is not proposed to occur at the same time as the Parkes Way closure to allow for this detour.

All alternative routes and/or detours and associated temporary traffic management measures would be further developed by the appointed contractor. These would be documented in a Construction Transport Management Plan (CTMP), which would be developed in consultation with the relevant stakeholders and agencies.

6.7.3 Off-street parking

The Project's construction compounds would result in the temporary loss of approximately 700 off-street car parking spaces at the following locations:

- Site compound A – Constitution Avenue car park: loss of approximately 255 public long stay parking spaces
- Site compound B – Marcus Clarke Street: loss of approximately 190 public long stay parking spaces
- Site compound C – Acton Waterfront Central and Southern car parks: loss of approximately 80 long stay parking spaces in the central car park and approximately 170 long stay parking spaces in the southern car park.

Most of the off-street parking loss due to construction compounds would occur in car parks that will be used as part of the RLC project. Therefore, most of the off-street car parking impacts would be a continuation of the impacts associated with the RLC project.

Additionally, the permanent loss of approximately 100 off-street parking spaces in the two car parks located on the corner of Northbourne Avenue and London Circuit is planned as part of the Project. It is anticipated that these spaces would be removed at the start of the Project's construction works. The associated permanent parking impact associated with the loss of these spaces is discussed in Section 7.7.2 However, it is noted that prior to the removal of these parking spaces, the car parks would be reconfigured to relocate at least all of accessible parking spaces affected by the works.

As discussed in Section 5.10.2, the study area currently has a total publicly available car parking supply of approximately 3,840 spaces. Therefore, nearly 20 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 park. 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. The surveys also suggest that the Acton Waterfront Southern car park is the least utilised in the study area and was less than five per cent utilised at the time that the survey data was collected.

Notwithstanding this, the parking loss brought about by the Project 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 the Project 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. There would be no net loss of accessible parking throughout the Project's construction period.

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

6.8 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 blocks along 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 Parkes Way traffic lanes and the adjacent work sites
- 40 km/h road works speed zone to be posted on Commonwealth Avenue between Vernon Circle and Parkes Way for the duration of the works
- All other works to take place in 40 km/h traffic environment.

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 CTMP. The CTMP and associated temporary traffic management measures would be developed by the appointed contractor in consultation with the relevant stakeholders and agencies.

6.9 Management and mitigation measures

A summary of the management and mitigation measures that could support management or mitigation of the construction related transport impacts are summarised in Table 6-6.

Table 6-6 Managements and mitigation measures

Ref	Management and mitigation measure	Timing
C1	A Traffic and Transport Liaison Group (TTLG) would be established to oversee and review traffic and multi modal implications of proposed construction activities and network arrangements. TTLG would include representation from: • TCCS • MPC • ESA • NCA • AFP • CRA • Project delivery teams of adjacent developments.	Prior to and during construction

Ref	Management and mitigation measure	Timing
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
C3	A Disruption Management Strategy would be developed and widely socialised, 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
C4	In consultation with relevant stakeholders, appropriate vehicular access would be maintained to the Sydney & Melbourne Buildings, Reserve Bank of Australia, Canberra City Police Station, ACT Courts, and 1 & 7 London Cct at all times during construction.	During construction
C5	A **Construction Transport Management Plan** (CTMP) would be developed to manage the impacts of the construction activities on the transport network and local parking.	Prior to construction
C6	Construction vehicle movement arrangements (Temporary Traffic Management Plans) would 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 • Peak hour traffic in Canberra City • Coordination of material deliveries • 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.	Prior to and during construction
C7	No net loss of accessible parking within the delivery phase area.	During construction
C8	Consideration would be given to providing shuttle services to transport site workers. If shuttle services are not provided as part of the Project, parking restrictions around work zones would be considered to reduce the impact on public parking facilities by site workers. This must be included in the CTMP and approved by TCCS.	During construction
C9	Complete a public awareness campaign of possible disruption to the transport network, and alternatives for travel.	During construction
C10	Clear and safe pedestrian and cyclist signage and wayfinding mechanisms would be in place prior to works commencing that would change access and movement arrangements through the Project delivery phase area.	Prior to and during construction
C11	Detailed planning of special equipment deliveries (rail etc.) to reduce impacts on local communities.	Prior to construction

6.10 Residual impacts

The residual (after mitigation) impacts associated with the Project construction works are summarised in Table 6-7.

Table 6-7 Summary of construction related impacts of the Project (after mitigation)

Category	Construction transport impact	Likelihood	Consequence	Rating
Road network	Increased congestion on local roads during road and lane closures including on Parkes Way, Marcus Clarke Street, Commonwealth Avenue and Northbourne Avenue.	Possible	Moderate	Medium
	Increased vehicle travel times on Commonwealth Avenue of between four and five minutes in the AM peak hour when Commonwealth Avenue would be reduced from three lanes to two lanes.	Possible	Moderate	Medium
	Additional construction related light and heavy vehicles using the local road network.	Likely	Minor	Medium
Public transport	Bus travel time increases of between one and four minutes for bus routes in the study area in the AM and PM peak hours.	Possible	Moderate	Medium
	Bus route and temporary stop relocations and detours required during intersection closures.	Possible	Minor	Low
Coach operations	Coaches may not be able to access the West Row during some construction works requiring temporary relocation of stop location.	Likely	Minor	Medium
Pedestrians	Short pedestrian detours during block and intersection closures.	Likely	Insignificant	Low
Cyclists	Short cyclist detours during block and intersection closures.	Likely	Minor	Low
Kerbside uses	All parking, loading and other kerbside uses would be removed along London Circuit West.	Likely	Insignificant	Low
Property access	All property access maintained but some alternative routes may be required during block and intersection closures.	Likely	Minor	Medium
Parking	Temporary loss of approximately 700 long-stay parking spaces in the study area.	Likely	Minor	Medium
Road safety	Additional heavy vehicles within the area, conflicting with pedestrians and cyclists.	Possible	Moderate	Medium

7.0 Operational impact assessment

7.1 Summary of impacts

A summary of the operational related transport impacts (post-construction) is outlined in Table 7-1 and discussed in the following sections of this report.

Table 7-1 Summary of unmitigated operational impacts of RLC (post-construction)

Type	Operational impacts or benefits	Likelihood	Consequence	Rating
Road network	Increased weekday peak period vehicle travel times due to the cumulative impacts of the Project, other planned projects and traffic growth in 2026 and 2036.	Possible	Moderate	Medium
	Cumulative impacts of the Project, other planned projects and traffic growth on weekday peak period traffic congestion (density) in 2026 and 2036.	Possible	Moderate	Medium
	Cumulative impacts of the Project, other planned projects and traffic growth on weekday peak period performance of the Commonwealth Avenue and London Circuit intersection, London Circuit and University Avenue intersection and London Circuit and Gordon Street intersection in 2026 or 2036.	Possible	Moderate	Medium
	The road network changes to London Circuit within the study area would result in the network not being able to accommodate heavy vehicles that are allowed on PBS Level 1 routes. London Circuit within the study area would need to be delisted as a PBS Level 1 route.	Likely	Insignificant	Low
Public transport	Increased weekday peak period bus travel times due to the Project in 2036.	Possible	Moderate	Medium
Pedestrians and cyclists	Providing signalised pedestrian crossings for all legs of any new signalised intersection could result in delays for pedestrians waiting at the proposed intersections.	Possible	Insignificant	Very low
	The combined active transport treatments and upgrades would improve the walkability and cycling connectivity within the study area and along the Project alignment.	N/A	N/A	Beneficial
Kerbside uses	All parking, loading and other kerbside uses would be removed along London Circuit West.	Likely	Insignificant	Low
Local area traffic access	Removal of some existing right turn and U-turn movements at intersections along the Project's alignment requires traffic to use alternative routes.	Likely	Insignificant	Low

Type	Operational impacts or benefits	Likelihood	Consequence	Rating
Road safety	Proposed signalised intersections along the Project's alignment could create new intersection related conflicts.	Possible	Moderate	Medium
	The proposed introduction of a LRV within the roadway would increase the severity of any possible vehicular, pedestrian or cyclist crash with the LRV.	Possible	Moderate	Medium
	Providing off-road cycling facilities along London Circuit, combined with wider footpaths and the protected intersection treatments would improve safety for vulnerable users, by separating cyclists, pedestrians, and traffic.	N/A	N/A	Beneficial

7.2 Transport integration

7.2.1 Road network

The Project would be provided within the median between opposing vehicular traffic flows for the entire length of its alignment. The median would be raised to minimise the possibility of road vehicles entering the light rail corridor. The median would transition to grade before each signalised intersection to facilitate vehicular, cyclist and pedestrian movement across the track.

To accommodate the Project's median light rail alignment and associated stops, the following road network changes would be included:

- Two 3.3 m wide traffic lanes in each direction along London Circuit between Northbourne Avenue and West Row, including a dedicated westbound right turn lane to West Row
- A single 3.7 m wide traffic lane in each direction along London Circuit between West Row and Edinburgh Avenue, except on the southbound approach to Gordon Street which would have a dedicated right turn lane. The lane arrangement on London Circuit between Edinburgh Avenue and Commonwealth Avenue would remain unchanged
- One lane in each direction on Alinga Street at the intersection of Alinga Street and Northbourne Avenue. These lanes would be for buses only and not permit right turns or U-turn movements from Northbourne Avenue
- The reservoir operations within the intersection at Northbourne Avenue and London Circuit would be removed. Vehicles turning right from Northbourne Avenue would complete the movement within a single signal stage. U-turn movements from Northbourne Avenue would not be permitted. Additionally, at the intersection of Northbourne Avenue and London Circuit the slip lanes on the westbound approach on London Circuit and the northbound approach on Northbourne Avenue would be removed
- The posted speed limit along London Circuit would remain 40 km/h except in the vicinity of the Edinburgh Avenue stop where the speed would be reduced to 20 km/h because of the high pedestrian activity expected at the stop
- To accommodate the Project alignment and one lane of traffic in each direction, all on street parking and loading along London Circuit would be removed
- Due to the road network changes London Circuit would need to be delisted as a PBS Level 1 route.

7.2.2 Intersection arrangements

A number of intersections within the study area would require modification, as summarised in Table 7-2. Refer to Chapter 3 of the Environmental Assessment for further details.

Two new signalised intersections on London Circuit are proposed to facilitate right turns and local access across the Project's alignment, at West Row and University Avenue. The remaining unsignalised intersections along the Project's alignment would be converted to left-in/left-out only.

Table 7-2 Proposed changes to intersections

Intersection	Baseline intersection type (post-RLC)	Proposed intersection type (with Project)	Changes to vehicle movements
Northbourne Avenue and Alinga Street	Signalised	Signalised	U-turns from Northbourne Avenue removed (southbound is only permitted for buses) All right turns removed
Northbourne Avenue and London Circuit	Signalised	Signalised and protected	U-turns from Northbourne Avenue removed and right turns from Northbourne Avenue northbound removed
London Circuit and West Row	T-intersection	Signalised	None
London Circuit and Hobart Place	T-intersection	Left-in/left-out	Right turns removed
London Circuit and University Avenue	T-intersection	Signalised	None
London Circuit and Knowles Place North	T-intersection (one-way)	Left-in only	Northbound right turn in removed
London Circuit and Knowles Place South	T-intersection	Left-in/left-out [1]	Right turns removed
London Circuit and Farrell Place	T-intersection	Left-in/left-out	Right turns removed
London Circuit and Gordon Street	Signalised	Signalised	Right turns to/from Blocks 10 and 11, Section 100 removed
London Circuit and Edinburgh Avenue	Signalised	Signalised	Right turn from London Circuit southbound removed
Commonwealth Avenue and London Circuit	Signalised	Signalised and protected	None
Commonwealth Avenue and Parkes Way off ramp	Unsignalised cyclist crossing	Signalised pedestrian and cyclist crossing	None

[1] Right turn out from Knowles Place south permitted by emergency vehicles under signals

7.2.3 Public transport

7.2.3.1 Bus network

No changes to the existing bus network including routes, services and frequency are proposed as part of the Project.

The northbound and southbound bus stops on Commonwealth Avenue which are currently located between Corkhill Street and Albert Street would be relocated approximately 20 m and 60 m south of their current locations, respectively. This would move the bus stops closer to the pedestrian access location for the Commonwealth Park Stop and facilitate an easier movement between bus and light rail services.

7.2.3.2 Light rail network

The Project would deliver 1.7 kilometres of light rail track, connecting Canberra's City south with the City north and on to Gungahlin. The extension of the light rail includes three new stops: Edinburgh Avenue, City South and Commonwealth Park which would improve access to public transport for existing and new residential and commercial activity in the city centre.

Light rail journey times have been extracted from the VISSIM microsimulation modelling, which takes into consideration various factors including dwell times at light rail stops and intersection delays. It is estimated that the light rail journey times between the existing Alinga Street stop and proposed Commonwealth Park stop would be between seven and ten minutes, in each direction during the 2026 and 2036 AM and PM peak hours.

The VISSIM microsimulation modelling would continue to be updated through the Project's detailed design and delivery phases to optimise intersection performance and LRV travel times.

7.2.4 Stop access

The Project includes three new light rail stops, as summarised in Table 7-3. The proposed multi-modal access provisions for these stops are discussed and shown in Figure 7-1, Figure 7-2 and Figure 7-3.

Pedestrian modelling has been undertaken for each of the proposed light rail stops and the stop layout has been designed to accommodate the expected demand.

Table 7-3 Stop locations and configurations

Stop name	Location	Stop platform and configuration
Edinburgh Avenue	London Circuit between Edinburgh Avenue and Gordon Street	Side platforms with access via signalised pedestrian crossings from both ends of the platforms
City South	Commonwealth Avenue south of the Commonwealth Avenue and London Circuit intersection	Island platform with access via the northern end of the platform
Commonwealth Park	Commonwealth Avenue adjacent Albert Street	Island platform with access via the southern end of the platform

At each of the stops a number of cycle racks would be provided, including:

- Edinburgh Avenue stop - at least 40 bicycles. It is anticipated that these bike racks would be used by customers accessing the light rail as well as the wider community, who would benefit from bike parking being provided along London Circuit
- City South stop – at least 12 bicycles
- Commonwealth Park stop – at least 12 bicycles.

Cycling activity to/from the proposed stops is unlikely to be commuter activity and therefore, would not require all day parking. As such, secure parking facilities would not be required at the proposed stops.

The Project also includes minor changes to the existing stop at Alinga Street. The kerb at the southern end of the median at the Alinga Street stop would be extended to provide additional space for pedestrian movements. The Project would include the extension of the light rail track across Alinga Street and through Northbourne Place. Signalised pedestrian crossings of the light rail track would be included within the medians to facilitate safe and convenient east-west pedestrian movements. The provision for other access modes at this stop is not within the scope of the Project.

Land use and trip generators

- Australian National University
- Office and civic buildings
- Future commercial and residential buildings
- New Acton precinct

Daily patronage in 2036

- Boardings: approximately 3,000 people per day
- Alightings: approximately 2,700 people per day

It is anticipated that this stop would have cater for more alightings in the AM peak and more boardings in the PM peak due to the surrounding land use mix

Pedestrians

- Walking is likely to be the primary mode of access to/from this stop
- 10m wide signalised crossings are proposed north and south of stop across London Circuit
- 4m and 3m wide footpaths are proposed on the west and east sides of London Circuit, respectively

Cycling

- The C8 Principal Cycle Route on Marcus Clarke Street is about 150m to the west of the stop, accessible via Gordon Street
- Off road cycle paths are to be constructed on London Circuit south of Edinburgh Avenue as part of RLC
- Bicycle racks with capacity for at least 40 bikes are proposed on London Circuit adjacent to the stop

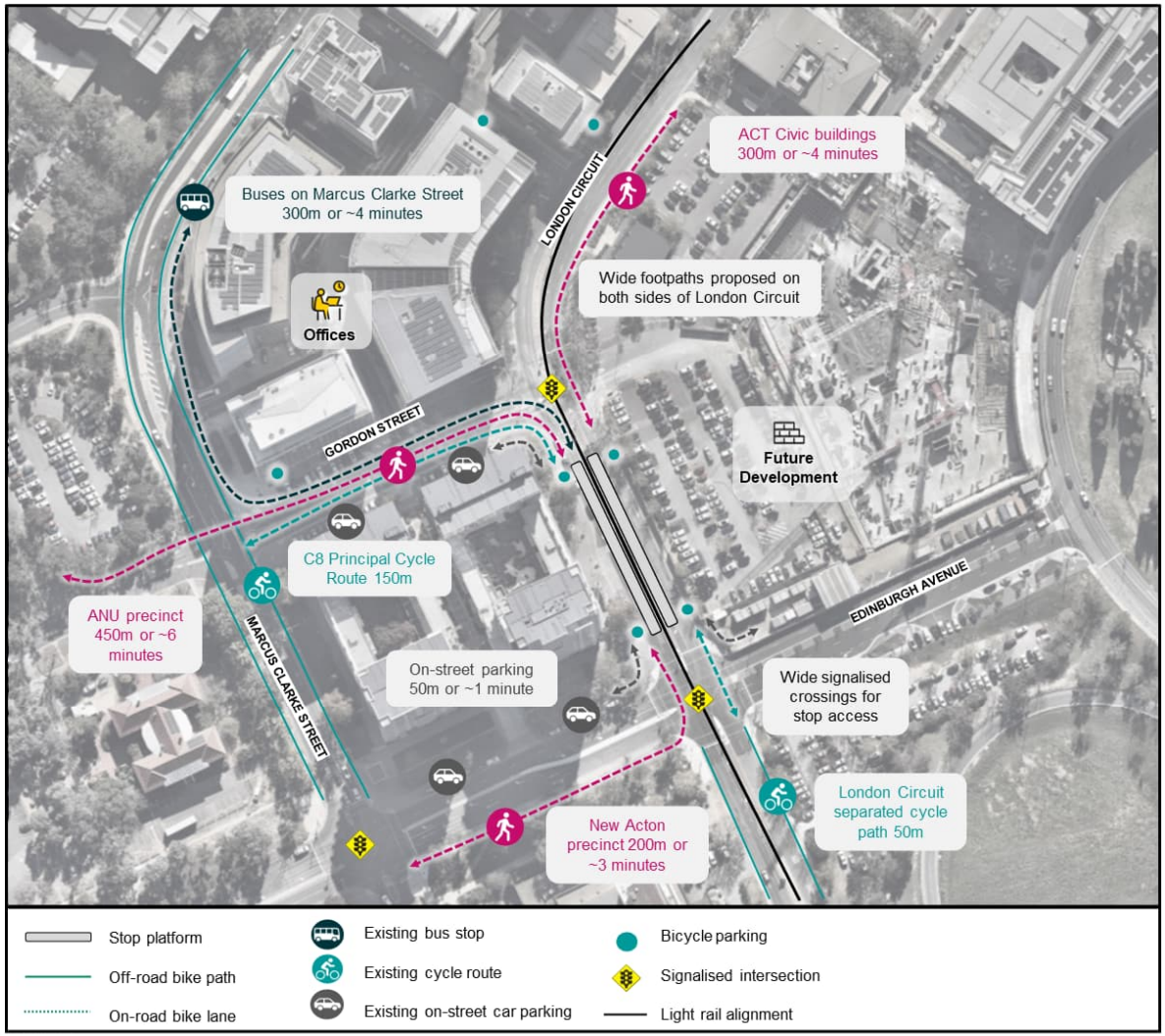
Bus

- The closest existing bus stop is located on Marcus Clarke Street, approximately 300m to the northwest

Access by car

- It is estimated that 75 people per day would access this stop by car via drop-off/pick-up or as a commuter
- There is opportunity to convert up to five of the nearby short stay parking spaces to drop-off/pick-up spaces during peak periods

Access mode [1]



1] Source: VLC, July 2019, Strategic Modelling and Public Transport Integration Advisory Services – Stage 2 of the Canberra Light Rail Project

Figure 7-1 Edinburgh Avenue stop indicative stop access plan

Land use and trip generators

- Future commercial and residential developments
- Canberra Olympic pool
- Office and entertainment precincts on London Circuit east
- New Acton precinct

Daily patronage in 2036

- Boardings: approximately 1,500 people per day
- Alightings: approximately 1,050 people per day

Pedestrians

- Walking is likely to be the primary mode of access to/from this stop
- 6m wide signalised crossings are proposed north of the stop across Commonwealth Avenue
- Path network along Commonwealth Avenue and London Circuit constructed as part of RLC
- A signalised crossing is proposed on the Parkes Way on-ramp from London Circuit to improve connectivity and safety
- Opportunity to provide direct pedestrian access to/from adjacent future developments

Cycling

- A protected intersection is proposed the at London Circuit and Commonwealth Avenue intersection facilitating safe walking and cycling movements
- Existing 2m wide off-road cycle paths on Commonwealth Avenue between Vernon Circle and London Circuit
- Bicycle racks with capacity for at minimum 6 bikes each are proposed at either end side of Commonwealth Avenue
- Commonwealth Avenue designated as a Principal Cycle Route

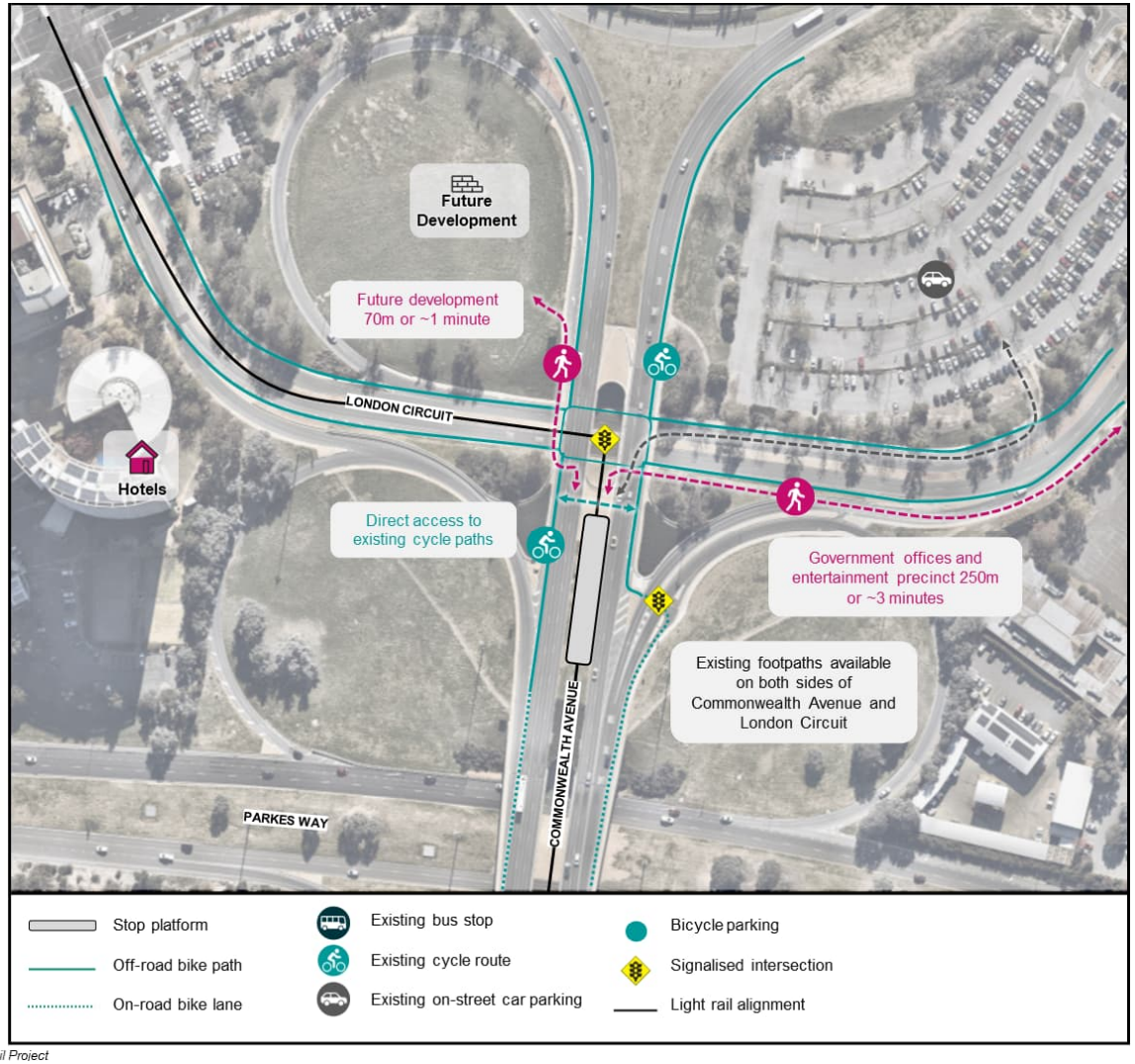
Bus

- The closest existing bus stop is located on Constitution Avenue
- Bus interchange more likely at other stops along the alignment

Access by car

- Long stay car parking is available to the north of London Circuit
- Opportunity to provide direct connection between car parking and path network
- There is opportunity to convert up to five of the nearby parking spaces to drop-off/pick-up spaces during peak periods

Access Mode [1]



[1] Source: VLC, July 2019, Strategic Modelling and Public Transport Integration Advisory Services – Stage 2 of the Canberra Light Rail Project

Figure 7-2 City South stop indicative stop access plan

Land uses and trip generators

- Acton waterfront
- Commonwealth Park
- Henry Rolland Park
- Canberra visitor's centre

Daily patronage in 2036

- Boardings: approximately 1,450 people per day
- Alightings: approximately 1,500 people per day

Pedestrians

- 10m wide pedestrian crossing at southern end of stop
- Existing paths along Commonwealth Avenue providing access to Commonwealth park, Acton waterfront, nearby bus stops and car parks
- Opportunity to provide direct pedestrian connection between stop, recreational areas and future waterfront development

Cycling

- Future principal north-south cycling route, existing 1.9m wide on-road cycle lanes provided
- This route is a key connection and the most direct route between north and south Canberra
- Bicycle racks with capacity for minimum 6 bikes each are proposed at either end side of Commonwealth Avenue

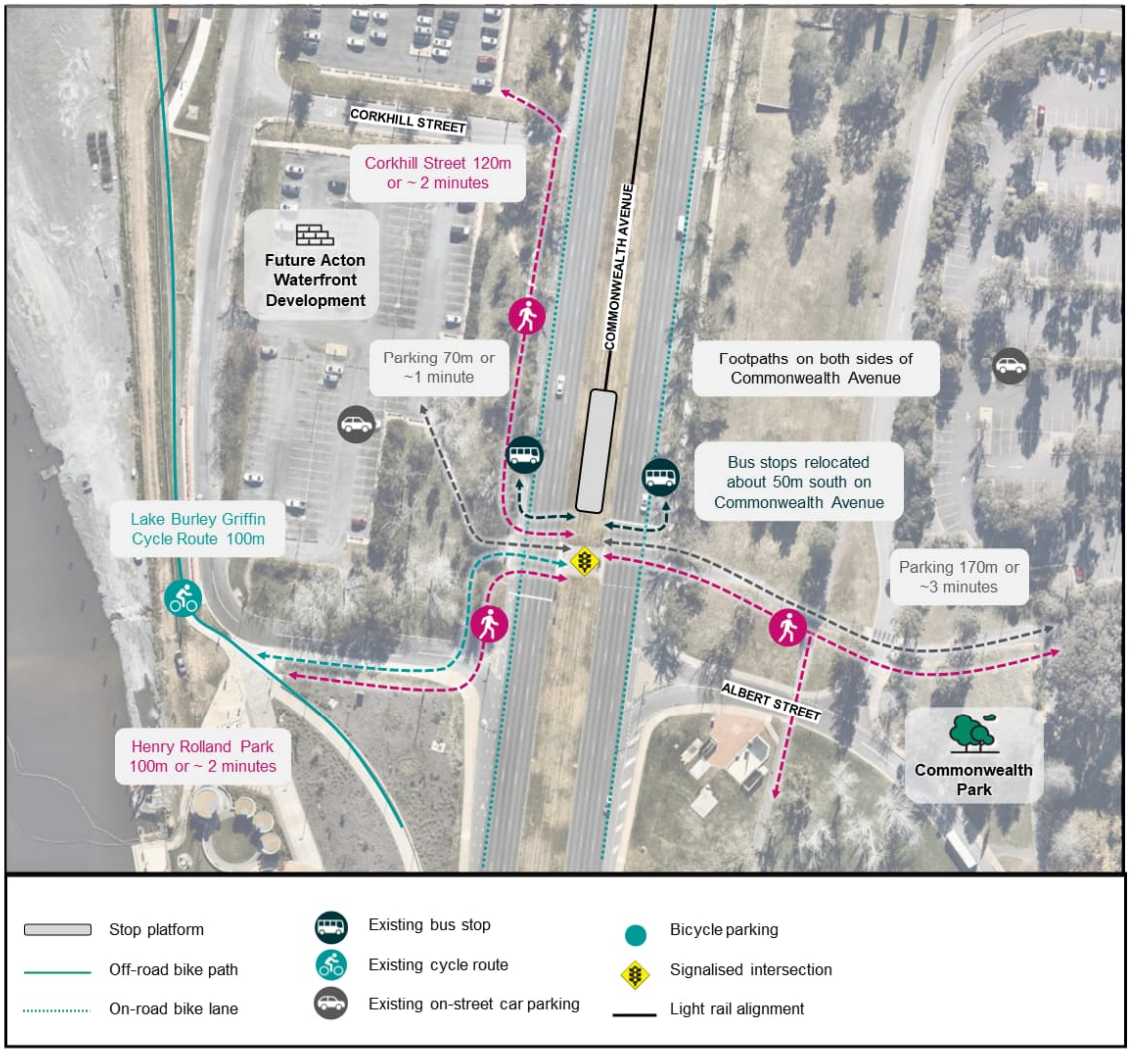
Bus

- Existing bus stops to be relocated south for more convenient interchange
- These stops service five rapid routes and five local routes
- Estimated that 1000 people per day will interchange between bus and light rail at this location
- Bus stop to be constructed with shade, lighting, wayfinding and seating

Access by car

- Short and long stay NCA parking provided to the east of the stop and long stay territory parking provided to the west of the stop
- Opportunity for direct and accessible paths are provided between the stop and the car parking areas
- There is not provision for parking or stopping along Commonwealth Avenue
- There is opportunity to convert up to five of the nearby parking spaces to drop-off/pick-up spaces during peak periods

Access Mode [1]



[1] Source: VLC, July 2019, Strategic Modelling and Public Transport Integration Advisory Services – Stage 2 of the Canberra Light Rail Project

Figure 7-3 Commonwealth Park stop indicative stop access plan

7.3 Road network performance assessment

To assess the impacts of the Project on the surrounding road network during operation, several scenarios have been assessed using transport modelling software. Further details regarding the adopted traffic modelling methodology is included in Section 4.0.

7.3.1 Traffic volumes

7.3.1.1 2026

As noted in Section 4.5.1, traffic volume difference plots for the study area and its surrounds have been produced from the Aimsun mesoscopic model. The traffic volume difference plots highlight changes in traffic volumes between the with and without Project scenarios for 2026 and 2036.

Figure 7-4 and Figure 7-5 show the 2026 change to traffic volumes between the with and without Project scenarios for the AM and PM peak hours, respectively. The following are key findings relating to the expected changes to flow due to the Project:

- Both the AM and PM peak hours would experience similar trends with regard to traffic volume changes within Civic, with larger changes in traffic volumes on Parkes Way in the PM peak hour
- Traffic volumes would decrease on Vernon Circle and the northern part of London Circuit, reflecting the expected reassignment of traffic from London Circuit to Marcus Clarke Street due to the loss of a traffic lane in each direction on London Circuit and reduced capacity at the Northbourne Avenue and London Circuit and Commonwealth Avenue and London Circuit intersections. This is particularly evident during the AM peak hour
- Traffic volumes would decrease on Commonwealth Avenue due to increased delays caused by the introduction of the light-rail movements through the Commonwealth Avenue and London Circuit intersection, as well as traffic re-assignment in the PM peak hour to Parkes Way and Kings Avenue
- Traffic volumes would decrease southbound on Northbourne Avenue due to different geometry with the Project and changes to traffic signal timing and phasing at the Northbourne Avenue and London Circuit intersection, which resulted in volume reductions along Northbourne Avenue in the southbound direction during the AM peak hour.

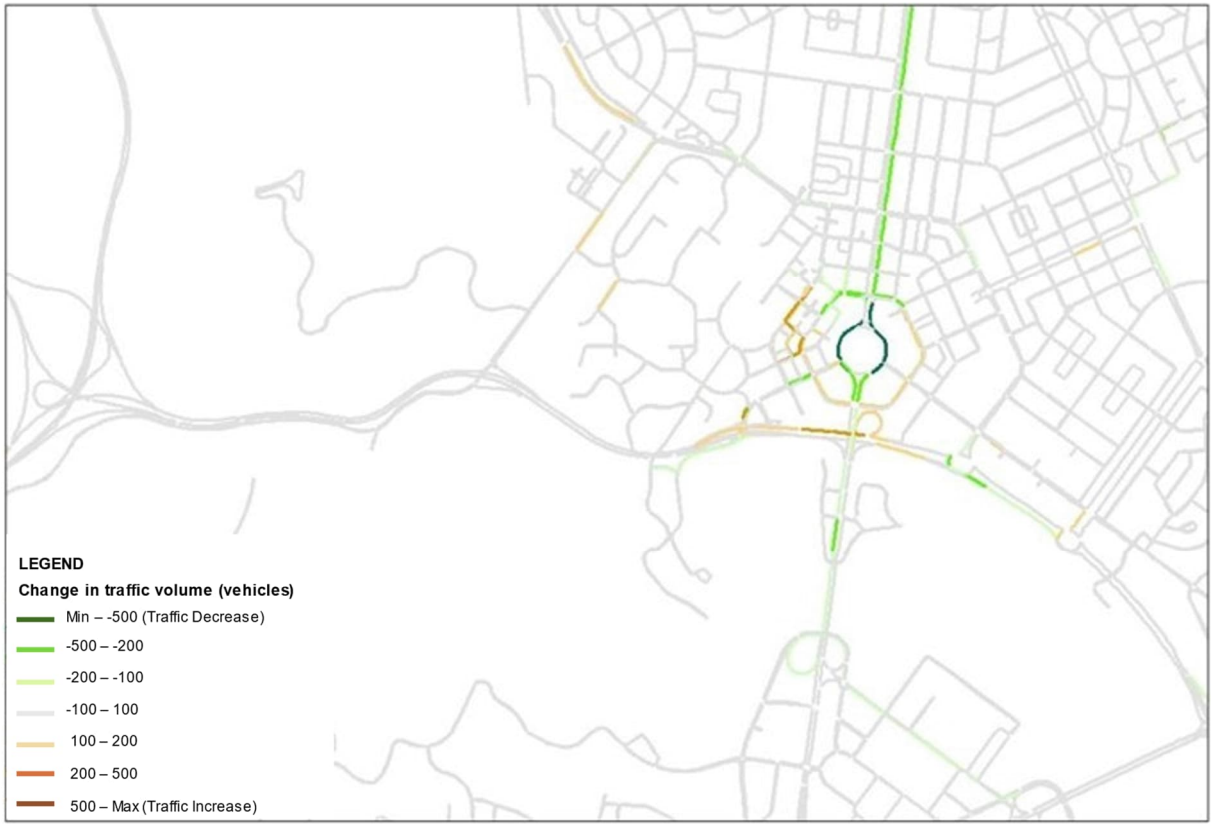


Figure 7-4 Traffic volume changes with the Project compared to without the Project during the weekday AM peak hour in 2026

Figure 7-5 Traffic volume changes with the Project compared to without the Project during the weekday PM peak hour in 2026

7.3.1.2 2036

Figure 7-6 and Figure 7-7 show the 2036 change to traffic volumes between the with and without Project scenarios for the AM and PM peak hours, respectively. The changes to traffic volumes due to the Project in 2036 would be broadly similar to 2026. Although, in 2036 some more strategic/regional traffic diversions are anticipated, as shown in the following key findings:

- Both the AM and PM peak hours would experience similar trends in traffic volume change within Civic
- Traffic volumes would decrease on Vernon Circle and the north-eastern part of London Circuit, reflecting the expected reassignment of traffic to Marcus Clarke Street and the corresponding increase in traffic volumes on these alternative routes. This reassignment is due to reduced capacity on London Circuit with the Project, and the model seeks to reassign traffic to alternative routes to reduce network congestion
- Traffic volumes would decrease on Commonwealth Avenue in the southbound direction, with traffic reassigned to Parkes Way during the AM peak hour
- Traffic volumes would increase on Parkes Way particularly in the AM peak hour
- Traffic volumes would decrease on Northbourne Avenue in the AM peak hour due to the reassignment to Limestone Avenue
- Traffic volumes would decrease on Northbourne Avenue and Vernon Circle in the southbound direction during the PM peak hour due to the reassignment to Limestone Avenue, Caswell Drive, Torrens Street, Coranderrk Street and Parkes Way.

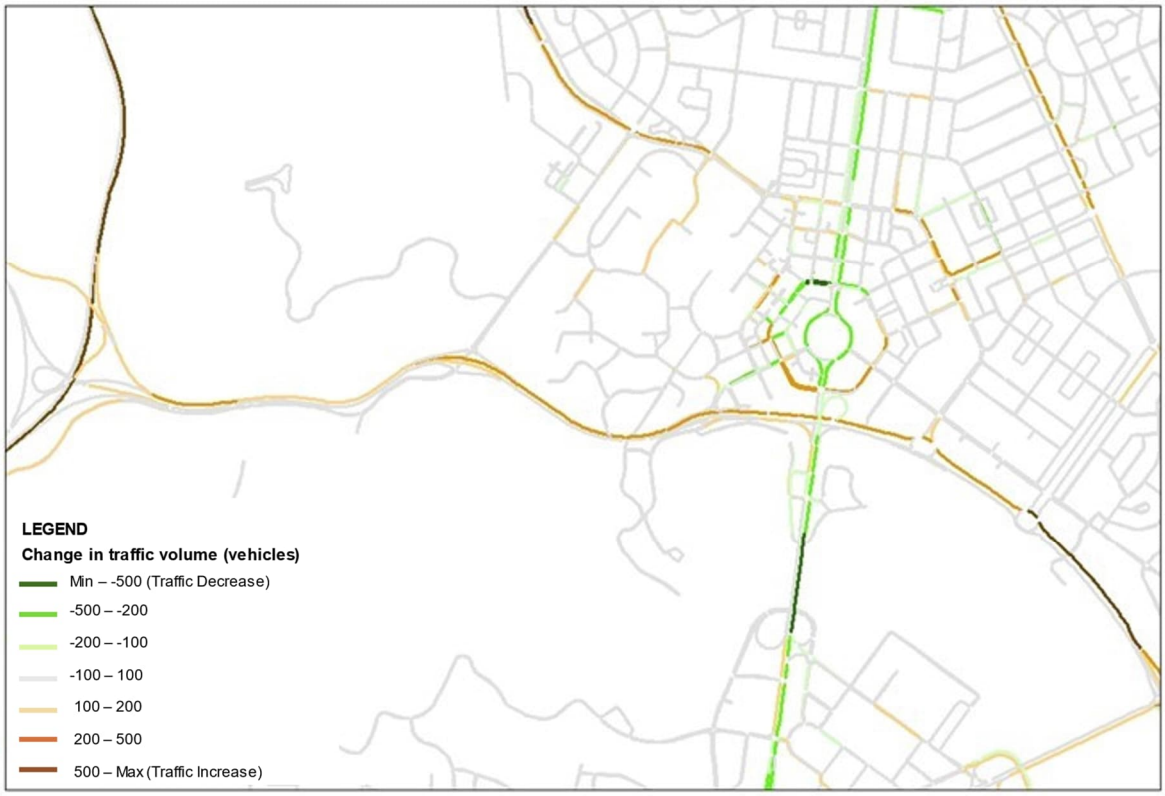


Figure 7-6 Traffic volume changes with the Project compared to without the Project during the weekday AM peak hour in 2036

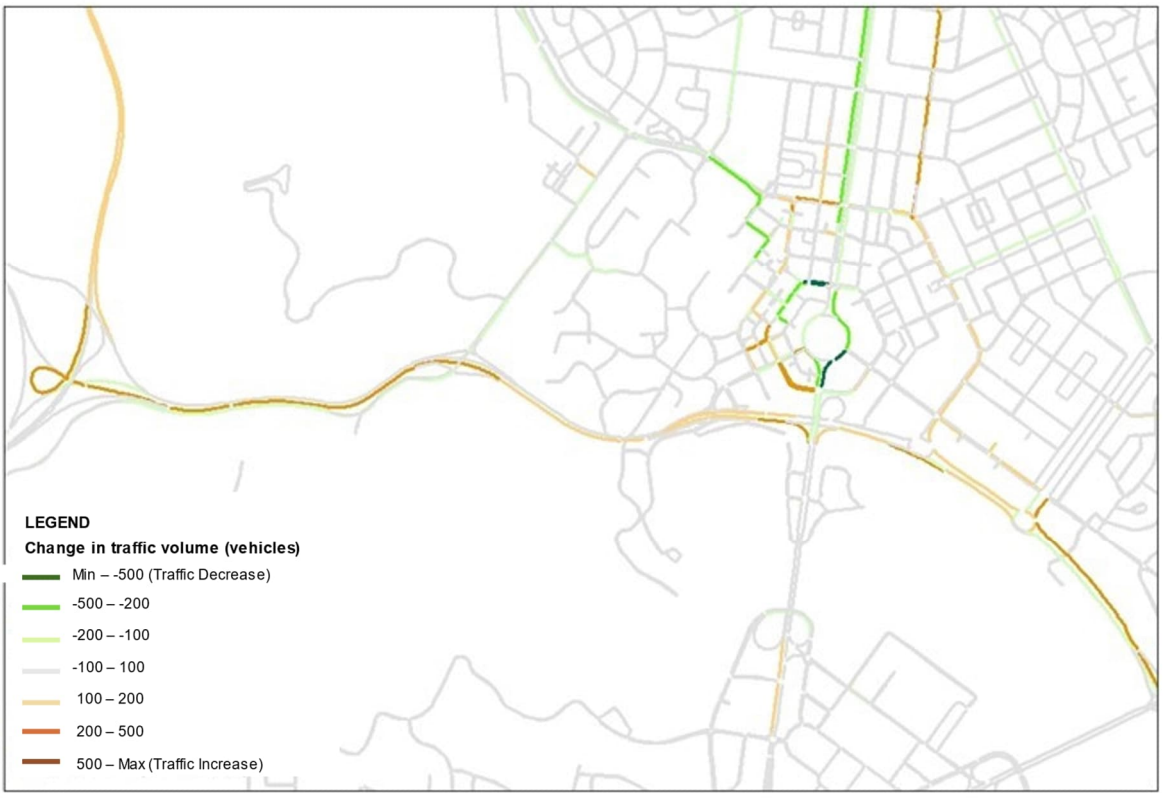


Figure 7-7 Traffic volume changes with the Project compared to without the Project during the weekday PM peak hour in 2036

7.3.2 Network performance statistics

As noted in Section 4.5.1, 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 to understand the overall network impacts of the Project during 2026 and 2036.

Table 7-4 and Table 7-5 compare the forecast network performance with and without the Project for the Aimsun mesoscopic model area during the weekday AM and PM peak hours, respectively.

Population and employment in Canberra is also expected to grow between the baseline conditions, and in 2026 and 2036. Table 7-4 and Table 7-5 indicates that traffic demand, congestion and delay would slightly increase with population growth between 2026 and 2036, based on the following key findings:

- Total traffic demand is forecast to grow by about 15-16 per cent between 2026 and 2036
- Average vehicle speeds would fall by approximately 3-5 km/h between 2026 and 2036
- Total vehicle kilometres travelled is forecast to increase by approximately 3-9 per cent between 2026 and 2036
- Total vehicle travel time is forecast to increase by about 21-24 per cent between 2026 and 2036
- Increased travel demand would also result in a relatively small increase in the number of unreleased vehicles of approximately 1-4 per cent (as a proportion of total demand).

Comparing the network performance statistics between the 2026 without Project and the 2026 with Project scenarios indicates that the Project would have a negligible impact on congestion within the area covered by the Aimsun mesoscopic model during both the AM and PM peak hours, noting the following:

- Total vehicle kilometres travelled, total vehicle travel time, average vehicle speeds and the total traffic demand would be similar in both the without Project and with Project scenarios during the AM and PM peak hours
- The number of unreleased trips would increase by approximately 13 per cent and decrease by 20 per cent with the Project in 2026 and 2036, respectively, during the AM peak hour. This indicates that a similar amount of traffic will enter the network with the Project as compared to the without Project scenario
- The number of unreleased trips would increase by approximately 7 per cent and 11 per cent with the Project in 2026 and 2036, respectively, during the PM peak hour. This indicates that less traffic would be able to enter the network due to more congestion. However, this would have a negligible impact as the additional unreleased vehicles with the Project represents less than one per cent of the total network demand

In general, the percentage of unreleased trips that fail to enter the model area with the Project is very small (one to four per cent). The percentage is 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.

Table 7-4 Weekday AM peak hour model network performance statistics in 2026 and 2036 with and without the Project

Network performance statistics	2026 AM peak hour				2036 AM peak hour			
	Without Project	With Project	Difference		Without Project	With Project	Difference	
Total vehicle kilometres travelled through network (km)	667,812	659,709	-8103	-1%	682,958	695,161	12,203	2%
Total vehicle travel time through the network (hours)	15,435	15,522	87	1%	19,114	19,332	218	1%
Average network speed (km/h)	41	40	-1	-1%	36	36	0	0%
Total traffic demand (vehicles)	103,408	103,640	232	<1%	120,058	119,793	-265	<1%
Unreleased trips (vehicles)	669	757	88	13%	2,865	2,302	-563	-20%
Unreleased trips (% of total demand)	0.7%	0.7%	0%	-	2.4%	1.9%	-0.5%	-

Table 7-5 Weekday PM peak hour model network performance statistics in 2026 and 2036 with and without the Project

Network performance statistics	2026 PM peak hour				2036 PM peak hour			
	Without Project	With Project	Difference		Without Project	With Project	Difference	
Total vehicle kilometres travelled through network (km)	620,290	621,560	1269	<1%	673,872	665,931	-7,941	-1%
Total vehicle travel time through the network (hours)	14,238	14,255	18	<1%	17,673	17,194	-479	-3%
Average network speed	41	41	0	0%	38	38	0	1%
Total traffic demand (vehicles)	97,819	97,692	-127	<1%	112,783	112,728	-55	<1%
Unreleased trips	1050	1126	76	7%	4,338	4,836	498	11%
Unreleased trips (% of total demand)	1.1%	1.1%	0%	-	3.9%	4.3%	0.5%	-

7.3.3 Vehicle travel times

The Project is likely to reduce the capacity of roads along the light rail alignment, potentially impacting vehicle travel times for routes through the City and Civic, particularly via London Circuit. Consequently, traffic reassignment would occur on surrounding roads as drivers seek to bypass London Circuit to maintain existing travel times.

As noted in Section 4.5.3, vehicle travel times along eight key routes were assessed. This includes both direct and alternative routes to or via the City to understand the relative impacts of the Project and any associated traffic reassignment in the wider network.

This vehicle travel time assessment is based on a conservative analysis that assumes full development of Block 40, Section 100, Blocks 10 and 11, Section 100 and Block 20, Section 63, and also considers traffic growth and travel patterns that are based on historical conditions. This assessment does not consider any modal shift (for example from car to light rail) that could be expected with the introduction of future potential light rail extension to Woden and introduction of future stages of CLR or other future public transport initiatives.

7.3.3.1 2026

Figure 7-8 and Figure 7-9 show the peak hour vehicle travel time comparisons with and without the Project in 2026 during the weekday AM and PM peak hours, respectively.

In the AM peak hour, Figure 7-8 demonstrates that the Project would impact the following travel times:

- Route 1 – between State Circle and Barry Drive via Commonwealth Avenue: one minute travel time increase in both the northbound directions
- Route 2 – between State Circle and Glenloch Interchange via Commonwealth Avenue: one minute travel time increase in the westbound direction
- Route 3 – between Glenloch Interchange and State Circle via Kings Avenue: one minute travel time increase in the eastbound direction
- Route 5 – between State Circle and City via Commonwealth Avenue: a one and half minute travel time increase in the northbound direction and about 30 seconds in the southbound direction
- Route 6 – between State Circle and City via Kings Avenue: one-minute travel time increase in the northbound direction and a one-and-a-half-minute increase in the southbound direction
- Route 7 – between Glenloch Interchange and City: a one and a half minutes travel time increase in the westbound direction due to more congestion at Parkes Way/Coranderrk Street roundabout. This is caused by a change in traffic assignment, with more traffic assigned to Anzac Parade with the Project and would result in queuing back to Parkes Way.
- Route 8 – between Barry Drive and City: 30 seconds travel times increase in the northbound direction.

In the PM peak hour, Figure 7-9 shows that the Project would result in increased vehicle travel times for several routes. The travel time increases reflect the increased level of congestion across the study area, in this period (compared to the AM peak hour).

Vehicle travel times may increase by one to three minutes in the PM peak hour for the following routes:

- Route 1 – between State Circle and Barry Drive via Commonwealth Avenue: approximately two-minute travel time increase in the northbound direction as a result of more congestion/higher density at Commonwealth Avenue northbound due to lower capacity with the Project arising from the introduction of light rail at the intersection of Commonwealth Avenue and London Circuit intersection
- Route 2 – between State Circle and Glenloch Interchange via Commonwealth Avenue: two-minute travel time increase in the westbound direction as a result of more congestion/higher density at Commonwealth Avenue northbound due to lower capacity with the Proejct arising from the introduction of light rail at the Commonwealth Avenue and London Circuit intersection

- Route 3 – between Glenloch Interchange and State Circle via Kings Avenue: one minute travel time decrease in the westbound direction and a 30 second increase in travel time in the eastbound direction
- Route 4 – between State Circle to/from Limestone Avenue via Kings Avenue: a one-minute decrease in the northbound direction.
- Route 5 – between State Circle and City via Commonwealth Avenue: three-minute travel time increase in the northbound direction as a result of more congestion/higher density at Commonwealth Avenue northbound due to lower capacity with the Project arising from the introduction of light rail at the Commonwealth Avenue and London Circuit intersection. The travel time would also increase by about one-minute in the southbound direction
- Route 6 – between State Circle and City via Kings Avenue: one minute travel time increase in the northbound direction
- Route 7 – between Glenloch Interchange and City: about a 30-second travel time decrease in the eastbound direction and a one-minute increase in the westbound direction
- Route 8 – Barry Drive to/from City via Northbourne Avenue: about a 30-second decrease in travel time in each direction.

Routes 1, 2 and 5 share a common section on Commonwealth Avenue between State Circle and London Circuit. Delays on these routes are largely due to the introduction of light rail movements and associated traffic signal modifications at the Commonwealth Avenue and London Circuit intersection.

Route 7 serves as an alternative route to/from the City. The estimated travel time increases on this route is associated with traffic reassignment, as drivers would seek to avoid increased congestion on Commonwealth Avenue.

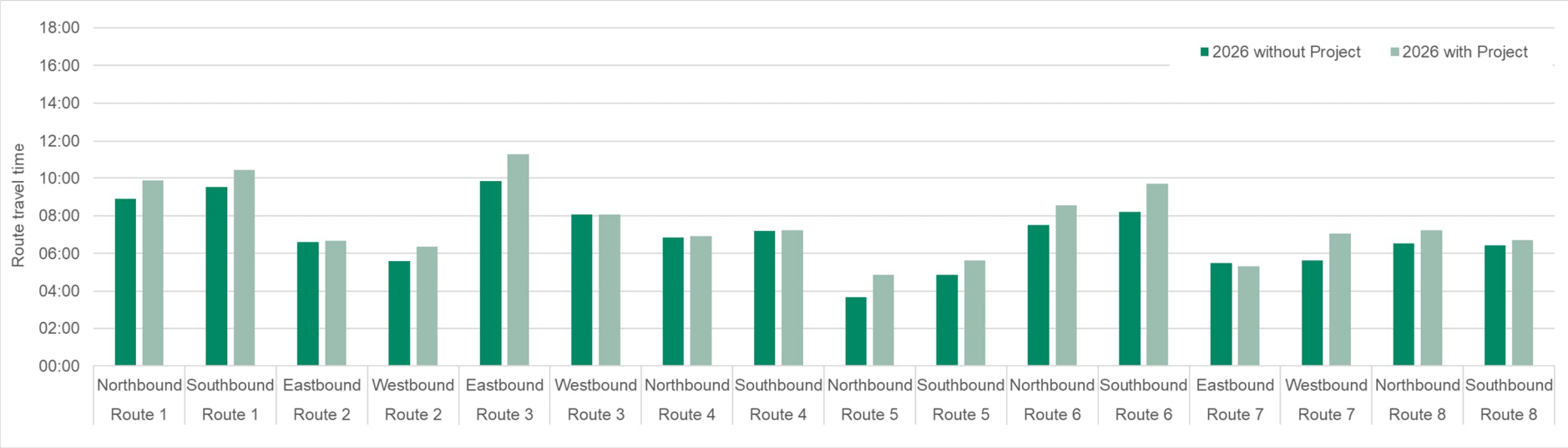


Figure 7-8 Weekday AM peak hour vehicle travel time comparisons in 2026

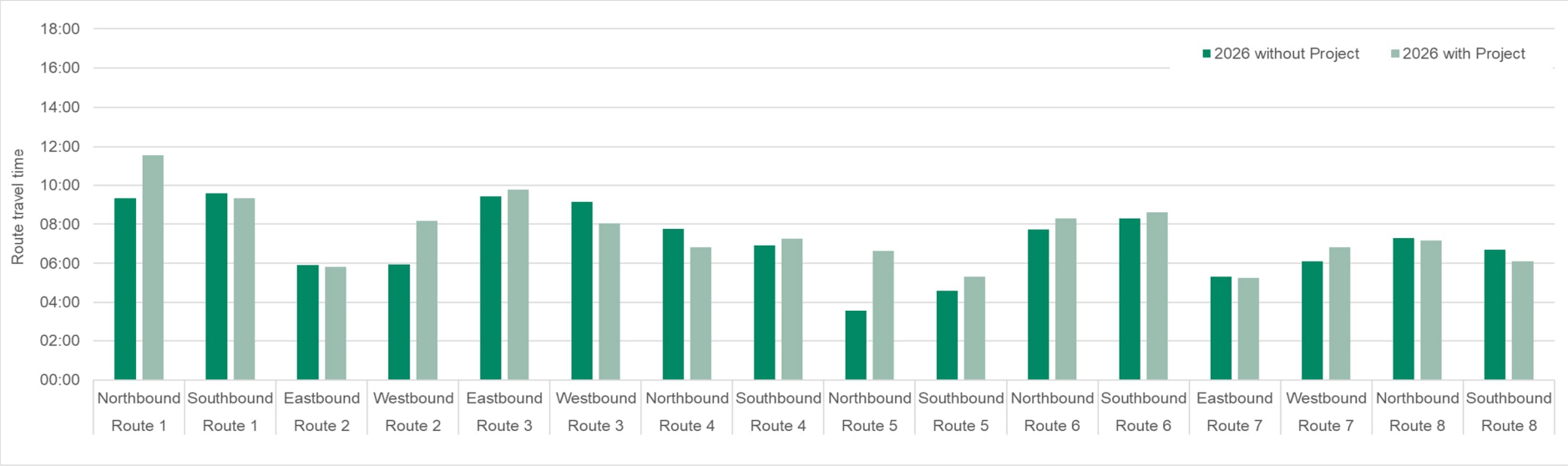


Figure 7-9 Weekday PM peak hour vehicle travel time comparisons in 2026

7.3.3.2 2036

In 2036, background traffic growth and the introduction of two large land use developments; Acton Waterfront and Section 63, are likely to change traffic patterns in the study area and result in increased vehicle travel times on some parts of the road network. The 2036 travel times would increase more substantially when compared with the same travel times in 2026.

Figure 7-10 and Figure 7-11 show the peak hour vehicle travel time comparisons with and without the Project in 2036 during the weekday AM and PM peak hours, respectively.

In the AM peak hour, Figure 7-10 demonstrates that most of the travel times would be similar (small changes) with and without the Project. However, the Project would impact travel times as follows:

- Route 1 – Between State Circle and Barry Drive via Commonwealth Avenue: a one-minute travel time decrease in the northbound direction. This change is a result of less congestion/lower density on Commonwealth Avenue northbound. The reduced congestion/delay is due to traffic reassignment with the Project. A one-and-a-half-minute travel time increase in the southbound direction. This change is a result of more congestion/higher density on Commonwealth Avenue southbound between Vernon Circle and London Circuit. The increased congestion/delay is due to traffic reassignment with the Project
- Route 2 – State Circle to/from Glenloch Interchange via Commonwealth Avenue: a two-minute travel time increase in the eastbound direction and a one-and-a-half-minute decrease in the westbound direction with the Project. This is caused by increased congestion/higher density on Parkes Way eastbound due to reassignment with the Project. This is partly due to the introduction of Anzac Park development which increases demand and results in lower speeds and higher density on Anzac Parade on the eastbound approach to Parkes Way
- Route 3 – State Circle to/from Glenloch Interchange via Kings Avenue: five-minute travel time decrease in the westbound direction with the Project caused by less congestion/lower density at Parkes Way westbound. The reduced congestion/density is a result of traffic reassignment
- Route 4 – State Circle to/from Limestone Avenue via Kings Avenue: a one-minute increase in travel time southbound
- Route 5 – State Circle to/from City via Commonwealth Avenue: three-minute increase in travel time in a southbound direction as a result of more congestion/higher density on Commonwealth Avenue southbound. The increased congestion/delay is due to traffic reassignment with the Project
- Route 7 – Glenloch Interchange to/from City: a two-and-a-half-minute reduction in travel time in the westbound direction
- Route 8 – Barry Drive to/from City via Northbourne Avenue: a four-and-a-half-minute reduction in travel time in the southbound direction with the Project because there is less congestion/lower density at Barry Drive eastbound. This is due to reassignment. With the Project, there is less traffic flow on Northbourne Avenue southbound, which results in less queuing back along Northbourne Avenue to Barry Drive. This allows more traffic through the Barry Drive and Northbourne Avenue intersection from Barry Drive, with a correspondingly lower density.

In the PM peak hour, Figure 7-11 demonstrates that most of the vehicle travel times would be similar with and without the Project. However, the Project would impact the travel times as follows:

- Route 1 – State Circle to/from Barry Drive via Commonwealth Avenue: a two-and-a-half-minute reduction in travel time in a northbound direction and a one-minute decrease in travel time in a southbound direction as there is less congestion/lower density Northbourne Avenue northbound and southbound due to network changes in the Civic area.
- Route 2 – State Circle to/from Glenloch Interchange via Commonwealth Avenue: a one-minute increase in travel time in the westbound direction.
- Route 5 – State Circle to/from City via Commonwealth Avenue: a one-minute increase in travel time in a northbound direction. Also, there would be a two-minute increase in travel time in a southbound direction. This change is a result of more congestion/higher density on Commonwealth Avenue southbound. The increased congestion/delay is due to traffic reassignment with the Project.
- Route 8 – Barry Drive to/from City via Northbourne Avenue: a three-minute reduction in travel time in a northbound direction and a five-and-a-half-minute reduction in travel time in a southbound direction with the Project arising from less congestion/lower density Northbourne Avenue northbound and southbound due to network changes in the Civic area.

This travel time assessment is based on a conservative analysis that assumes full development of Section 100, Section B40, Section 63, Acton Waterfront and Anzac Park east and west sites. This assessment does not consider any modal shift (for example, from car to light rail) that could be expected with the introduction of future potential stages of Canberra Light Rail or other future public transport initiatives.

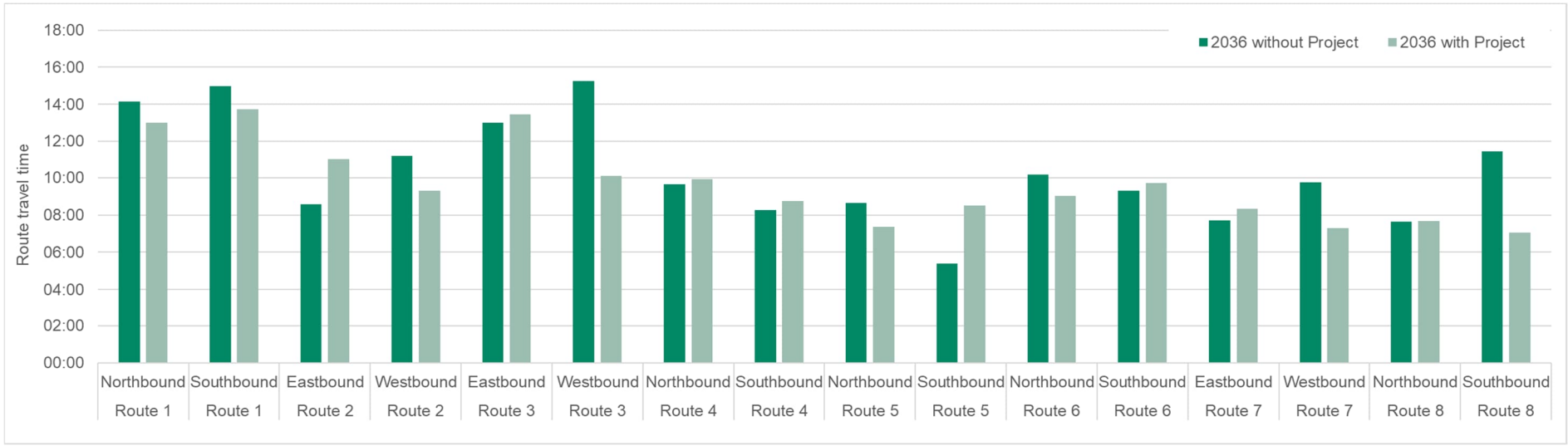


Figure 7-10 Weekday AM peak hour vehicle travel time comparisons in 2036

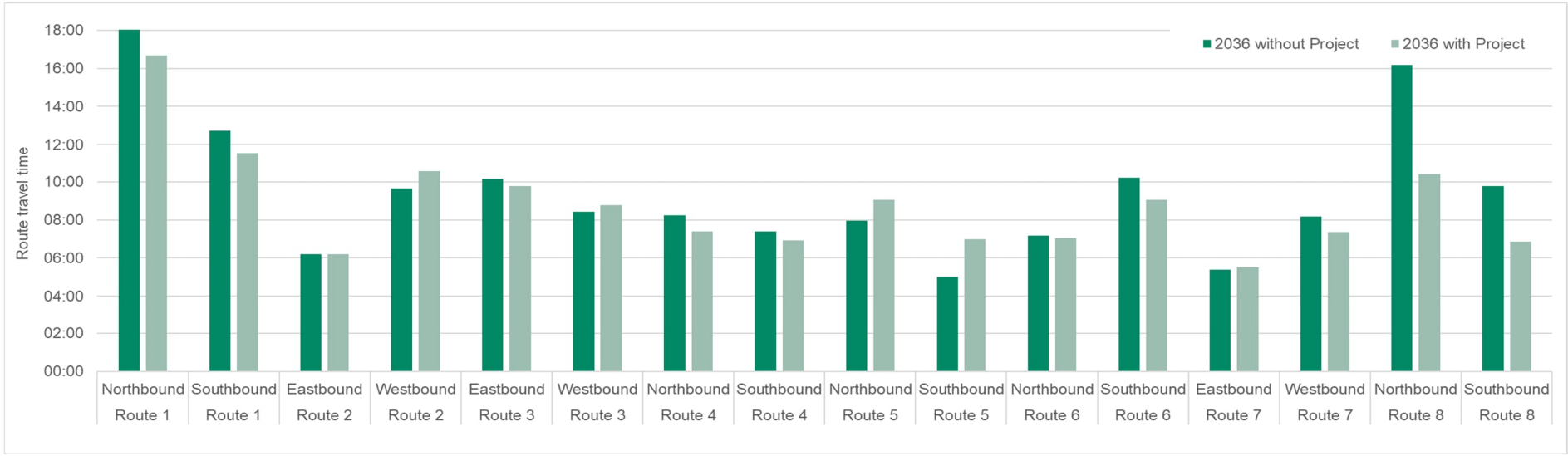


Figure 7-11 Weekday PM peak hour vehicle travel time comparisons in 2036

7.3.4 Density

7.3.4.1 2026

As noted in Section 4.5.4, density difference plots of the study area and its surrounds have been produced from the Aimsun mesoscopic model. The density plots highlight changes in network performance between the with and without Project scenarios for 2026 and 2036.

Figure 7-12 and Figure 7-13 show the 2026 change to vehicle density between the with and without the Project scenarios for the AM and PM peak hours, respectively. The following are key findings relating to the expected changes to density due to the Project:

- Both peak hours would experience similar trends with regard to density changes within the Civic area. However, densities would generally be higher in the PM peak hour, due to more congestion as office workers leave at the end of the working day (within Civic) and on the Commonwealth Avenue northbound approach to London Circuit
- Vehicle density would increase on London Circuit, reflecting the expected increased levels of congestion associated with the loss of one traffic lane in each direction to accommodate the Project
- Vehicle density would increase along University Avenue and Gordon Street due to the proposed changes to the respective intersections with London Circuit to accommodate the Project's alignment
- Vehicle density would slightly decrease in the southbound direction on Northbourne Avenue on approach due to different geometry with the Project and changes to signal timing and phasing at the Northbourne Avenue and London Circuit intersection
- Vehicle density would slightly increase in the northbound direction on Commonwealth Avenue on approach to Albert Street (AM only), and the northbound on-ramp from Flynn Drive merge with Commonwealth Avenue due to increased delay from Commonwealth Avenue on the northbound approach to London Circuit
- Vehicle density would increase in the eastbound direction on Parkes Avenue between Coranderrk Street and Anzac Parade due to increased traffic diversion on these alternative routes.

Figure 7-12 Network density changes with the Project compared to without the Project during the Weekday AM peak hour in 2026

Figure 7-13 Network density changes with the Project compared to without the Project during the Weekday PM peak hour in 2026

7.3.4.2 2036

In 2036, background traffic growth and planned developments adjacent to London Circuit are expected to add traffic demand in the City and Civic. This traffic growth is likely to change travel patterns in the localised area and may result in increased congestion in certain areas of the network.

Figure 7-14 and Figure 7-15 show the 2036 change to vehicle density between the with and without the Project scenarios for the AM and PM peak hours, respectively.

The changes to density due to the Project in 2036 would be similar to 2026. This includes increased vehicle density, and therefore congestion, on London Circuit due to the Project's removal of one traffic lane in each direction on London Circuit and light rail priority at signalised intersections.

Figure 7-14 and Figure 7-15 show that in 2036 vehicle density would increase on several roads in Civic, including London Circuit, Marcus Clarke Street and Edinburgh Avenue, in both peak hours. This is primarily due to the reduction in traffic lanes on London Circuit and local reassignment caused by the Project, such as London Circuit, increasing density. However, vehicle density would decrease on some routes, such as Commonwealth Avenue northbound, Barry Drive eastbound and Northbourne Avenue, due to traffic reassignment as a result of network changes.

The Territory continues to monitor demand and plan movement capacity upgrades, of which light rail forms one component of the wider movement network development. The Territory planning will provide the ACT Government with an updated strategic document to assess the needs and identify priorities of all modes and ensure efficient use of limited funding.

A travel demand management strategy could be used to support a mode shift towards public transport in the future, particularly as part of the future potential Light Rail to Woden Project. 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.

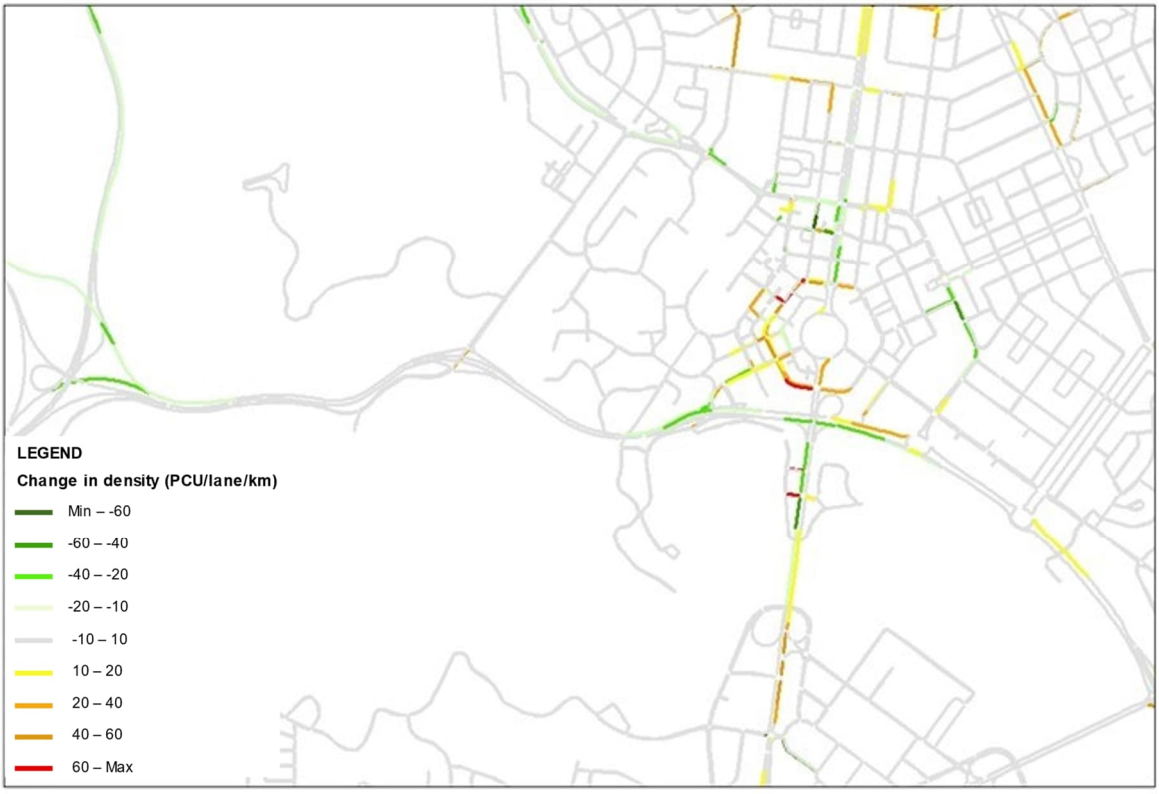


Figure 7-14 Network density changes with the Project compared to without the Project during the weekday AM peak hour in 2036

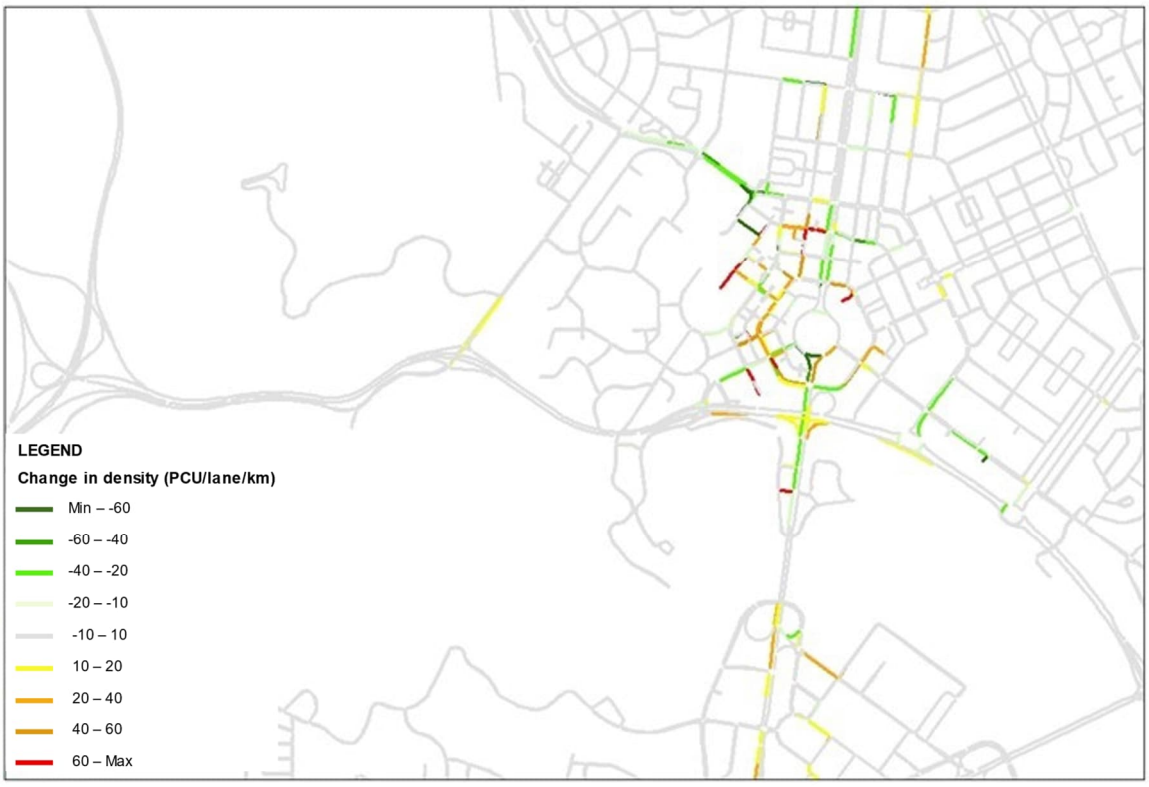


Figure 7-15 Network density changes with the Project compared to without the Project during the weekday PM peak hour in 2036

7.3.5 Intersection performance

7.3.5.1 2026

As noted in Section 4.5.5, traffic modelling has been undertaken to evaluate the Project impacts to the performance of intersections, which are typically the constraining elements of urban road networks. Level of service is presented as the metric for evaluating intersection performance in this report. Level of service represents the extent of delays experienced by drivers at an intersection.

The modelled level of service for the study intersections in the 2026 AM and PM peak hours with and without the Project are provided in Figure 7-16.

Most of the study intersections would operate at level of service D or better with the Project, indicating acceptable performance in 2026.

The level of service at the Commonwealth Avenue and London Circuit intersection would change from a level of service C or D without the Project to level of service F with the Project, during the AM and PM peak hour. This is due to the introduction of the Project alignment and associated signal phasing changes. However, it is noted that the signal phasing at the Commonwealth Avenue and London Circuit intersection would be optimised during detailed design and operations to balance light rail priority and road network performance. This may impact the performance of adjacent intersections on London Circuit.

In the AM or PM peak hours, the following intersections would operate at level of service E or F with the Project due to the high light rail priority and/or queue interactions between the respective closely spaces intersections:

- London Circuit and Knowles Place South
- London Circuit and Gordon Street (PM peak hour only)
- London Circuit and Edinburgh Avenue
- London Circuit and Constitution Avenue (PM peak hour only).

The London Circuit and West Row intersection and the London Circuit and University Avenue intersection would be signalised as part of the Project. The proposed signalisation would result in the intersection level of service changing from A to C or during the AM and/or PM peak hours. This reflects a minor increase to travel delay at these intersections but overall, the intersections would continue to operate satisfactorily.

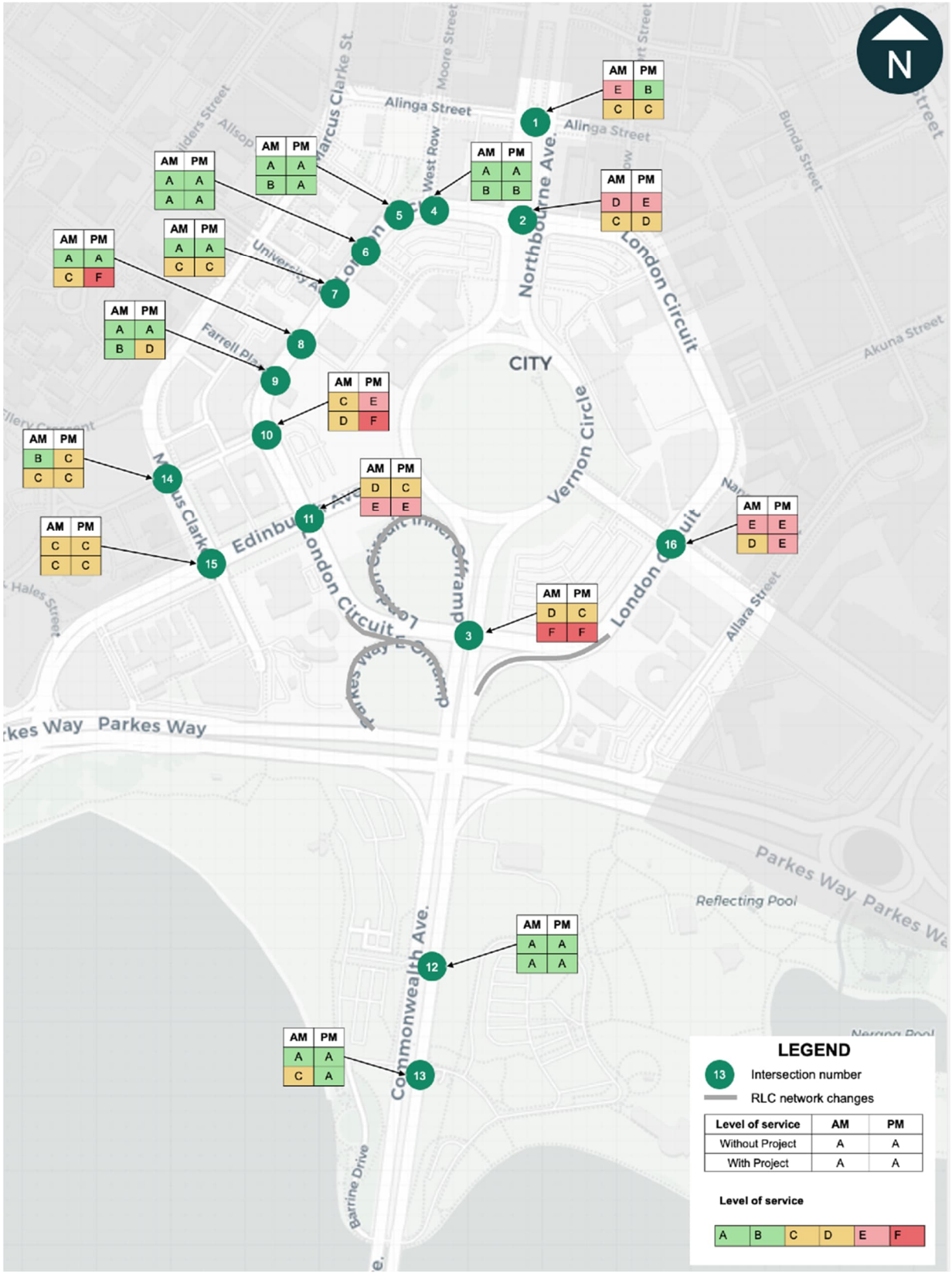


Figure 7-16 Comparison of the intersection level of service in 2026 with and without the Project

7.3.5.2 2036

Background traffic growth arising from changes in population and employment would result in increased traffic demand in 2036 and congestion irrespective of the Project. When traffic demand increases through intersections that already experience congestion, the intersection's average delay also increases.

The modelled level of service for the study intersections in the 2036 AM and PM peak hours, with and without the Project are provided in Figure 7-17. With traffic growth increasing from 2026 to 2036, some intersections would operate with increased congestion without the Project, due to developments in the City (when compared with the 2026 without Project scenario).

The following intersections would operate with a level of service E or F without the Project in the AM and/or PM peak hours, due to land use densification in Civic and the City, including planned major developments along the Project's alignment:

- Northbourne Avenue and Alinga Street (AM peak hour only)
- Northbourne Avenue and London Circuit (PM peak hour only)
- London Circuit and Constitution Avenue (AM and PM peak hours)

In the AM and/or PM peak hours, the level of service at the following intersections would change from level of service D or better to level of service E or F due to the high light rail priority and/or queue interactions between the respective closely spaces intersections:

- London Circuit and University Avenue (PM peak hour only)
- London Circuit and Knowles Place South (PM peak hour only)
- London Circuit and Gordon Street (PM peak hour only)
- Commonwealth Avenue and London Circuit.

It should be noted that intersection performance is generally affected by the operation of adjacent intersections due to the interaction of queues. This can result in reduced capacity with groups of intersections performing with higher delays. This would likely occur on London Circuit.

The operation of the intersection of Northbourne Avenue and Alinga Street appears to improve with the Project. However, this is due to downstream congestion on London Circuit which reduces the volume of traffic that could access the City and this intersection. In addition, the intersection of London Circuit and West Row would also improve with the Project, due to the proposed signalisation of this intersection.

Overall, the model results indicate that the network would operate with higher levels of congestion and delay with and without the Project in 2036, when compared with 2026, particularly for journeys from Northbourne Avenue to the City via London Circuit. This is due to background traffic growth and developments in the area, which are exacerbated by the Project. Such increases in delay could be reduced by changing travel behaviours, such as increasing mode shift to public transport or further upgrades and enhancements to increase the road network capacity.

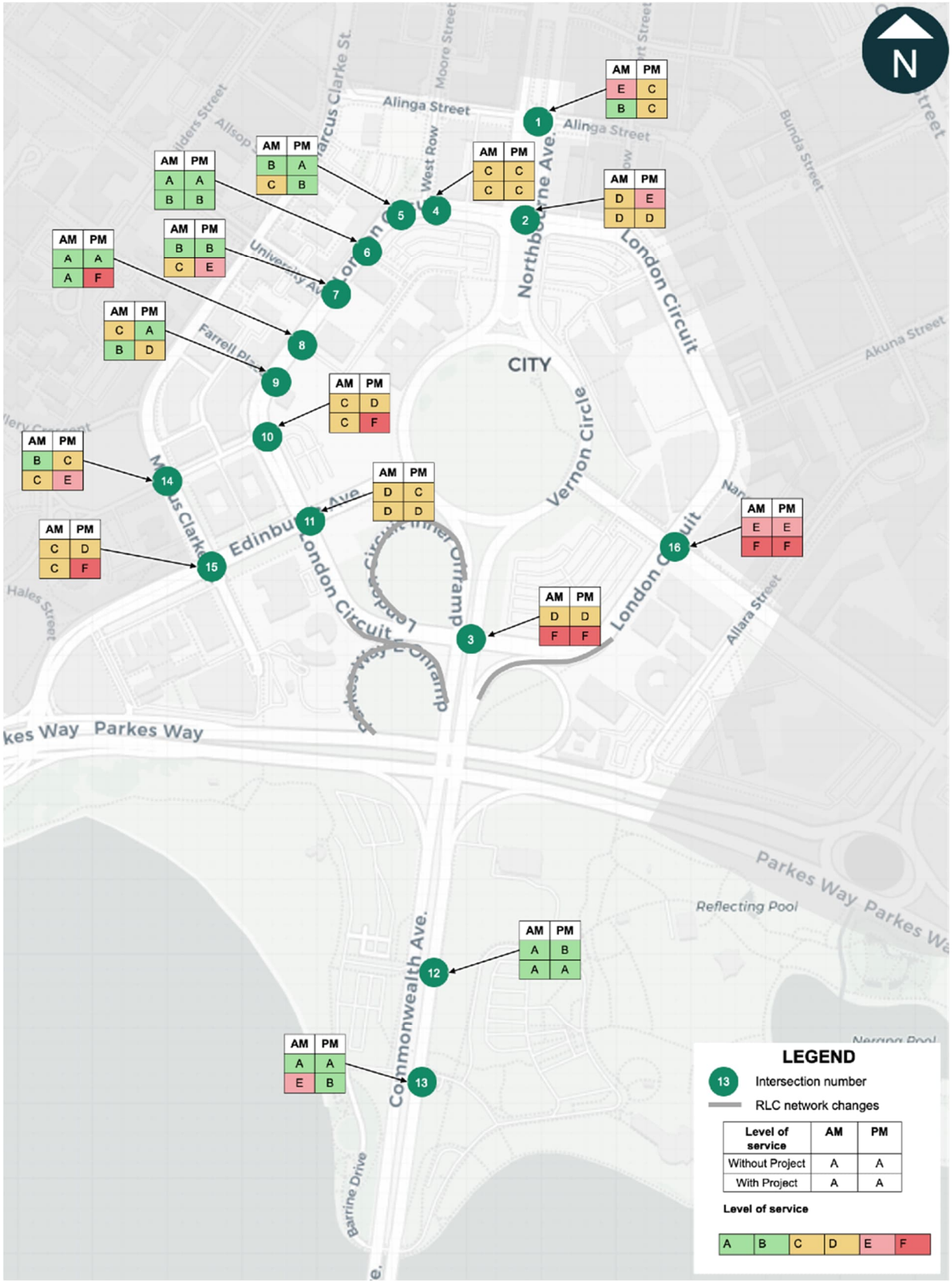


Figure 7-17 Comparison of the intersection level of service in 2036 with and without the Project

7.3.6 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 Project and other planned projects could result in notable increase in delays and congestion in the road network by 2036.

The impacts include increased congestion on London Circuit and generally across parts of Civic. This in turn, is expected to result in traffic redistribution in the network with increased travel times along several key routes. These impacts are anticipated as a result of the following key network changes that would be needed to accommodate the Project:

- Most of London Circuit West would be reduced to one lane in both directions to accommodate the Project alignment, which reduces the capacity of London Circuit
- Signalised intersections along the Project alignment would require signal phase time to be dedicated to LRV movements. At the Northbourne Avenue and London Circuit intersection and the Commonwealth Avenue and London Circuit intersection, the signal phasing would be optimised during detailed design and operations to balance light rail priority and road network performance. This may impact the performance of adjacent intersections on London Circuit.

By 2036, the road network operation would deteriorate in the AM and PM peak hours and in both the without Project and with Project scenarios due to traffic growth associated with land use densification. The capacity reductions and intersection modifications associated with the Project exacerbate the identified issues. The increased congestion in the network due to the Project is shown most clearly in the intersection performance (see Section 7.3.5) and travel time assessments (see Section 7.3.3). As less traffic would be able to move through the network, density changes can incorrectly give the impression that the network would operate better than expected.

It is anticipated that Marcus Clarke Street would act as a bypass for London Circuit, which would function as a public transport corridor. As traffic demand along Marcus Clarke Street increases, mitigations that increase capacity along Marcus Clarke Street could be considered. As discussed in Section 5.7, Marcus Clarke Street is an important active transport route and is a designated principal cycle route. Any mitigations on Marcus Clarke Street undertaken to increase capacity would need to consider the impact of the safety and connectivity of the active transport network.

Notwithstanding the above, it is noted that the assessment documented in Section 7.3 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. In particular, it could be considered that more trips generated by the nearby planned developments would take advantage of the high-quality public transport provided by the Project and future public transport initiatives.

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 anticipated that similar outcomes would result from the future potential 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).

7.4 Public transport impacts

At the intersection of Northbourne Avenue and Alinga Street, buses can turn right from Alinga Street to Northbourne Avenue and/or make U-turns on Northbourne Avenue. However, these movements are not required for any scheduled Transport Canberra bus services and are only used by out-of-service bus routes. The proposed modifications to the intersection of Northbourne Avenue and Alinga Street would mean that these out-of-service bus routes would need to take alternative routes.

In addition, the proposed modifications to the intersection of Northbourne Avenue and Alinga Street would simplify the intersection phasing and operation. Therefore, the signals would provide more time

for buses to travel through the intersection on Alinga Street, which could slightly improve bus reliability or shorter bus travel times.

7.4.1 Bus travel times

Table 7-6 shows the peak hour bus travel time comparisons with and without the Project in 2026 and 2036, during the weekday AM and PM peak hours. Most of the assessed bus travel times would decrease with the Project due to traffic reassignment. However, the R4 travel time could increase by approximately three and a half minutes in the AM peak hour in 2036.

Table 7-6 Changes to bus travel times in both peak hours in 2026 and 2036

Year	Scenario	Travel time differences per route (minutes:seconds)							
		AM peak hour				PM peak hour			
		R2		R4		R2		R4	
		Aranda to Fyshwick	Fyshwick to Aranda	Woden to Aranda	Aranda to Woden	Aranda to Fyshwick	Fyshwick to Aranda	Woden to Aranda	Aranda to Woden
2026	Without Project	**30:00**	**30:30**	**28:00**	**28:30**	**28:00**	**28:30**	**25:00**	**26:00**
	With Project	-5:30	-00:30	-2:00	-1:00	-4:30	+1:30	+1:00	-1:00
2036	Without Project	**40:00**	**40:30**	**33:30**	**35:30**	**35:30**	**44:00**	**32:30**	**33:00**
	With Project	-6:00	0:00	-00:30	+3:30	-6:30	-1:30	+0:30	-5:00

7.5 Active transport impacts

7.5.1 Proposed network changes

Pedestrian and cyclist activity and demand within the study area is expected to increase, as a result of the Project and planned land-use developments. Therefore, the Project includes walking and cycling facilities or upgrades that aim to improve pedestrian and cyclist safety, connectivity and amenity within the study area, and in particular along London Circuit West and Commonwealth Avenue.

In addition, the Project includes walking improvements that would facilitate pedestrian access to/from the Project's three light rail stops, as it is expected that this would be the primary access mode.

The key pedestrian and cyclist treatments that are proposed as part of the Project and their benefits or impacts are summarised in Table 7-7.

Table 7-7 Proposed active transport provisions and associated impacts and benefits

Proposed treatment	Impact or benefit
Cycling provisions along London Circuit including: • 2 m wide off-road cycling paths (one-way pairs) on London Circuit extending between East Row and West Row in the eastbound direction and between East Row and Knowles Place North in the westbound direction • 2 m wide on-road cycle lane between Hobart Place and West Row in the eastbound direction • 1.8 m wide off-road cycle path between Knowles Place North and University Avenue in the westbound direction • Mixed traffic environment (shared by vehicles and cyclists) with 3.7 m travel lanes between Hobart Place and Edinburgh Avenue in the eastbound direction and between	Improve the safety and connectivity of east-west cycle connections across Canberra's City

Proposed treatment	Impact or benefit
University Avenue and Edinburgh Avenue in the westbound direction • Indented hook turn bays in the eastbound and westbound directions on London Circuit at Gordon Street and Edinburgh Avenue to allow for cyclists to store before turning right	
Upgraded and wider footpaths along both sides of London Circuit, as shown in Figure 7-18	Provide an improved pedestrian experience and cater for anticipated pedestrian growth along the alignment
Specific provisions at several intersections, including: • Pedestrian priority is provided via continuous footpath treatments at the intersections of London Circuit and Hobart Place and London Circuit and Farrell Place • Pedestrian priority is also introduced via raised pedestrian crossings at Knowles Place North and Knowles Place South • Protected intersection treatments which include separate bicycle and pedestrian crossings across all legs of the intersections with cyclist storage areas on each corner, allowing sufficient space for cyclists to move past vehicles waiting to turn right at the intersections of: - Northbourne Avenue and London Circuit - Commonwealth Avenue and London Circuit • Kerb adjustments at the Northbourne Avenue and Alinga Street intersection • Signalised pedestrian crossings on all legs of the following intersections: - Northbourne Avenue and London Circuit - London Circuit and West Row - London Circuit and University Avenue - London Circuit and Gordon Street - London Circuit and Edinburgh Avenue • Signalised cycle crossing at the intersection of London Circuit and University Avenue across the southern leg of the intersection, enabling cyclists to safely turn right onto University Avenue	• Continuous footpath treatments and raised pedestrian crossings prioritise pedestrians at the respective intersections, improving walkability • Protected intersections improve the safety of pedestrians and cyclists at major intersections, reducing the likelihood of collisions involving cyclists at the respective intersections • Kerb adjustments provide additional pedestrian storage space adjacent at the Alinga Street stop and the City Interchange • Signalised pedestrian crossings provide safe crossing locations at the respective intersections • Signalised cyclist crossing provides safe crossing opportunity for cyclists at the respective intersection
The existing marked pedestrian crossing on London Circuit between Knowles Place and University Avenue would be removed	Provide pedestrians safe and convenient crossing locations on London Circuit
New signalised cyclist and pedestrian crossing on the Parkes Way off ramp between Parkes Way and Commonwealth Avenue	Provides a safe crossing location for cyclists and pedestrians heading south and means vehicles do not have to give way to cyclists while merging at high speed on to Commonwealth Avenue
Modifications to the existing pedestrian facilities at the existing Alinga Street stop, including: • Widened pedestrian storage area at the southern end of the existing Alinga Street stop • A new pedestrian crossing across the light rail track	Facilitates east-west pedestrian movement and access to/from the Alinga Street stop and improves connectivity across the City as well as catering for increased interchange demand

Proposed treatment	Impact or benefit
• North-south crossings between the southern end of the Alinga Street stop and the northern end of Northbourne Place	between light rail and buses in the City Interchange
At least 5 m wide crossings at all signalised intersections along the Project alignment. 10 m wide pedestrian crossings are proposed at the Edinburgh Avenue stop and Commonwealth Park stop to cater for the anticipated higher pedestrian activity	Accommodates future potential stop access demand, as discussed further in Section 7.2.4

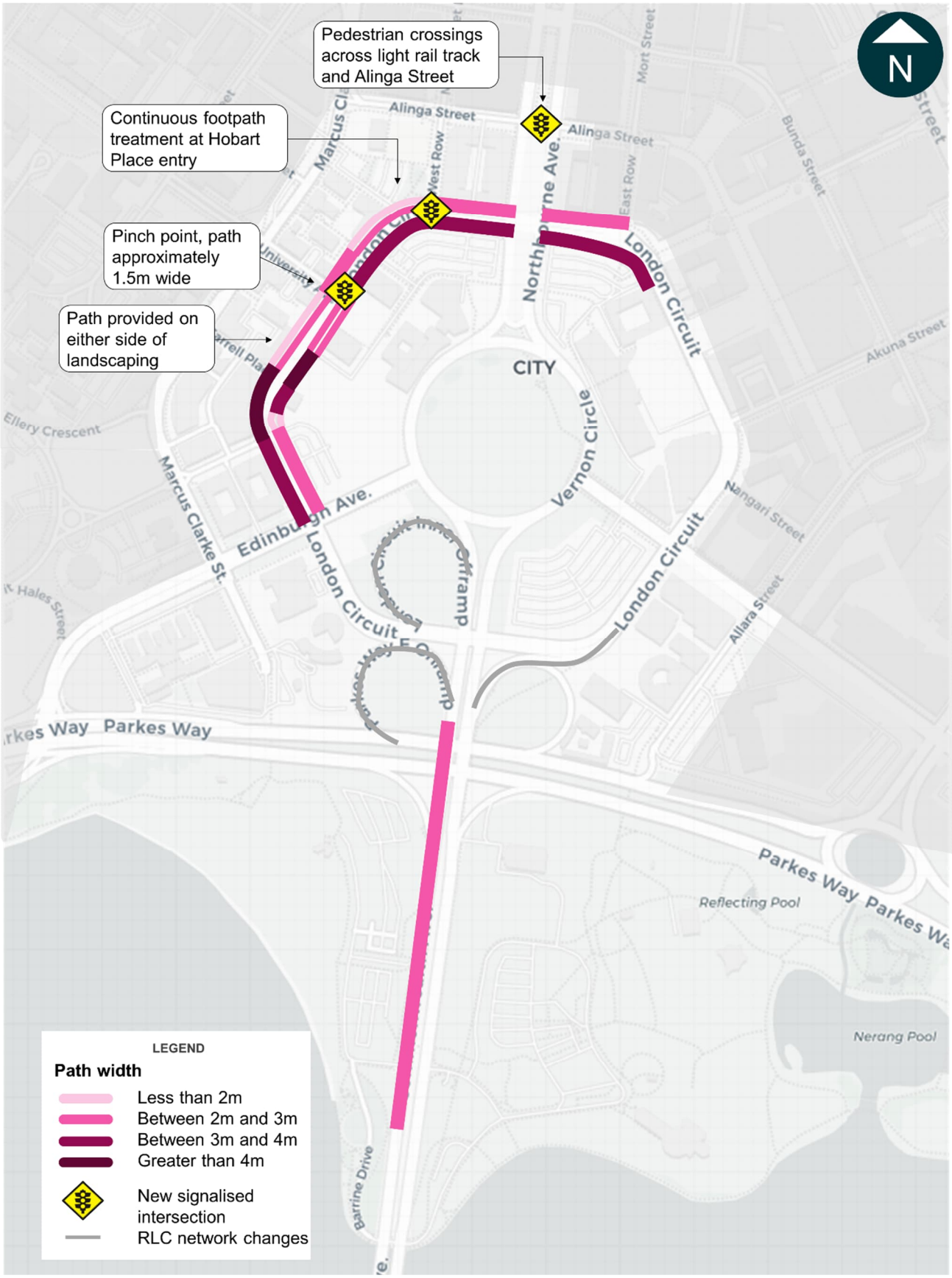


Figure 7-18 Pedestrian infrastructure proposed to be included as part of the Project

7.6 Coach operation impacts

The proposed road network changes discussed in Section 7.2.1 include a right turn ban from Alinga Street into Northbourne Avenue and a right turn ban from London Circuit into Edinburgh Avenue. These right turns are currently used by coaches to access the coach stops of West Row. Therefore, these coaches would need to use the alternative routes shown in Figure 7-19.

Table 7-8 summarises the existing coaches that use the West Row coach stops and their service frequency. Based on this, it is anticipated that around five coaches per day would need to use alternative routes due to the proposed road network changes.

Table 7-8 Existing coach services and frequency

Impacted coach service	Coach service frequency (service)
Greyhound bus to/from Melbourne	One per day
Greyhound bus to/from Thredbo	One per day (winter only)
784 Goulburn to Canberra	One per day (weekdays only)
704 Wagga Wagga to Queanbeyan	Three times per week
702 Wagga Wagga to Queanbeyan	Three times per week
771 Canberra to Eden	Three times per week
775 Canberra to Bombala	One per day

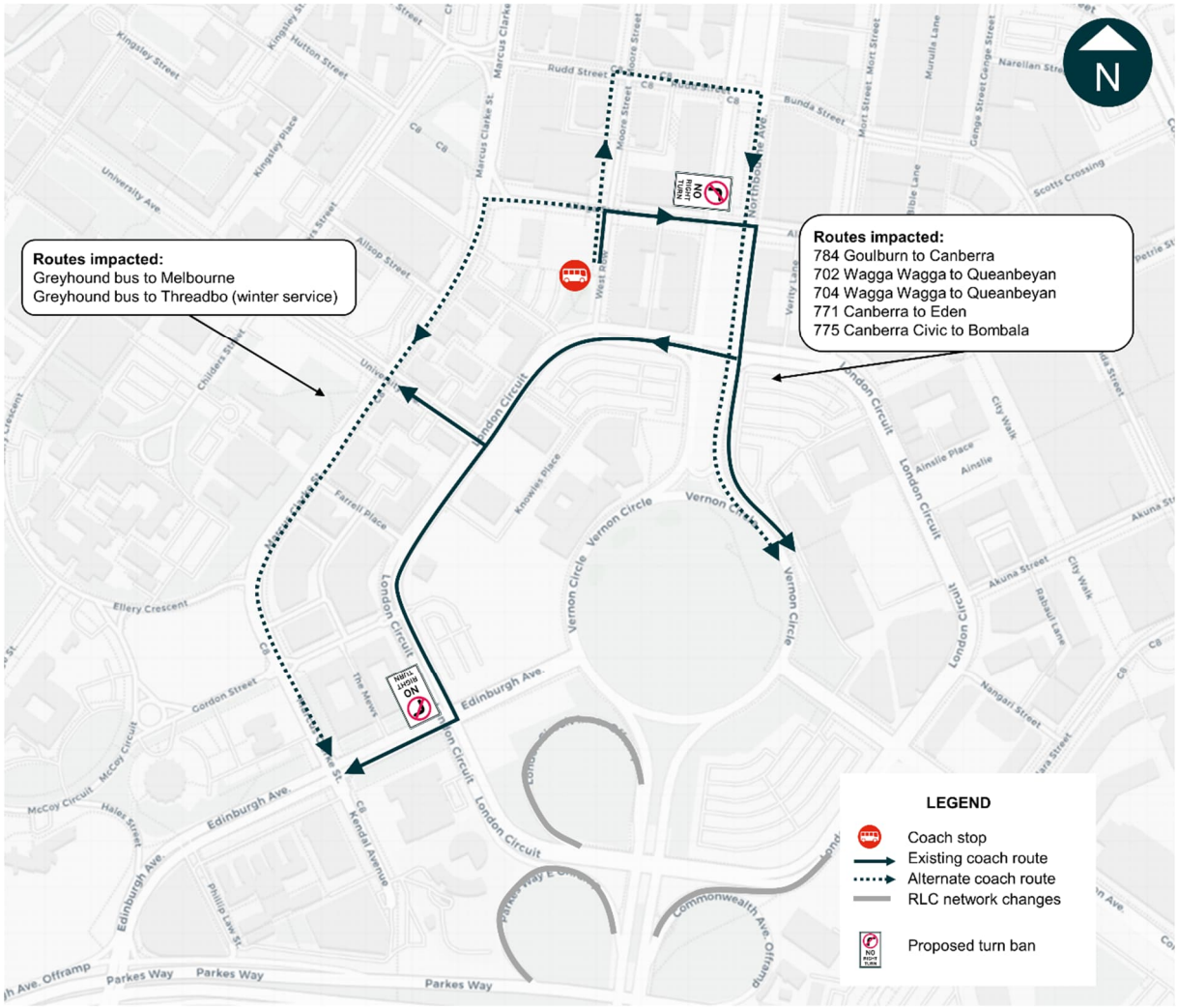


Figure 7-19 Alternative routes for coaches

7.7 Parking and access impacts

7.7.1 Kerbside uses

All parking, loading and other kerbside uses would be removed along the Project alignment, which is limited to changes to kerbside uses on London Circuit West. The Project's impact on these existing kerbside uses is summarised in Table 7-9.

Table 7-9 Impact to kerbside uses

Affected kerbside uses on London Circuit West	Impact rating	Reason for impact rating
Ten Police only bays located outside the Canberra City Police Station	None	These spaces have been temporarily moved from Knowles Place to London Circuit as part of the Blocks 10 and 11, Section 100 construction works. TCCS plans to relocate these spaces prior to opening on the Project
Seven loading zone spaces located south of West Row	Minor	Could be relocated to nearby side streets, if required
Nine bus zones	None	These spaces are only used for bus layover, which can now be accommodated elsewhere
Three short-term parking spaces located south of Knowles Place North	Minor	Could be relocated to nearby side streets, if required

Affected kerbside uses on London Circuit West	Impact rating	Reason for impact rating
Two pick-up/set-down bays located north of Knowles Place South	Minor	Could be relocated to nearby side streets, if required
One No Stopping (emergency vehicles excepted) space located north of Knowles Place South	Minor	Emergency vehicles could stop on nearby side streets, if required

7.7.2 Off-street parking

The road network changes along London Circuit between East Row and West Row require some loss of parking in the two off-street car parks located on either side of the Northbourne Avenue and London Circuit intersection.

Approximately 40 car parking spaces would be removed in the car park bounded by Northbourne Avenue, London Circuit and Theatre Lane to the east of Northbourne Avenue. This car park would be reconfigured in accordance with Australian Standards and any affected accessible parking spaces would be relocated within the reconfigured car park.

Approximately 55 car parking spaces would be removed in the Block 40, Section 100 car park which is bounded by Northbound Avenue, London Circuit and Knowles Place. This car park would also be reconfigured in accordance with Australian Standards and any affected accessible parking spaces and car share spaces would be relocated within the reconfigured car park. However, it also noted that this site is planned for redevelopment (see 3.4.1.7). There may be opportunities for the parking loss to be accommodated in any future car parks that would be provided as part of the planned development of this site.

Access to/from car parks on Knowles Place and Hobart Place would be affected by the proposed road network changes. The associated access impacts and alternatives routes are discussed in Section 7.7.3.

7.7.3 Local area traffic access

As discussed in Section 7.2.1, the Project includes road network changes including some turn restrictions at intersections that would affect local area access. The proposed road network changes and their impact are summarised in Table 7-10. The overall impacts to local area access are considered to be minor given that short alternative access routes are available, as shown in Figure 7-20.

Most of the alternative routes would be via Marcus Clarke Street or alternatively via Vernon Circle. This is consistent with the Project's intent for Marcus Clarke Street to be a detour route for London Circuit, which would function as a key public transport route.

At the intersections of Northbourne Avenue and Alinga Street and Northbourne Avenue and London Circuit, the permitted U-turn movements would be removed. It is understood that these U-turns are most frequently used to access kerbside uses along the northbound carriageway of Northbourne Avenue including taxi and set-down and pick-up bays outside the Jolimont Tourist Centre. Alternative routes are available via Vernon Circle or West Row.

Drivers should be made aware of the proposed road network changes and alternative routes before they are implemented.

The impacts of changes to local access have been accounted for in the operational traffic modelling and therefore, their impacts on the road network are included Section 7.3 of this report.

Table 7-10 Impact to local area access

Intersection	Proposed changes to vehicle movements	Impact
Northbourne Avenue and Alinga Street	• U-turns from Northbourne Avenue removed • Right turns from Alinga Street removed (bus excepted)	Alternative routes available including via Vernon Circle for northbound traffic and via West Row for southbound traffic
Northbourne Avenue and London Circuit	• U-turns from Northbourne Avenue removed • Right turns from Northbourne Avenue northbound removed	Alternative routes available including via Vernon Circle or London Circuit West for northbound traffic and via West Row for southbound traffic
London Circuit and West Row	No change	None
London Circuit and Hobart Place	Right turns removed	Alternative routes are available via Marcus Clarke Street
London Circuit and University Avenue	No change	None
London Circuit and Knowles Place North	Northbound right turn into Knowles Place removed	Alternative routes available including via Marcus Clarke Street
London Circuit and Knowles Place South	All right turns removed	Alternative routes available including via Marcus Clarke Street
London Circuit and Farrell Place	All right turns removed	Alternative routes available via Marcus Clarke Street
London Circuit and Gordon Street	Right turns to/from Blocks 10 and 11, Section 100 removed	Alternative routes available via Marcus Clarke Street
London Circuit and Edinburgh Avenue	Right turn from London Circuit southbound removed	Alternative routes available via Marcus Clarke Street
Commonwealth Avenue and London Circuit	No change	None
Commonwealth Avenue and Parkes Way off-ramp	No change	None
Commonwealth Avenue and Corkhill Street	No change	None
Commonwealth Avenue and Albert Street	No change	None

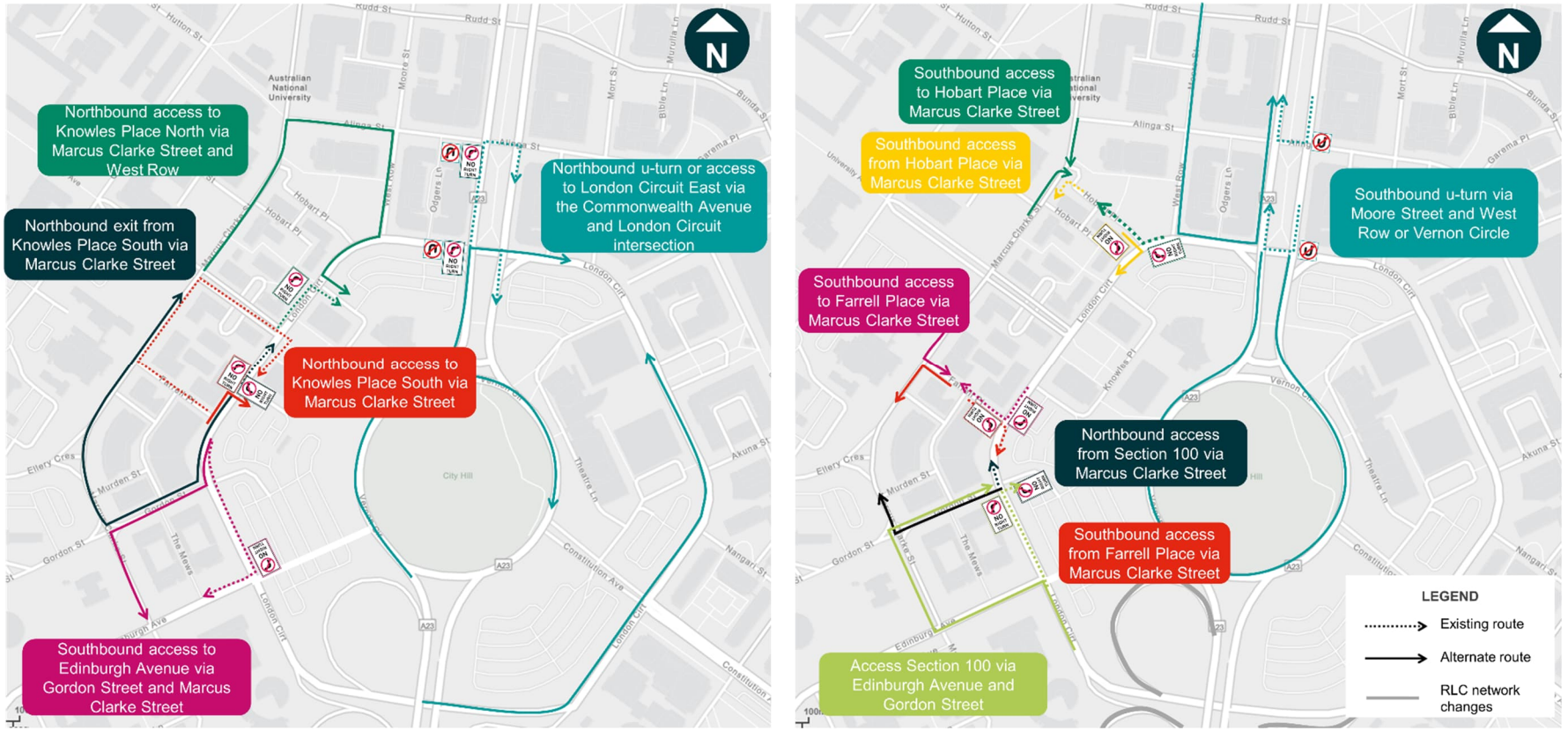


Figure 7-20 Alternative routes for local area traffic

7.7.4 Property access

There would be no direct changes to any property accesses as a result of the Project.

7.7.5 Emergency access

The Project includes several new turn bans and intersection modifications, as summarised in Section 7.2.2. However, emergency vehicles could continue to turn right out of Knowles Places South, by using lights and sirens, which provides access from the Police Station

Emergency vehicles could use the light rail alignment during emergency situations. Therefore, the Project is expected to have only a minor impact on restricting emergency vehicle access.

7.8 Road safety

The proposed new signalised intersections along the Project's alignment create new intersection related conflicts. However, the intersections 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.

The proposed introduction of a LRV within the roadway would increase the severity of any possible vehicular, pedestrian or cyclist crash with the LRV. The following aspects have been included in the design to reduce the likelihood of a crash occurring with the LRVs, and/or reduce the severity if a crash was to occur:

- The posted speed limit for all vehicles including LRVs would be 20 km/h in locations of higher pedestrian activity, such as Northbourne Plaza and Edinburgh Avenue
- Right turn movements across the light rail track would only be permitted at signalised intersections and in a separate phase to the LRVs
- The light rail would run within a median which would be 80-150 mm high to minimise the possibility of road vehicles straying into the corridor and pedestrians crossing the corridor The median would transition to be at grade before each signalised intersection to facilitate vehicular, cyclist and pedestrian movement across the track.

The Project presents the following road safety benefits:

- Providing separated off-road cycleways, and two protected intersections, would likely reduce the frequency of cyclist crashes by separating cyclist movements from vehicles
- Providing improved footpath facilities and separating cyclists from pedestrians, where possible, would likely reduce the frequency of a cyclist and pedestrian crash.

7.9 Movement and place assessment

A summary of the movement and place assessment, and classifications for the study area streets is provided in Table 7-11. Overall, the movement and place classifications and associated typologies are not expected to change due to the Project. However, some minor changes to the movement and place functions would be expected, as shown in Figure 7-21.

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

The movement function of Northbourne Avenue, London Circuit and Commonwealth Avenue are expected to increase due to the construction and installation of the Light Rail alignment.

Along London Circuit the movement function would increase due to the installation of off-road cycling lanes and the reallocation of two vehicle lanes for the Project alignment. The place function of London Circuit is expected to increase due to an increased number of trees, installation of furniture, bicycle racks and drinking fountains which would encourage users to use the space. In addition, the proposed Light Rail stop on London Circuit could activate the existing place functions on London Circuit.

The pedestrian plaza within the median on Northbourne Avenue is expected to be reduced due to the Project's alignment within the median. This would reduce the place function of the space however the wide footpaths provide opportunity to improve the place function along the corridor.

A protected intersection treatment is proposed at the Northbourne Avenue and London Circuit intersection and the Commonwealth Avenue and London Circuit intersection, to facilitate cyclist movements across the corridor. The cycling crossing would be separated from the pedestrian crossings. These intersections would increase the movement function of these corridors.

The movement function along Marcus Clarke Street would increase, with traffic volumes anticipated to shift from London Circuit to Marcus Clarke Street.

Table 7-11 Potential future movement and place assessment

Road	Without Project classification			With Project potential classification		
	Movement	Place	Typology	Movement	Place	Typology
Northbourne Avenue between Alinga Street and London Circuit	M3	P3	Vibrant Street	M3	P3	Vibrant Street
Vernon Circle including approaches to London Circuit	M3	P1	Movement Corridor	M3	P1	Movement Corridor
Commonwealth Avenue between London Circuit and north edge of the Lake	M3	P1	Movement Corridor	M3	P1	Movement Corridor
London Circuit West between Northbourne Avenue and Edinburgh Avenue	M2	P2	Vibrant Street	M3	P2	Vibrant Street
London Circuit West between Edinburgh Avenue and Commonwealth Avenue	M2	P1	Movement Corridor	M3	P1	Movement Corridor
London Circuit East between Constitution Avenue and Commonwealth Avenue	M2	P1	Movement Corridor	M2	P1	Movement Corridor
Edinburgh Avenue between Parkes Way	M3	P1	Movement Corridor	M3	P1	Movement Corridor

Road	Without Project classification			With Project potential classification		
	Movement	Place	Typology	Movement	Place	Typology
and Vernon Circle						
Marcus Clarke Street between Alinga Street and Kendall Lane	M2	P2	Vibrant Street	M3	P2	Vibrant Street

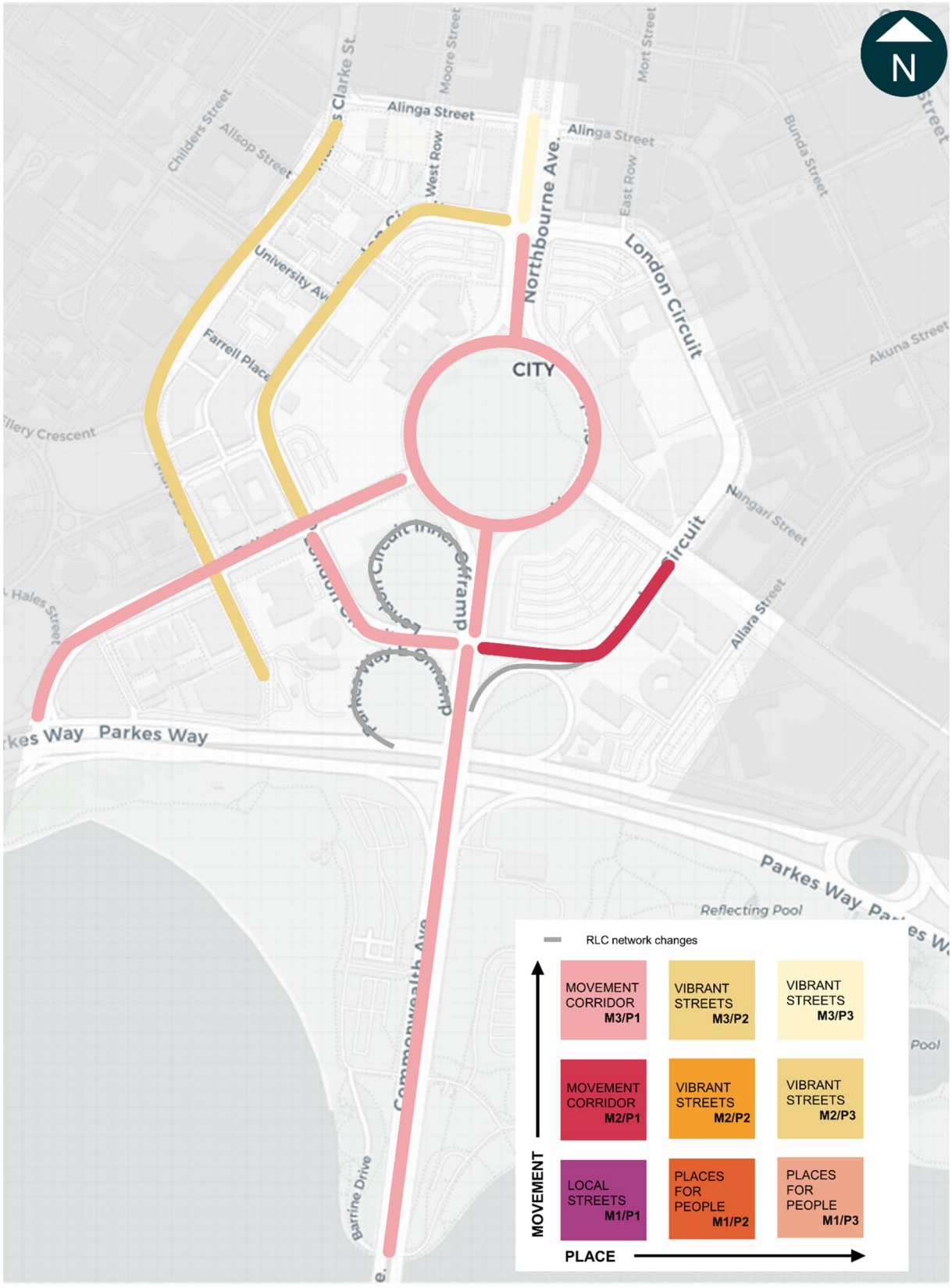


Figure 7-21 Potential future movement and place typologies

7.10 Special event considerations and impacts

The planned stop and terminus at Commonwealth Park is located adjacent surrounding parklands and facilities that are used for special events. There are a number of events, both large and small, which require transport planning and service delivery consideration.

The Commonwealth Park stop has not been primarily designed as an event operation stop and has lower forecast patronage demands than other stops in the network. It is anticipated that the light rail operator would be required to prepare and implement a management plan to manage people accessing events. There are various management measures that could be considered to manage a high level of pedestrians accessing and egressing the stop during event operation, including higher frequency services and fencing for crowd control. Free ticketing options could be considered for extra-large events to assist with pedestrian and passenger movement.

7.11 Management and mitigation measures

A summary of the management and mitigation measures that could support in managing or mitigating the operational (post-construction) related transport impacts of the Project are summarised in Table 7-12.

Table 7-12 Operational safeguards and management measures

Ref	Management and mitigation measure	Timing
O1	Public awareness campaigns will be undertaken to increase understanding of new arrangements and interactions between cars, bicycles and pedestrians with light rail.	Prior to operation
O2	Continue to investigate measures to optimise the performance of key intersections (e.g., adjusted signal phasing). Refinement of intersection signals phasing to improve light rail, traffic and pedestrian movement efficiency	Prior to operation
O3	No net loss of accessible parking within the delivery phase area.	During operation

7.12 Residual impacts

The residual (after mitigation) impacts associated with the Project operational assessment are summarised in Table 7-13.

Table 7-13 Summary of post-construction related impacts of the Project (after mitigation)

Type	Operational impacts or benefits	Likelihood	Consequence	Rating
Road network	Increased weekday peak period travel times due to the cumulative impacts of the Project, other planned projects and traffic growth in 2026 and 2036.	Possible	Minor	Low
	Cumulative impacts of the Project, other planned projects and traffic growth on weekday peak period traffic congestion (density) in 2026 and 2036.	Unlikely	Moderate	Low
	Cumulative impacts of the Project, other planned projects and traffic growth on weekday peak period performance of the Commonwealth Avenue and London Circuit intersection, London Circuit and University Avenue intersection and	Unlikely	Moderate	Low

Type	Operational impacts or benefits	Likelihood	Consequence	Rating
	London Circuit and Gordon Street intersection in 2026 or 2036.			
Public transport	Increased weekday peak period bus travel times due to the Project in 2036	Possible	Minor	Low
Pedestrians and cyclists	Providing signalised pedestrian crossings for all legs of any new signalised intersection could result in delays for pedestrians waiting at the proposed intersections.	Possible	Insignificant	Very low
	The combined active transport treatments and upgrades would improve the walkability and cycling connectivity within the study area and along the Project alignment.	N/A	N/A	Beneficial
Kerbside uses	All parking, loading and other kerbside uses would be removed along London Circuit West.	Likely	Insignificant	Low
Local area traffic access	Removal of some existing right turn and U-turn movements at intersections along the Project's alignment requires traffic to use alternative routes.	Likely	Insignificant	Low
Road safety	Proposed signalised intersections along the Project's alignment could create new intersection related conflicts.	Possible	Minor	Low
	The proposed introduction of a LRV within the roadway would increase the severity of any possible vehicular, pedestrian or cyclist crash with the LRV.	Possible	Minor	Low
	Providing off-road cycling facilities along London Circuit, combined with wider footpaths and the protected intersection treatments would improve safety for vulnerable users, by separating cyclists, pedestrians, and traffic.	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 Stage 2A City to Commonwealth Park Project during construction and operation (post-construction).

Overall, the assessment demonstrates that the Project could extend the existing light rail network to Commonwealth Park with minor to moderate 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 Light Rail to Woden
- Provides a frequent and reliable public transport service on the doorstep of several large development sites that are planned along London Circuit and Commonwealth Avenue, which supports low reliance on private vehicles for the future residents, visitors and employees of these developments
- Reduces the dominance of cars through London Circuit West by reconfiguring the road layout and allocating more space to public transport, as well as walking and cycling, delivering on a number of strategic planning and policy goals
- Improves active transport connectivity and safety by providing new infrastructure including protected intersections, additional off-road bike paths and widened footpaths along London Circuit
- 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-designed 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 and 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 Project construction works are anticipated to commence in 2024, with completion planned in 2026. The works would largely be carried out in blocks to minimise disruption to residents, visitors, businesses and existing transport operations in the local vicinity. Closures of major intersections would likely be required at night or during weekend periods.

Traffic modelling assessed six construction scenarios. Each of the assessed scenarios represent a point in time, or stage, based on the indicative construction staging. The construction scenarios include varying combinations of block and intersection closures.

The construction assessment indicates that the local road network would experience moderate increases to congestion, density and travel times for general traffic, as well as buses. However, these impacts could be minimised through implementation of the committed mitigation and management measures.

Throughout construction and block closures, pedestrian access would be maintained. These pedestrian access ways could also facilitate access for cyclists through the construction zones. Wayfinding and

signage would need to be provided to inform pedestrians about and detours, changes to crossing points and associated travel time increases.

Safe routes for pedestrians and cyclists would be maintained throughout the construction works with minimal diversion from the desire line. During block closures a pedestrian path, with provisions for cyclists would be allowed for to maintain connectivity. Therefore, this Project's construction is anticipated to have minimal impact to pedestrian and cyclist movements and travel times.

8.3 Operations

The introduction of the Project and its associated road network changes, forecast background traffic growth and traffic generated from nearby developments could result in traffic reassignment, as well as increased congestion, density and intersection delays, particular along London Circuit and Commonwealth Avenue.

These impacts are anticipated as a result of the following key network changes needed to facilitate the Project:

- Reallocation of the London Circuit West road space from predominantly traffic to a mix of light rail, pedestrians, cyclists and local area traffic including the loss of one existing traffic lane in each direction
- Changes to permitted movements at intersections, particularly the removal of any uncontrolled right turns or U-turns across the Project alignment
- New signalised intersections at the London Circuit and West Row intersection and the London Circuit and University Avenue intersection, to facilitate controlled right turn movements across the Project alignment.

Traffic modelling suggests that drivers would choose alternative routes, particularly along Vernon Circle, Marcus Clarke Street and West Row to avoid London Circuit and the intersection of London Circuit and Commonwealth Avenue.

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 the Project, forecast traffic growth and in particular the completion of several large development sites in the study area could result in moderate road network impacts by 2036, when compared to existing conditions.

The above impacts may warrant the potential need for road network upgrades on the surrounding road network to encourage the alternative routes, such as Marcus Clarke Street or alternative routes around Canberra's city centre. However, it is noted that the assessment has been undertaken based on a 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 potential future extension of the light rail from Commonwealth Park to Woden other public transport initiatives.

A successful travel demand management strategy may 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.