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Major Projects Canberra  
ABN: 66 676 633 401

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**AECOM**



# LIGHT RAIL

STAGE 2

Preliminary Environmental  
Assessment

# Preliminary Environment Assessment

## Light Rail Stage 2B

Client: Major Projects Canberra

ABN: 66 676 633 401

### Prepared by

**AECOM Australia Pty Ltd**

Ngunnawal Country, Civic Quarter, Lvl 4, 68 Northbourne Avenue, GPO Box 1942, Canberra ACT 2601, Australia

T +61 2 6100 0551 [www.aecom.com](http://www.aecom.com)

ABN 20 093 846 925

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## Acronyms and abbreviations

Acronym	Meaning
ABS	Australian Bureau of Statistics
CEEC	Critically endangered ecological community
CEMP	Construction environmental management plan
CCTV	Closed-circuit television
CHL	Commonwealth Heritage List
CSD	Contaminated Sites Database
DA	Development Approval
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EIS	Environmental Impact Statement
EPAA	Environmental Protection Agreements/Authorisations
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPSDD	Environment, Planning and Sustainable Development Directorate
GHG	Greenhouse gas
ha	Hectares
JSCNCET	Commonwealth Joint Standing Committee on the National Capital and External Territories
km	Kilometre
LRV	Light Rail Vehicle
m	Metre
MNES	Matters of National Environmental Significance
MPC	Major Projects Canberra
NC Act	<i>Nature Conservation Act 2014</i>
NCA	National Capital Authority
NCP	National Capital Plan
NHL	National Heritage List
PALM Act	Commonwealth <i>Planning and Land Management Act 1988</i>
PD Act	<i>Planning and Development Act 2007</i>
PEA	Preliminary Environmental Assessment
PMST	Protected Matter Search Tool
RNE	Register of the National Estate
Stage 1	Gungahlin to the City Centre
Stage 2A	City to Commonwealth Park
TCCS	Transport Canberra and City Services
TEC	Threatened Ecological Communities
TPS	Traction power substation
TTMP	Temporary Traffic Management Plan

## Executive summary

### Background

Public transport in Canberra is currently provided by a bus network and the existing Light Rail network between Gungahlin and the City Centre. Despite the broad coverage of the bus network, there is a limit to its capacity to meet the movement needs of a growing city and to support its projected population growth.

Light Rail between the northern area of Gungahlin to the City Centre is currently operational with 14 stops provided along Northbourne Avenue, the Federal Highway and Flemington Road. The ACT Government has committed to continue to better connect Canberra by extending the existing Light Rail network from the City Centre to Woden Town Centre. The extension of the Light Rail from the City Centre to Woden Town Centre was split into two projects. The first stage being Light Rail City to Commonwealth Park (Stage 2A), which received Conditional Approval from the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (EPBC 2019/8582). Stage 2A has also been granted Works Approval by the National Capital Authority (NCA), and Development Approval (DA) by the Environment, Planning and Sustainable Development Directorate (EPSDD).

The second stage of this extension would comprise Light Rail Commonwealth Park to Woden (Stage 2B), (the Project). The Project would extend the north-south Light Rail alignment between Gungahlin, the City Centre, and Woden Town Centre. An EPBC Referral was previously submitted for a different proposal for Stage 2B, which provided an alignment on the eastern side of State Circle through the National Triangle (EPBC 2019/8491) (**Referral 2019/8491**). This referral for Stage 2B does not constitute either a request to vary Referral 2019/8491 or a withdrawal of Referral 2019/8491. This referral, which is for the Project, comprises a separate proposal.

### Purpose of this Preliminary Environmental Assessment

This Preliminary Environmental Assessment (PEA) has been prepared to support a referral for the Project which proposes two alternative alignment options for Light Rail Stage 2B as described below.

This PEA will assist:

- The Commonwealth Minister for the Environment and DCCEEW to determine whether the Project is a controlled action under the Commonwealth (Cth) *Environment and Protection Biodiversity Conservation Act 1999* (EPBC Act) and the appropriate method for assessing the environmental impacts of the two alternative alignment options described below
- The ACT Minister for Planning and Land Management of EPSDD to define the scope of environment assessment needed to support an application for a DA made under the *Planning Act 2023* (ACT) (Planning Act).

### Applicable jurisdictions

The Project will require the following statutory environmental and planning approvals:

- A Works Approval from the NCA under the *Australian Capital Territory (Planning and Land Management) Act 1988* (Cth) (PALM Act) to carry out certain works in Designated Areas under the National Capital Plan (NCP)
- A DA from the territory planning authority or the Minister under the Planning Act, for works on Territory land subject to the *Territory Plan 2023*
- Approval from the Commonwealth Minister for the Environment under the EPBC Act to carry out the Project, if determined a controlled action
- Approval from both Houses of Parliament, for works within the Parliamentary Zone, as defined in the *Parliament Act 1974* (Cth).



## Project overview

Key features of the Project would include:

- About 10 kilometres (km) of light rail track between Commonwealth Park and Woden Town Centre including stops
- Two alternative alignment options being considered through the National Triangle including:
  - an alignment along State Circle East (see Figure 1-2). Figure 1-2 shows two options being considered to connect to Adelaide Avenue, either from State Circle or Capital Circuit
  - an alignment through National Triangle-Barton, which would follow King George Terrace, Macquarie Street, Bligh Street, National Circuit and Sydney Avenue, before connecting with State Circle (Figure 1-2)
- A new light rail bridge on Commonwealth Avenue over Lake Burley Griffin
- Landscaping features consistent with the prescribed outcomes in the NCP and what was envisioned by the Griffins' plan for Canberra
- Track infrastructure, including wire-free areas from the approved Stage 2A stop at Commonwealth Park through the Parliamentary Zone. The final endpoint of wire-free travel would be determined during detailed design
- Road network alterations to accommodate the Project
- Integration with the wider active and public transport network
- Dedicated traction power substations to provide electricity for the Project
- Upgrade of the existing stabling depot and maintenance facility in Mitchell to accommodate additional light rail vehicles
- Rail systems infrastructure, including inground service routes, wayside cabinets, and communications systems.

## Environmental context

This PEA and risk analysis has identified the following key environmental issues:

- Non-Aboriginal heritage (Section 6.1)
- Aboriginal heritage (Section 6.2)
- Traffic and transport (Section 6.3)
- Biodiversity (Section 6.4)
- Noise and vibration (Section 6.5)
- Urban design, landscape character and visual amenity (Section 6.6).

Detailed assessment of these issues and the other environmental issues identified would be carried out as part of the assessment for the Project (if the Project is determined to be a controlled action). Other issues that will be included in the assessment are:

- Social and economic (Section 7.1)
- Climate change (Section 7.2)
- Hydrology, flooding and water quality (Section 7.3)
- Property and land use (Section 7.4)
- Geology, soils and contamination (Section 7.5)
- Air quality (Section 7.6)
- Greenhouse gas (Section 7.7)

- Resource management and waste (Section 7.8)
- Utilities (Section 7.9)
- Hazards and risk (Section 7.10).

Specialist assessments have been carried out to assess the significance of the impact on the heritage and biodiversity values protected as matters of national environmental significance (MNES) under the EPBC Act to support the referral made to the Commonwealth Minister for the Environment. These are appended separately to the referral and summarised in this document.

## Next steps

The next steps in the approval process are:

- A referral will be made under the EPBC Act. DCCEEW will determine whether the Project is a controlled action and the appropriate assessment approach, which is likely to be an EIS (and the steps below assume that this will be the nominated assessment method). If deemed a controlled action, DCCEEW will prepare and issue assessment guidelines for the Project in collaboration with EPSDD
- An application for an EIS scoping document will be prepared for EPSDD. EPSDD will provide its scoping document (assessment) requirements in consultation with relevant entities
- Major Projects Canberra (MPC) will prepare a draft EIS to address the above requirements and for public exhibition
- MPC will consider the submissions to prepare a final EIS for the Project
- EPSDD will assess the final EIS and, if satisfied, will then prepare an EIS assessment report. With this information, the Minister for Planning and Land Management will make their determination on the EIS. Once the EIS process is complete, an application for a DA can be lodged
- DCCEEW will prepare its Recommendation Report for the Commonwealth Minister for the Environment to decide whether to approve the proposed action
- The Commonwealth Minister for the Environment and EPSDD will issue a final decision on the proposed action
- Once the EIS process is complete, a Works Approval can be sought from the NCA to carry out certain works within Designated Areas under the NCP.

## 1.0 Introduction

This chapter provides an overview of the Project, including background and the purpose of this report.

### 1.1 Background

#### 1.1.1 Existing transport pressures

As Canberra's population and visitors to Canberra are forecast to increase, it is necessary to act to enhance movement capability by enhancing public transport capacity. About 85% of people drive to work every day in Canberra despite having some of the shortest commutes across Australia (Australian Bureau of Statistics, 2018). Visitor numbers to Canberra are projected to “increase by 363,000 per year by 2030” following the addition of new international flights and its global recognition as an emerging tourist destination, rich with history, culture, and entertainment (ACT Government, 2023a).

Public transport in Canberra is currently provided by a bus network and the existing Light Rail network between Gungahlin and the City Centre (Stage 1). Despite the broad coverage of the bus network, there is a limit to its capacity to meet the movement needs of a growing city and to support its projected population growth.

#### 1.1.2 Reducing the city's dependency on cars

Transport Canberra released the draft of *Light rail network: delivering a modern transport system for a growing city* that presented the idea, justification, and options for bringing Light Rail to Canberra (ACT Government, 2015). The draft plan was updated with the release of the *ACT Planning Strategy* in 2018 (ACT Government, 2018). The document states that the incorporation of an integrated Light Rail system into Canberra would:

- Promote the city as a world class and liveable destination
- Encourage people to leave their car at home
- Assist the ACT Government to meet the goals of its transport, climate change and health strategies
- Increase the use of public transport by people to help reduce congestion and greenhouse gas (GHG) emissions
- Increase growth and regeneration in the neighbourhoods and precincts along the Light Rail transport corridors.

The *ACT Transport Strategy 2020* sets out the government's approach to achieving the vision for transport in Canberra to be world class in supporting a compact, sustainable and vibrant city (ACT Government, 2020). This strategy provides a framework for planning and investment in transport for the next 20 years, aiming to provide:

- Flexible, reliable, and sustainable options for Canberrans to make their journeys
- Convenient and connected public transport
- High quality environments for walking and cycling
- A safe and reliable road network.

Bringing Light Rail to Canberra is therefore a response to the above strategies as it would service the city by helping provide integrated public transport that would connect many suburbs, precincts, services, and amenities. The introduction of a Light Rail network will help reduce road congestion and its associated costs while helping form part of a smart, sustainable, integrated transport network.

### 1.2 Overview of the Light Rail network

Stage 1 is currently operational with 14 stops provided along Northbourne Avenue, the Federal Highway and Flemington Road (Figure 1-1). With more than one million passengers boarding the Light Rail within the first three months of operation, Light Rail has proven successful in providing the public a sustainable, accessible, and affordable public transport option. Building on the success of Stage 1, the

ACT Government has committed to continue to better connect Canberra by lengthening the north-south alignment, extending the current Light Rail network to Woden Town Centre (Figure 1-1). The extension of the Light Rail from the City Centre to Woden Town Centre was split into two projects. The first stage being Light Rail City to Commonwealth Park (Stage 2A), received Conditional Approval from the Commonwealth Minister for the Environment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC 2019/8582). Stage 2A has also been granted Works Approval by the National Capital Authority (NCA) and Development Approval (DA) by the Environment, Planning and Sustainable Development Directorate (EPSDD) under the *Planning and Development Act 2007* (PD Act).

### 1.3 The Project

The second stage of the City Centre to Woden Town Centre alignment would be delivered through Light Rail Stage 2B Commonwealth Park to Woden (the Project). The Project would extend the north-south Light Rail alignment between Gungahlin, the City Centre and Woden Town Centre. An overview of the Project is shown on Figure 1-2.

Key features of the Project would include:

- About 10 kilometres (km) of light rail connecting the approved Stage 2A Commonwealth Park stop and Woden Town Centre including stops
- Two alternative alignment options being considered through the National Triangle including:
  - an alignment along State Circle East. Figure 1-2 shows two alignment options being considered to connect to Adelaide Avenue, either from State Circle or Capital Circuit
  - an alignment through National Triangle-Barton, which would follow King George Terrace, Macquarie Street, Bligh Street, National Circuit and Sydney Avenue, before connecting with State Circle
- A new light rail bridge on Commonwealth Avenue over Lake Burley Griffin
- Landscaping features consistent with the prescribed outcomes in the National Capital Plan (NCP) and what was envisioned by the Griffins' plan for Canberra
- Track infrastructure, including wire-free areas from the approved Stage 2A stop at Commonwealth Park through the Parliamentary Zone. The final endpoint of wire-free travel would be determined during detailed design.

The Project is shown on Figure 1-2. Further details of the Project are described in Chapter 4.0.

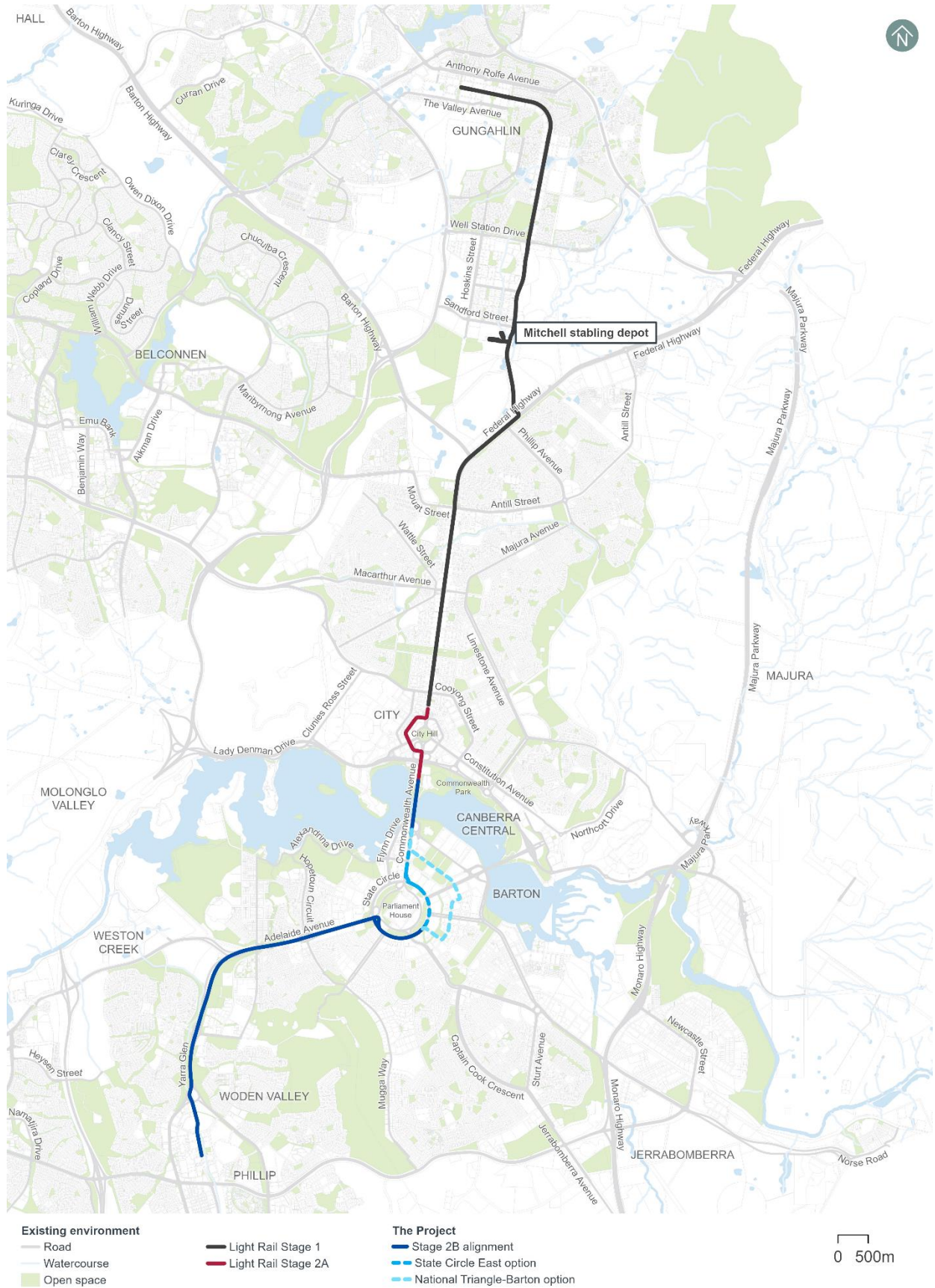


Figure 1-1 Existing and proposed Light Rail network

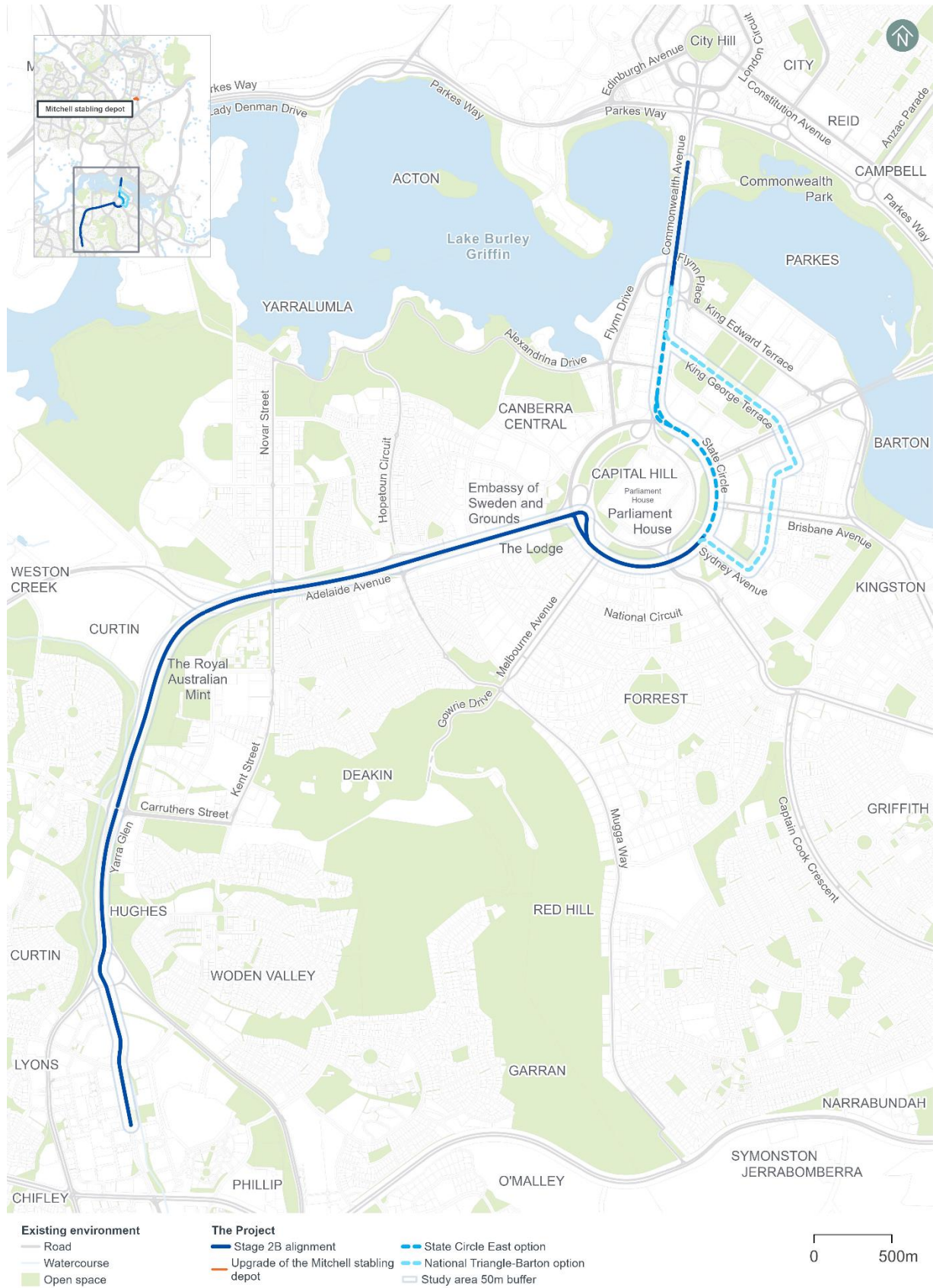


Figure 1-2 Overview of the Project

## 1.4 Purpose of this report

An EPBC Referral was previously submitted for a different proposal for Stage 2B, which provided an alignment on the eastern side of State Circle through the National Triangle (EPBC 2019/8491) (**Referral 2019/8491**). This referral for Stage 2B does not constitute either a request to vary Referral 2019/8491 or a withdrawal of Referral 2019/8491. This referral, which is for the Project, comprises a separate proposal.

This Preliminary Environmental Assessment (PEA) has been prepared to support a referral for the Project which proposes two alternative alignment options for Light Rail Stage 2B as described below.

This PEA will assist:

- The Commonwealth Minister for the Environment to determine whether the Project is a controlled action under the EPBC Act and the appropriate method for assessing the environmental impacts of the two alternative alignment options described above
- The ACT Minister for Planning and Land Management of EPSDD to define the scope of environment assessment needed to support a development application made under the *Planning Act 2023* (ACT) (Planning Act).

**Chapter 3.0 Planning and legislation** describes the planning and assessment framework and how this PEA would support the Project approval process.

## 1.5 Structure of this report

This report is structured as follows:

- **Executive summary** – summarises the main chapters of the PEA
- **Chapter 1.0 Introduction** – provides an introduction to the Project and states the report's purpose
- **Chapter 2.0 Strategic need and context** – details the strategic need for the Project, Project benefits and objectives, and outlines how the Project responds to key strategic plans and policies
- **Chapter 3.0 Planning and legislation** – outlines the Project's planning approvals framework including applicable laws and planning policies
- **Chapter 4.0 Project description** – details the Project's key features
- **Chapter 5.0 Preliminary risk assessment** – describes the assessment process to identify issues and support the environmental assessment for the Project
- **Chapter 6.0 Key environmental issues** – provides a preliminary assessment of the Project's key environmental issues
- **Chapter 7.0 Other environmental issues** – provides a preliminary assessment of the Project's other environmental considerations
- **Chapter 8.0 EPBC referral** – summarises the potential impacts on matters of national environmental significance (MNES)
- **Chapter 9.0 Scoping Statement Application** – summarises the potential EIS Scoping Document Application triggers
- **Chapter 10.0 Conclusions and further assessment** – details the key conclusions and summarises the additional assessments needed to support the environmental assessment
- **Chapter 11.0 References** – includes the references used to develop this document
- **Appendix A Preliminary risk assessment** – the preliminary risk register presents a preliminary risk assessment for the Project.

## 2.0 Strategic need and context

This chapter details the strategic need for the Project, Project benefits and objectives, and outlines how the Project responds to key strategic plans and policies.

### 2.1 Project need and benefits

The Project is 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 NCP (described in Section 2.3.1) and the *Territory Plan 2023* (Territory Plan) (described in Section 2.3.2) for Canberra and its surrounds.

The Project will provide the foundation for an integrated public transport system which will better connect Canberra to meet the city's transport needs, including:

- **Future-proofing the transport network** by providing public transport infrastructure that responds to current needs and provides strategic capacity for future growth
- Providing **sustainable transport** options and reaching net zero GHG emissions by providing public transport that utilises renewable energy
- Facilitating the transition to a **compact and connected city** by providing more public transport closer to the City Centre to limit urban sprawl and car use, and to limit the stress of a growing Canberra population.

The Project is anticipated to have multiple benefits, including:

- **Greater access and opportunities:** the Project would provide greater connections to Lake Burley Griffin, cultural institutions, festivals, events, and key town centres and economic districts. Furthermore, with more people living and working in Canberra, there is a need to be able to move more people more often. The Project would provide a reliable mass transit option and encourage increased use of public transport within a car-dominant city
- **Delivering a city-wide network:** the Project would create a frequent and reliable transport alignment that better connects major town centres and residential employment hubs
- **Good for the environment:** the Project would be powered by 100% renewable energy, making it one of the cleanest travel options in Canberra and providing an attractive alternative to car travel
- **Keeping Canberra competitive:** the Project would connect North and South Canberra, which would encourage business growth and tourism, increase trip capacity, enable active travel and be a catalyst for building more vibrant precincts and places
- **Maintaining liveability:** the Project would help maintain Canberra's liveability to remain competitive in attracting and retaining people and businesses by improving public transport connections to business and employment hubs
- **Challenges of a growing city:** Canberra's population is expected to grow to 550,000 by 2033 (2022 Population Statement, Centre for Population) and this increased population will rely on an integrated public transport system which will better connect Canberra. Without action, increased congestion on the existing road and bus networks will likely impact the quality of life that residents, students and workers currently enjoy
- **Housing more people:** Canberra generally comprises a higher level of low-density housing when compared to other Australian capital cities. The Project would support urban renewal and development along the corridor which would allow for increased housing density in a sensitive and sustainable manner that is close to public transport which would help accommodate the city's growing population
- **Reducing congestion:** car use in Canberra is high and combined with population growth, increased car usage will lead to a congested road network. Without action, Canberra's roads will become busier and trip times will become longer for car and bus users across the network. The Project would provide a viable alternative to car use which would allow more Canberrans to utilise public transport and promote a mode shift away from cars



- **Supporting tourism in the National Capital:** as the National Capital, Canberra is home to several tourist attractions and national institutions. Delivering light rail through the National Triangle would better connect these institutions and provide opportunities to increase patronage and activate areas of the National Capital.

## 2.2 Project vision and objectives

The ACT Government made a clear commitment in *Canberra: A Statement of Ambition 2016* (ACT Government, 2016a) and the *City Plan 2014* (ACT Government, 2014) to construct the Light Rail network to help achieve its vision for Canberra. The vision for the Project is to:

- Deliver a city-shaping Project which supports the principles set out in *Canberra: A Statement of Ambition*
- Implement the Project as the next stage of the Light Rail network
- Consider opportunities for supporting other ACT Government initiatives and aspirations for urban renewal
- Maximise value for money
- Serve future population and employment centres in the south of the ACT
- Provide an integrated convenient, reliable, and efficient transport system.

In pursuit of the vision outlined above, and across key planning strategies, the design, development, and delivery of the Project would be guided by the seven objectives as shown in Table 2-1.

**Table 2-1 Objectives of the Project**

<b>Connectivity</b>	Provide a north-south public transport alignment that represents the next stage of a future city-wide Light Rail network that connects communities across Canberra
<b>Shape and place</b>	Frame the future shape of development along the Light Rail corridor while reinforcing the identity of existing communities and provide early delivery of city-wide initiatives for urban renewal and diversity of place
<b>Transport choice</b>	Provide an attractive, convenient, efficient, and reliable integrated public transport system that facilitates choice, increases public transport patronage, and reduces car dependency
<b>Value and innovation</b>	Deliver an affordable Project solution that drives innovation and provides a value for money outcome
<b>Environment</b>	Reduce emissions and promote sustainable urban form for the benefit of current and future generations
<b>Community beliefs</b>	Provide a connected and accessible public transport network that strengthens opportunities for social and economic participation
<b>Liveable and productive</b>	Build a productive, diversified, and smart economy by making Canberra a more attractive place to live, work, and invest

## 2.3 Strategic planning and policy context

### 2.3.1 The National Capital Plan

The NCP is the strategy and blueprint giving effect to the Commonwealth Government's interests and intentions for planning, designing and developing Canberra and the ACT. It is prepared and delivered by the NCA under the *Australian Capital Territory (Planning and Land Management) Act 1988* (Cth) (PALM Act) and is focused on planning and development matters of national significance.

The NCP includes provisions in three key areas that are relevant to the Project:

- The Statement of Planning Principles that aim to give effect to the object of the NCP to ensure that Canberra and the Territory are planned and developed in accordance with their national significance, including:
  - Productivity: ensure that infrastructure supports the development of Canberra's National Capital functions
  - Sustainability: ensure the development of a city that both respects environmental values and reflects national concerns with the sustainability of Australia's urban areas
  - Liveability: enhance and preserve Canberra's symbolic and unique design and role as the National Capital
  - Accessibility: support a connected and equitable multi-modal transport system
- Land use plans and general land use controls
- Requirements applicable to Designated Areas, particularly the City Hill, West Basin, and Constitution Avenue and Anzac Parade Designated Area Precincts.

Both alignment options through the National Triangle would span Designated Areas regulated under the NCP and would be subject to planning principles, policies and requirements of the NCP. The Project would require a Works Approval from the NCA for development proposed within the Designated Areas, as discussed in Section 3.2.1.

The NCP provides for a public transport route that traverses Commonwealth Avenue, State Circle and Adelaide Avenue. An amendment to the NCP would be required if the National Triangle-Barton alignment option is identified as the preferred alignment option for the Project.

### **2.3.2 The Territory Plan**

The Territory Plan is the key statutory planning document in the ACT, providing the policy framework for the administration of planning in the ACT under the Planning Act. The purpose of the Territory Plan is to manage land use change and development in a manner consistent with strategic directions set by the ACT Government, Legislative Assembly, and the community, and must not be inconsistent with the NCP. The Territory Plan includes administration and governance directives, territory plan maps, planning principles and strategic links, district policies and zone policies.

DA is required from the territory planning authority or the Minister for those sections of the Project taking place on Territory land outside of Designated Areas, as discussed in Section 3.2.2.

The *Territory Plan 2023* was released on 11 September 2023 and is expected to commence on 27 November 2023.

The new *Territory Plan 2023* introduces district and zone policies, design guides and technical specifications to deliver outcomes focused planning on Territory land. Project approvals for works on Territory land will be sought under the incoming *Territory Plan 2023*.

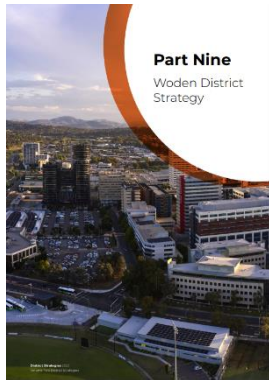
### **2.3.3 Other key strategic plans, policies, and guidelines**

The Project would be designed with consideration of the NCP and Territory Plan. Other key strategic plans, policies and guidelines that would be relevant to the Project are listed in Table 2-2.

Table 2-2 Key strategic plans, policies, and guidelines

Guiding policy documents	
	<p><b>ACT Planning Strategy 2018</b></p> <p>The <i>ACT Planning Strategy 2018</i> is the key strategic document for managing growth and change in the ACT (ACT Government, 2018). Key challenges the strategy aims to respond to include a growing population, growing transport needs and responding to climate change. The Project supports the following directions of the strategy:</p> <ul style="list-style-type: none"> <li>● <b>A compact and efficient city:</b> the Project would introduce an additional public transport option between the City Centre and Woden Town Centre. The Project would also shape future urban development along the corridor</li> <li>● <b>Sustainable and resilient territory:</b> the Project would offer a transport option that utilises the ACT’s renewable electricity and incorporates climate-wise and sustainable design</li> <li>● <b>Accessible Canberra:</b> the Project would enhance accessibility to key Town Centres in the city and Woden and would provide additional and improved cycling and pedestrian paths and amenities.</li> </ul>
	<p><b>District Strategies: Inner North and City District Strategy 2023</b></p> <p>There are nine strategic districts considered under ACTs planning system, each with their own corresponding strategic planning document. The aim of each document is to guide how each district within Canberra will change and grow towards 2038 and beyond to 2050.</p> <p>The <i>Inner North and City District Strategy 2023</i> is one of nine district strategies that captures the area centrally located just north of Lake Burley Griffin, and includes the City Centre, as shown on Figure 2-1 (EPSDD, 2023). The Project would provide greater connection to Commonwealth Park and the Acton Waterfront which are identified as key destinations within the Strategy. The strategy also identifies that the community values the existing Light Rail along Northbourne Avenue, and that the extension of the Light Rail to Commonwealth Park is a key opportunity for growth and change within the District.</p>
	<p><b>District Strategies: Inner South District Strategy 2023</b></p> <p>The <i>Inner South District Strategy 2023</i> captures the area extending from the Fyshwick Industrial precinct in the east to Yarralumla and Deakin in the west, as shown on Figure 2-1 (EPSDD, 2023). The State Circle East alignment option would provide connections to key destinations identified in the Strategy including the National Library of Australia, Albert Hall, Lennox Gardens, National Archives, Australian Parliament House, John James Memorial Hospital, and the Royal Australian Mint. The National Triangle-Barton option would provide connections to these destinations as well as Questacon, the National Portrait Gallery of Australia, the High Court of Australia, and the National Gallery of Australia.</p> <p>The Project is identified as a key opportunity for transformation within the District that would enhance accessibility to employment and reduce traffic congestion.</p>

**Guiding policy documents**



**District Strategies: Woden District Strategy 2023**

The *Woden District Strategy 2023* captures the area towards the southern part of the city and contains Woden Town Centre, as shown on Figure 2-1 (EPSDD, 2023). The Project would provide connections to all nine key destinations identified within the Strategy, including the Woden Bus Interchange, Canberra Hospital and Woden Shopping Centre.

The Project is identified as a catalysing initiative for the District, that would act as a key north-south alignment in Canberra’s public transport network. Light Rail initiatives included in the Strategy include investigation of extensions to Mawson and Tuggeranong and improving the urban environment in key road corridors.



**Canberra: A Statement of Ambition 2016**

*Canberra: A Statement of Ambition 2016* outlines a plan for developing a compact and competitive city, which attracts and retains talented people, has a diversified economy, delivers high-quality metropolitan infrastructure, and embraces a digital mindset (ACT Government, 2016a). The ACT Government has delivered on numerous initiatives to implement the Ambition, and identifies the expansion of the Light Rail network as a key example of delivering better metropolitan infrastructure.

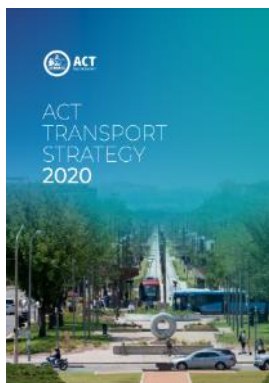
Building the Light Rail network is specifically identified as a key urban renewal task, that will be critical to meeting the movement needs of a growing population, developing compact urban centres, and boosting sustainable growth by improving transport options, settlement patterns and employment opportunities.



**The Griffin Legacy 2007**

In 2007, the NCA prepared *The Griffin Legacy – A Policy Framework* as a major strategy to unlock the potential of Canberra’s Central National Area, its landscape setting, and approaches (NCA, 2007).

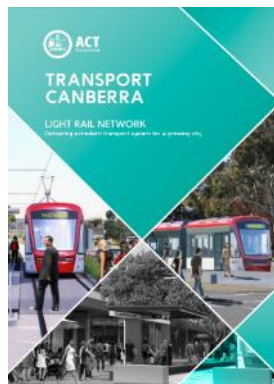
The Project responds to key Griffin Legacy propositions including linking the City Centre to the Central National Area, extending the City Centre to Lake Burley Griffin, reinforcing Canberra's main avenues as primary corridors for transport, and the development of improved linkages with high quality and efficient public transport networks. Furthermore, wire-free technology would be implemented within the National Triangle to minimise potential visual impacts.



**ACT Transport Strategy 2020**

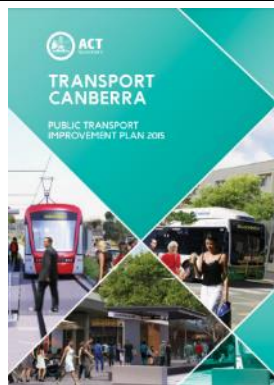
The *ACT Transport Strategy 2020* sets the ACT Government’s objectives for developing Canberra’s transport network (ACT Government, 2020). The Strategy established three principal outcomes for Canberra’s public transport network, including managing congestion, reducing emissions, and supporting a compact and efficient city. A key concept within the Strategy includes the 30-minute city concept, to ensure all Canberrans can travel around Canberra in an efficient way. The Strategy highlights the positive outcomes of Stage 1 and specifically identified the Project as a key priority investment in further developing the public transport network. The Strategy recognises that the Project would be a catalyst for the transformation and revitalisation of Adelaide Avenue.

**Guiding policy documents**



**Transport Canberra - Light Rail Network 2015**

The *Transport Canberra - Light Rail Network 2015* plan is Transport Canberra and City Services' (TCCS) vision for Light Rail that showcases Canberra as a prosperous, sustainable, and liveable city (TCCS, 2015). The plan highlights that the Woden to City corridor is a high priority corridor, that is highly valued by public transport passengers. It recognises that providing seamless interchange with other services in the National Triangle will be important to providing good access to the wide range of employment and tourist destinations. It highlights that providing Light Rail within this corridor would support the role and identity of Woden Town Centre and provide economic opportunities at key centres along and adjacent to the corridor.



**Public Transport Improvement Plan 2015**

The *Public Transport Improvement Plan 2015* sets out how TCCS will deliver the ACT Government's vision for a quality public transport system that is convenient and easy to use, efficient, affordable, reliable, and integrated (TCCS, 2015). The Plan emphasises that the Light Rail network would be pivotal for delivering a modern transport system, and that it would play a pivotal role in building the next stage of Canberra's public transport network. Furthermore, the Plan emphasises that the Project would support economic development opportunities along and adjacent to the alignment.

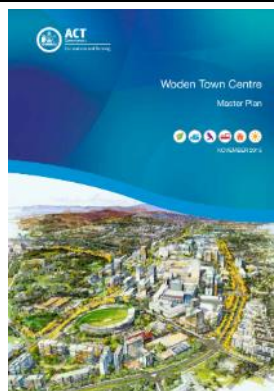


**Light Rail Sustainability Policy 2021**

An overarching Sustainability Policy has been developed for Light Rail to Woden (MPC, 2021). This Policy sets the themes and key objectives for sustainability and resilience for development and operation of Light Rail to Woden.

The Sustainability Policy aims to capture themes from ACT policies and best practice guidelines to underpin planning and design decision making.

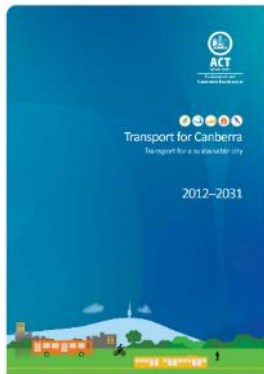
The Sustainability Policy identifies commitments against sustainability themes to drive sustainable outcomes in Project development. The adoption of such commitments assists to successfully deliver targets and initiatives to address themes under the Sustainability Policy for the Project.



**Woden Town Centre Master Plan 2015**

The master plan *Woden Town Centre Master Plan 2015* outlines the vision, planning principles, spatial framework, planning strategies and policies to guide development of the centre (ACT Government, 2015). The Master Plan identifies key areas that are important to the Woden Town Centre and opportunities for enhancing the qualities of the space. A key area identified within the Master Plan included Callam Street which would be reserved for future public transit, in particular Light Rail, where the Project would provide a terminus and direct Light Rail connections to the National Triangle and City Centre.

**Guiding policy documents**



**Transport for a Sustainable City 2012-2031**

*Transport for a Sustainable City 2012-2031* is the ACT Government’s plan that establishes mode share targets and frames an integrated transport and land use approach to create a cleaner, more sustainable Canberra (EPSDD, 2012). A key action within the plan includes actively planning for mass public transport such as Light Rail. Key messages from the Canberra community included within the plan highlighted that the community generally supports a shift from car dependency to more sustainable options, such as Light Rail. An additional objective within the plan includes managing travel demand, by promoting sustainable transport options.



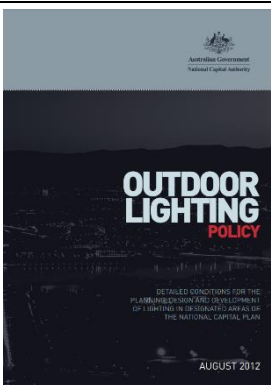
**ACT Climate Change Strategy 2019-2025**

The *ACT Climate Change Strategy 2019-2025* outlines the ACT Government’s response to climate change (EPSDD, 2019). Specifically, it details how the ACT Government aims to reach a 50-60% reduction in emissions by 2025 and establishes the foundations for reaching net zero emissions by 2045. The Strategy strongly focuses on reducing emissions from transport, since it was one of the largest sources of emissions in 2020, in the ACT. The Strategy specifically identifies the Project as a key objective for increasing public transport use and reducing emissions from private vehicle use in the ACT.



**Kings and Commonwealth Avenues Draft Design 2017**

The *Kings and Commonwealth Avenues Draft Design* was developed to guide future development of the Kings and Commonwealth Avenues, to restore their status as key, memorable, and functional boulevards and as integral components of Canberra’s identity (NCA, 2017). Key principles highlighted in the Design include a setting where pedestrians, cyclists and public transport are encouraged. The Project is included in the Design of Commonwealth Avenue and plays an important role in accentuating its character and special quality. The Design identifies that the Light Rail would play an essential part in improving the effective movement and connection along Commonwealth Avenue, and its role as a key traffic route, that is integrated with public transport systems.



**Outdoor Lighting Policy 2012**

The *Outdoor Lighting Policy 2012* provides detailed conditions for the planning, design, and development of lighting in Designated Areas of the NCP (NCA, 2012). The Policy seeks to ensure that the planning, design and operation of outdoor lighting balances the needs of people and the environment and strengthens the role that lighting plays in the understanding and appreciation of the National Capital and Canberra’s urban landscape. The Project would consider the requirements of this Policy as part of design development.

### Guiding policy documents



#### ***Tree Management Policy 2021***

The *Tree Management Policy 2021* details the approach to the management of NCA urban trees and treescape and the Lindsay Pryor National Arboretum (NCA, 2021). Three key targets of the Policy include increasing tree canopy cover to 40% by 2030, improving age diversity of the treescape and improving existing diversity of species. The Project would consider the requirements of this Policy as part of design development.

In the spirit of accountability, the National Capital Authority acknowledges the Traditional Owners. Traditional Owners of the land this policy refers to and pays respect to Elders past and present.

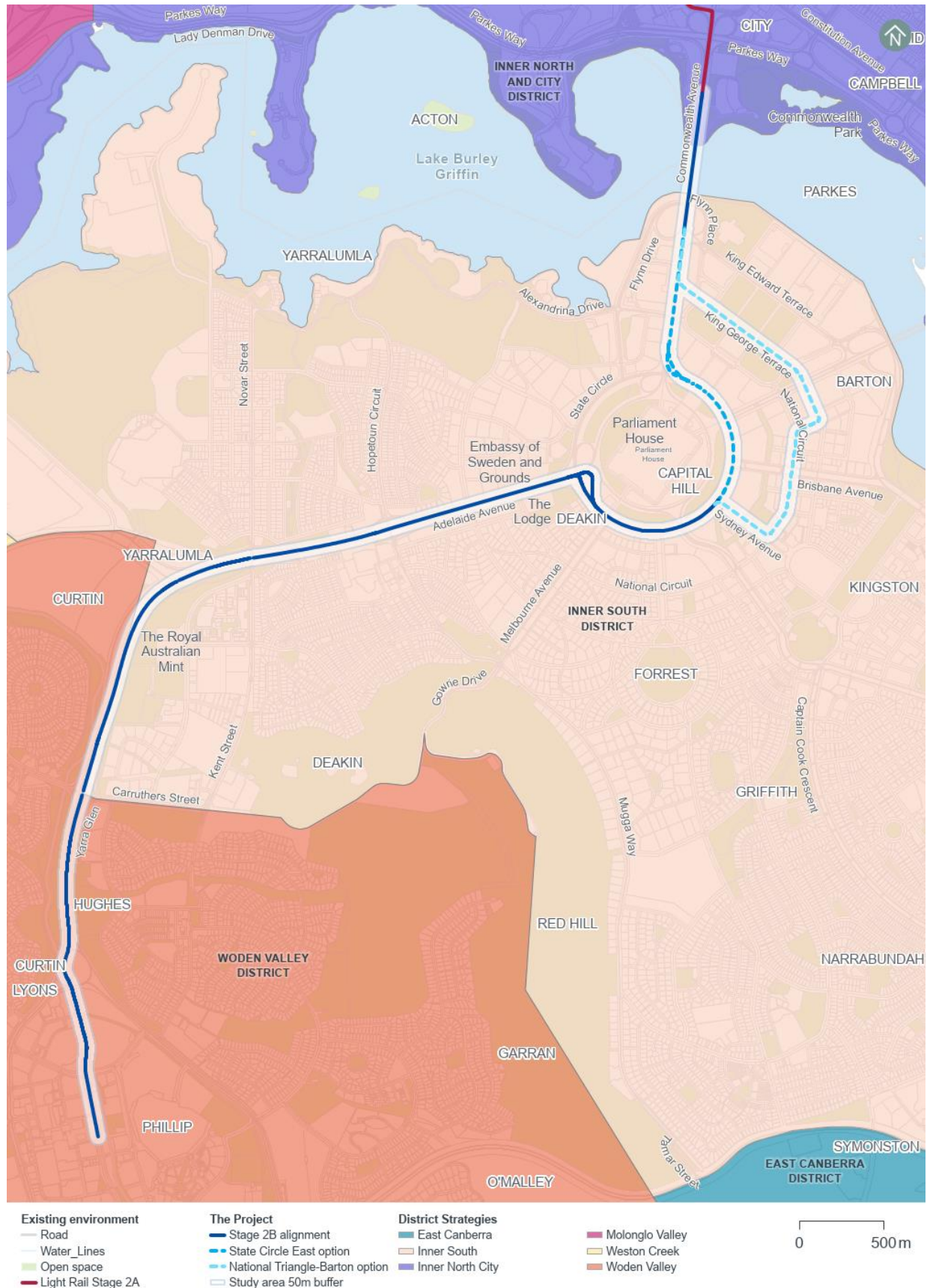


Figure 2-1 Districts of the ACT (EPSDD, 2023)



### 3.0 Planning and legislation

This chapter outlines the various statutory and planning approvals required for the Project.

#### 3.1 Overview

The Project will require the following statutory environmental and planning approvals:

- A Works Approval from the NCA under the PALM Act to carry out certain works in Designated Areas under the NCP
- A DA from the territory planning authority or the Minister under the Planning Act, for works on Territory land subject to the Territory Plan
- Approval from the Commonwealth Minister for the Environment under the EPBC Act to carry out the Project
- Approval from both Houses of Parliament, for works within the Parliamentary Zone, as defined in the *Parliament Act 1974* (Cth).

Each of these approvals is discussed in further detail in the following sections. An overview of the statutory environmental and planning approvals process for the Project is presented on Figure 3-1. The relationship of the planning and approval processes is illustrated on Figure 3-2. The coordination of Commonwealth planning approvals processes is illustrated on Figure 3-3. Application of this legislation over the alignment is shown on Figure 3-4.

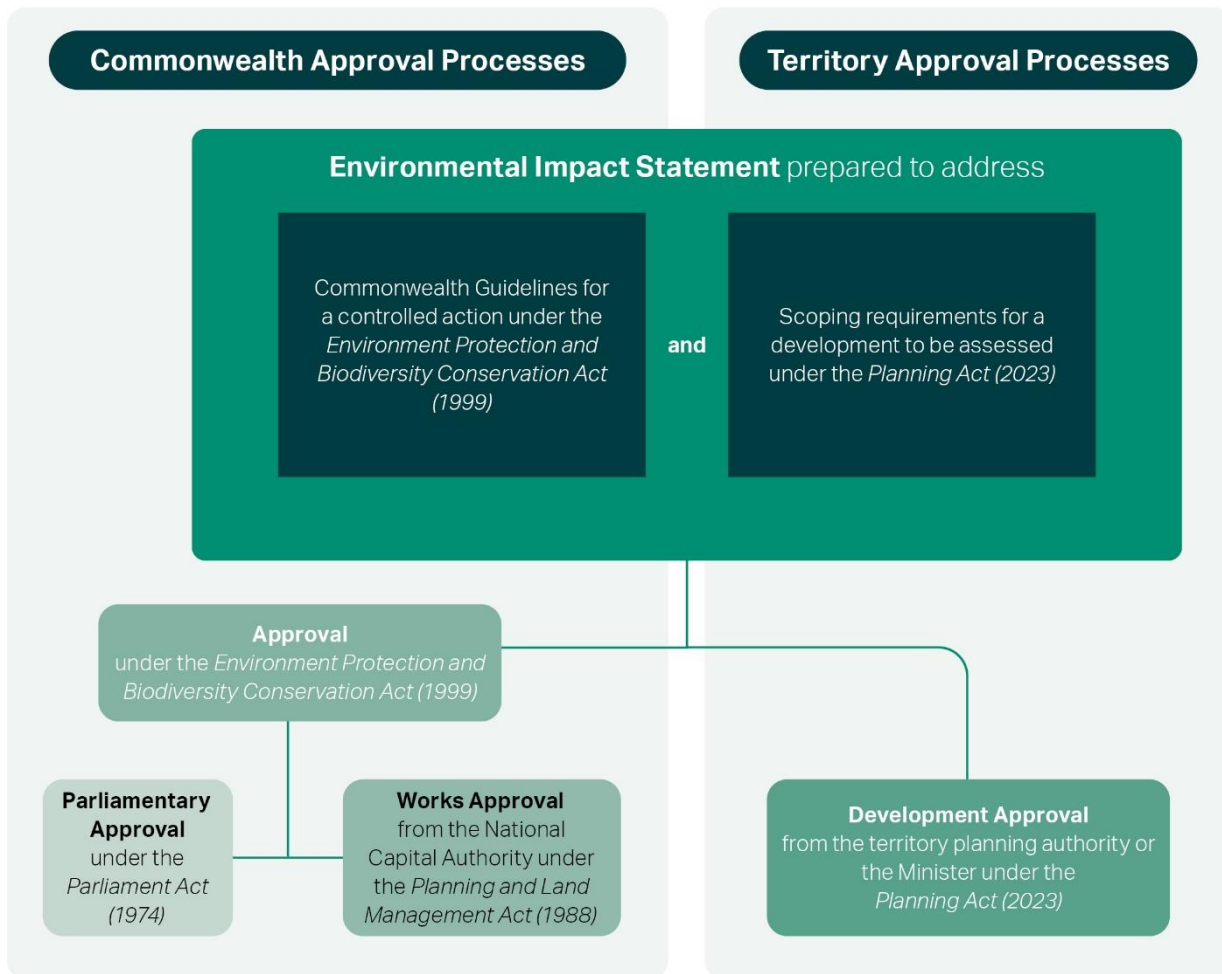


Figure 3-1 Relationship of the approval process in Commonwealth and Territory entities

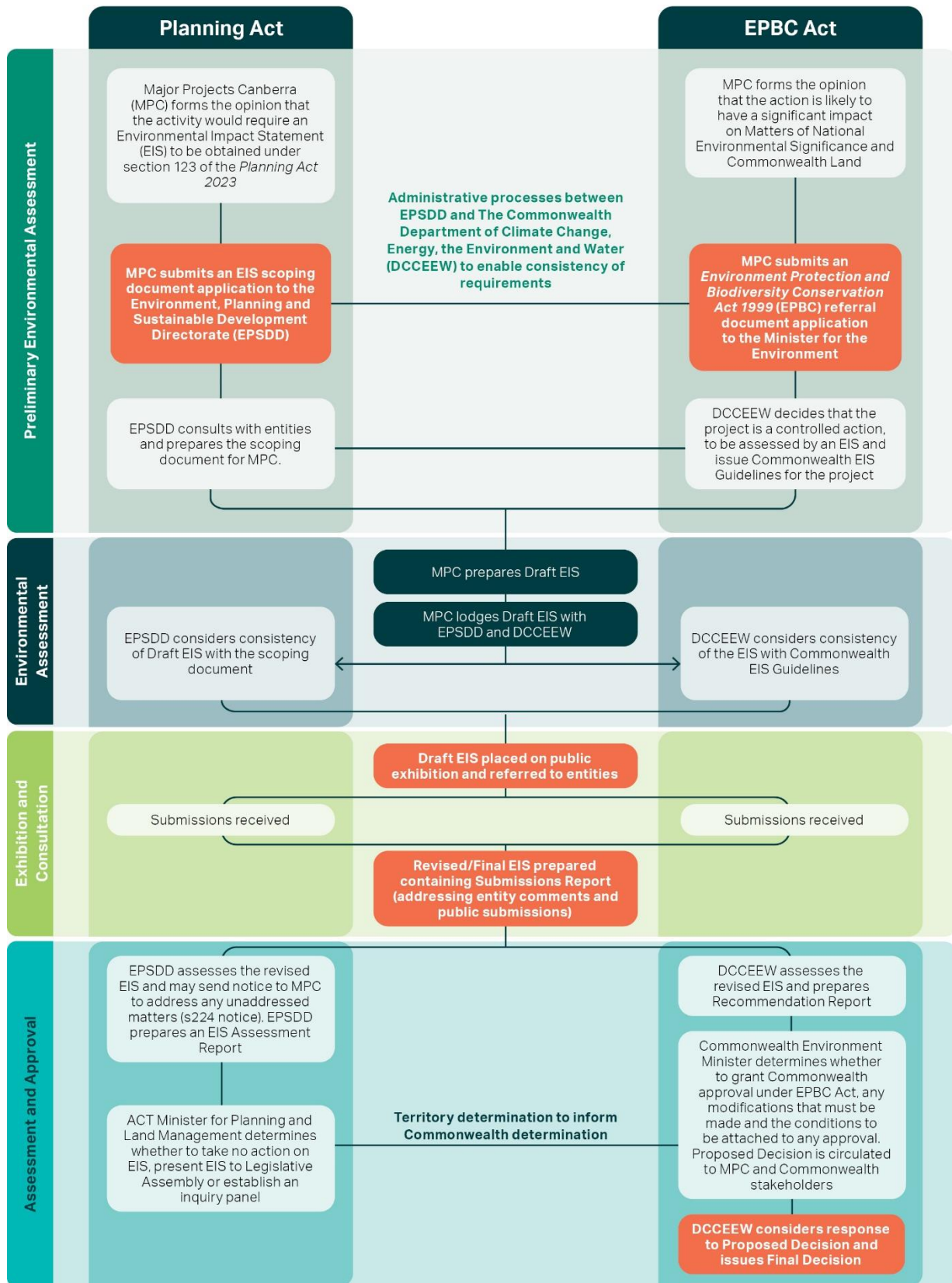


Figure 3-2 Summary of the environmental assessment process under the EPBC Act and Planning Act

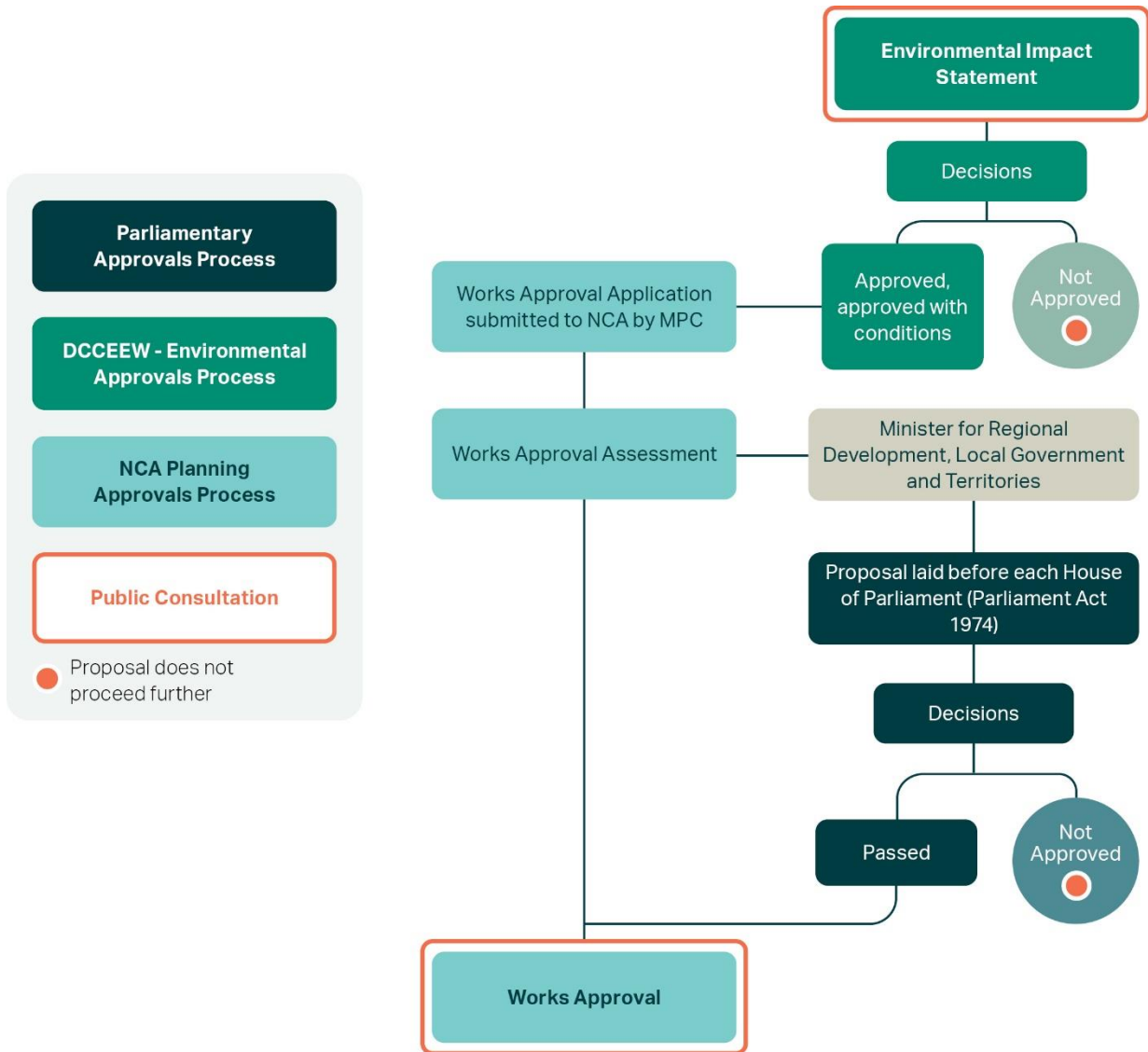


Figure 3-3 The Project's Commonwealth planning and environmental approvals process



Figure 3-4 Applicable jurisdictions along the alignments

## 3.2 Applicable jurisdictions

Each of the applicable jurisdictions below have separate independent assessment and approval requirements under their corresponding Commonwealth and Territory legislation.

A coordinated approach has been scoped with both Commonwealth and Territory Government planning authorities to simplify documentation requirements and easily engage with the community during the assessment and approval processes for the Project. This coordinated approach is outlined in Figure 3-2.

### 3.2.1 Australian Capital Territory (Planning and Land Management) Act 1988 (Cth)

The PALM Act establishes the NCA and assigns it various functions and responsibilities relating to the Commonwealth Government's interest in the planning and development of the nation's capital. One of the NCA's key roles is the preparation and administration of the NCP, which aims to ensure that Canberra and the ACT are planned and developed in accordance with their national significance.

The NCP identifies a series of Designated Areas deemed to have special characteristics of the National Capital, and sets out priorities and detailed conditions of planning, design, and development for those areas. Under section 12 of the PALM Act the approval of the NCA (i.e. a Works Approval) is required to carry out works within a Designated Area.

The Project would require a Works Approval from the NCA for development proposed within the Designated Areas shown on Figure 3-4, and an amendment to the NCP would be required if the National Triangle-Barton alignment is identified as the preferred alignment option for the Project.

### 3.2.2 Planning and Development Act 2007 (ACT)

The PD Act meets the requirement of section 25 of the PALM Act to establish a planning authority and legal planning framework for the ACT, and the Territory Plan. The object of this Act (section 6) is "to provide a planning and land system that contributes to the orderly and sustainable development of the ACT—(a) consistent with the social, environmental and economic aspirations of the people of the ACT; and (b) in accordance with sound financial principles".

DA is required from the territory planning authority or the Minister for those sections of the Project taking place on zoned Territory land, outside of Designated Areas. This requires an environmental assessment, relevant design information and stakeholder consultation.

#### 3.2.2.1 Planning Act 2023 (ACT)

Since 2020, the ACT Government through EPSDD has been developing and delivering the ACT Planning System Review and Reform to review, refresh, improve and modernise the ACT land use planning and development control system. The reforms include two major components:

- New planning and development control legislation – the Planning Act, which was passed by the ACT Parliament in June 2023
- A new Territory Plan and associated District Strategies, which were publicly exhibited as draft documents for comment in early 2023. The District Strategies provide an additional level of planning detail compared to the Territory Plan prepared under the PD Act.

The Planning Act has come into force and has repealed and replaced the PD Act.

### 3.2.3 Environment Protection and Biodiversity Act 1999 (Cth)

A referral to DCCEEW is required for the Project under the EPBC Act as it is a proposed action that has the potential to significantly impact on MNES and the environment of Commonwealth land. The Commonwealth Minister for the Environment will decide whether assessment and approval are required under the EPBC Act due to the level of significance of forecast impacts of the Project on these matters. If the Minister decides that the Project needs approval, it is then a "controlled action" and must be assessed before the Minister decides whether to approve it.

An EPBC Referral was previously submitted for a different proposal for Stage 2B, which provided an alignment on the eastern side of State Circle (ie. Referral 2019/8491). This referral for Stage 2B does not constitute either a request to vary Referral 2019/8491 or a withdrawal of Referral 2019/8491. This referral, which is for the Project, comprises a separate proposal (refer to Chapter 8.0)..

### 3.2.4 Parliament Act 1974 (Cth)

Under the *Parliament Act 1974 (Cth)*, “no building or other work is to be erected on land within the Parliamentary Zone unless the Minister has caused a proposal for the erection of the building or work to be laid before each House of the Parliament and the proposal has been approved by resolution of each House of Parliament”. Under the Act, the Parliamentary Zone (National Triangle) includes the Parliamentary circle, and is the area bounded within Commonwealth Avenue, Kings Avenue, and Lake Burley Griffin.

To seek approval from each House of Parliament, MPC will prepare a Works Approval Application with a supporting EIS for the NCA. The NCA would submit the Works Approval Assessment to the Minister for Regional Development, Local Government and Territories to be presented before each House of Parliament for approval. Once the Project is passed by both houses, the Works Approval would be returned to the NCA for public consultation and its final decision of the Works Approval application. This approvals process is also shown on Figure 3-3.

### 3.3 Joint Standing Committee on the National Capital and External Territories

MPC presented Stage 2B to an inquiry held by the Joint Standing Committee on the National Capital and External Territories (JSCNCET) on its Commonwealth and Parliamentary planning approvals process in May 2018. The *Commonwealth Approvals for ACT Light Rail: Commonwealth and Parliamentary Approvals for the Stage 2A and Stage 2B of the ACT Light Rail Project* (JSCNCET Inquiry Report) was prepared to outline the planning approvals pathway and process.

The Commonwealth Government response to the JSCNCET Inquiry Report provided in March 2019, recorded agreement or agreement-in-principle to each of the JSCNCET’s six recommendations. These responses are detailed in Table 3-1.

Table 3-1 Recommendations from the Joint Standing Committee

Subject	Recommendation	Commonwealth Government response	Actioning within the current Project
Commonwealth jurisdiction and approval processes	The committee recommends that the Minister responsible for territories refer any Works Approval application or any amendment to the NCP relating to the light rail Project to the JSCNCET for inquiry, prior to its tabling in the Parliament.	<b>Agreed.</b> The Commonwealth Government recognises the potential impact of this Project on the Central National Area and supports the ongoing scrutiny of the JSCNCET.	Continued engagement with the NCA.
Light Rail Stage 2	If the ACT Government chooses to pursue a route alignment that is only partially consistent with the NCP, the committee recommends that there be a two-stage process for seeking Commonwealth approval: <ul style="list-style-type: none"> <li>• Stage 1: the ACT Government works with the NCA to ensure Commonwealth approval of the route alignment, by way of amendment to the NCP.</li> <li>• Stage 2: completion of Works Approval application and other Commonwealth approval processes.</li> </ul>	<b>Agreed.</b> The Commonwealth Government notes that the NCA, through the NCP, has previously identified options for inter-town public transport routes through the Central National Area.  This recommendation captures approvals like those under the EPBC Act. The NCA does not grant Works Approval until all EPBC matters are resolved to ensure its decision is consistent with the Act.	Concept planning and investigations associated with the EPBC assessment process are further informing the need or otherwise to undertake an NCP amendment. Continued engagement with the NCA, and potential requirement to amend the NCP.
Light Rail Stage 2	The committee recommends that the NCA require any light rail bridge design on either the Commonwealth or Kings Avenue bridges to: <ul style="list-style-type: none"> <li>• Be of equal quality to that of the existing bridges</li> <li>• Have the same column spacing as the existing bridges</li> <li>• Not reduce existing lake-to-underside of bridge clearances</li> <li>• Be slimmer than the existing bridges so as not to visually impact on the existing two bridges</li> <li>• Have no impact on the structural soundness of the existing bridges.</li> </ul>	<b>Agreed.</b> Noting the final design of any new structure must be agreed by the NCA and will potentially be subject to a heritage impact assessment by DCCEEW, the Commonwealth Government agrees that the design of any new structure must not impact on the existing bridges.	Continued engagement with the NCA.

Subject	Recommendation	Commonwealth Government response	Actioning within the current Project
Heritage	<p>The committee recommends that the Parliament require any light rail to be wire-free on:</p> <ul style="list-style-type: none"> <li>• Commonwealth Avenue</li> <li>• Kings Avenue</li> <li>• State Circle</li> <li>• Brisbane Avenue</li> <li>• Sydney Avenue</li> <li>• Canberra Avenue (to Manuka Circle)</li> <li>• Hobart Avenue</li> <li>• Melbourne Avenue</li> <li>• Adelaide Avenue (to Kent Street)</li> <li>• The National Triangle.</li> </ul>	<p><b>Agreed in principle.</b> The Commonwealth Government supports the recommendation, subject to further information about the viability of a wire-free route. The Commonwealth Government notes that this recommendation is intended to conserve the heritage and character of the Central National Area and National Triangle.</p>	<p>This is being considered in design development (refer to Section 4.2.6).</p>
Heritage	<p>The committee recommends that Parliament requires the placement and appearance of light rail stops, landscaping, and signage to be unobtrusive and complementary to the heritage value of nearby buildings, views of Parliament, and the character of the Central National Area and National Triangle.</p>	<p><b>Agreed in principle.</b> This recommendation is intended to conserve the heritage and character of the Central National Area and National Triangle.</p>	<p>This is being considered in design development (refer to <b>Chapter 4.0 Project description</b>).</p>
Heritage	<p>The committee recommends that Parliament require that the removal of any trees with heritage value, such as the Weston plantings, be met with an appropriate replanting and landscaping strategy that maintains heritage values in the Central National Area and the National Triangle.</p>	<p><b>Agreed in principle.</b> Without restricting future change, the Commonwealth Government agrees that the landscape setting of the Central National Area must be preserved. The Government notes that any changes to the landscape must be agreed by the Australian Parliament and the NCA and will be subject to heritage impact assessment.</p>	<p>This is being considered in design development, through consultation with the NCA and preparation of landscape and heritage advice to inform a masterplan for the Project (refer to Section 6.1).</p>



## 4.0 Project description

This chapter describes the Project and outlines the construction method and operational requirements.

### 4.1 Overview

The Project would deliver about 10 km of light rail that would extend from the approved Stage 2A Commonwealth Park stop on the northern side of Lake Burley Griffin, via the National Triangle, continuing onto Adelaide Avenue and Yarra Glen to a proposed Callam Street terminus in Woden Town Centre, as shown on Figure 1-2.

The Project would provide access to defined activity centres including residential areas, government precincts, educational institutions, major retail, entertainment and employment areas, and key landmarks in between the City Centre and Woden Town Centre. The Project would extend the existing Light Rail from Gungahlin to Woden.

The key landmarks the Project would service are outlined in Table 4-1.

**Table 4-1 Key landmarks to be serviced by the Project**

<b>Section of alignment common to both options</b>	<ul style="list-style-type: none"> <li>• Action Waterfront Park</li> <li>• Henry Rolland Park</li> <li>• National Capital Exhibition</li> <li>• Department of Foreign Affairs and Trade Canberra</li> <li>• Commonwealth Park</li> <li>• Lake Burley Griffin</li> <li>• Albert Hall</li> <li>• Hyatt Hotel Canberra</li> </ul>	<ul style="list-style-type: none"> <li>• Forrest Primary School</li> <li>• Royal Thai Embassy</li> <li>• Embassy of Sweden</li> <li>• Embassy of the Philippines</li> <li>• Indian High Commission</li> <li>• Canberra Girls Grammar</li> <li>• Deakin Stadium</li> <li>• Royal Australian Mint</li> <li>• Phillip Oval</li> </ul>
<b>State Circle East alignment option</b>	<ul style="list-style-type: none"> <li>• Parliament House</li> <li>• Canberra Centenary Trail</li> <li>• British High Commission</li> <li>• New Zealand High Commission</li> </ul>	
<b>National Triangle-Barton alignment option</b>	<ul style="list-style-type: none"> <li>• National Library of Australia</li> <li>• Old Parliament House</li> <li>• Treasury</li> <li>• Questacon</li> <li>• High Court of Australia</li> <li>• National Portrait Gallery</li> <li>• Aboriginal Tent Embassy</li> <li>• National Portrait Gallery</li> <li>• National Gallery of Australia</li> </ul>	<ul style="list-style-type: none"> <li>• Australian Federal Police</li> <li>• Department of Prime Minister and Cabinet</li> <li>• Office of National Intelligence</li> <li>• Hotel Kurrajong</li> <li>• Telopea Park School</li> <li>• Australian Federal Police</li> <li>• John Gorton Building</li> <li>• National Archives of Australia</li> </ul>

## 4.2 The Project

### 4.2.1 Key features

Key features of the Project would include:

- A light rail from Commonwealth Park, south over Lake Burley Griffin on Commonwealth Avenue, that continues east through the National Triangle, then onto Adelaide Avenue, and Yarra Glen Drive before terminating at a proposed terminus at Woden including stops
- Two alternative alignment options being considered through the National Triangle including:
  - an alignment along State Circle. Figure 1-2 shows two alignment options being considered to connect to Adelaide Avenue, either from State Circle or Capital Circuit

- an alignment through National Triangle-Barton, which would follow King George Terrace, Macquarie Street, Bligh Street, National Circuit and Sydney Avenue, before connecting with State Circle (Figure 1-2)
- A new light rail bridge on Commonwealth Avenue over Lake Burley Griffin
- Landscaping features consistent with the prescribed outcomes in the NCP and what was envisioned by the Griffins' plan for Canberra
- Light rail stops, including access, facilities, security, closed-circuit television (CCTV), lighting, and furniture, and other customer facilities (e.g., passenger information display systems)
- Additional drainage for the light rail tracks to meet required design standards
- Integration with the wider active and public transport network
- Road network alterations to accommodate the Project
- Upgrade of the existing stabling depot and maintenance facility in Mitchell to accommodate additional LRVs
- Power supply, including TPSs, inground service routes, track infrastructure, and a combination of wire-free and overhead wiring.

The following sections detail some of these key features of the Project.

#### **4.2.2 Track configuration and form**

The Project would pass through the suburbs of Parkes, Capital Hill, Yarralumla, Forrest, Deakin, Curtin, Hughes, and Phillip (Figure 1-2). The National Triangle-Barton alignment option would use existing roads passing through and along:

- Commonwealth Avenue
- State Circle
- Adelaide Avenue
- Yarra Glen
- Callam Street, Woden.

The National Triangle-Barton alignment option would pass through the suburb of Barton and through or along:

- King George Terrace
- Macquarie Street
- Bligh Street
- National Circuit
- Sydney Avenue.

#### **4.2.3 Light rail stops**

Indicative stop locations would include:

- Common alignment (applicable to both alignment options)
  - Melbourne Avenue
  - Hopetoun Circuit
  - Kent Street
  - Carruthers Street
  - Phillip Oval
  - Woden

- State Circle East alignment option
  - Albert Hall
  - Kings Avenue (on State Circle)
  - Sydney Avenue (on State Circle)
- National Triangle-Barton alignment option
  - Treasury
  - Bligh Street
  - Sydney Avenue.

Each stop would have step-free access, passenger information displays, audio announcements and signage. Cycle racks would be provided where possible to encourage connectivity between the two modes.

The final number of stops and the location of each stop would be confirmed during design development and would be dependent on:

- The preferred alignment through the National Triangle
- Technical considerations, patronage and demand (including future land use change)
- Where wire-free technology is implemented
- Ongoing community and stakeholder consultation
- Land releases and developments adjacent to the proposed alignment.

#### **4.2.4 Road network changes**

The following access and road configuration changes would be needed to support the Project:

- A new bridge on Commonwealth Avenue over Lake Burley Griffin and Flynn Drive
- Potential for substantial changes in the vicinity of the transition to and from State Circle, including the possibility of major civil structures enabling grade separation of the rail and road traffic
- Traffic arrangement changes in the National Triangle
- Intersection layout, traffic signal phasing and footpath modifications where needed
- Access to properties or existing car park access and specifically changes to accessing the Woden retail district, including the closure of Callam Street to private vehicles between Matilda Street and New Bradley Street
- New and/or modified traffic signals where needed
- Road carriageway widening and kerb line changes where needed.

#### **4.2.5 Power supply and substations**

Overhead wiring and on-board energy storage would power the LRVs. It is anticipated that about three TPSs would be needed to service the Project. The final number and location of substations would be determined. Substations would be within the overhead wire section of the alignment, generally south of the National Triangle from a location to be determined during detailed design. The number of substations and the detail, location, and power specification of each substation would be confirmed during design development in consultation with power network providers.

#### **4.2.6 Wire-free operation**

Wire-free technology would be used to reduce potential visual impacts within areas of cultural value and amenity sensitivity where feasible and reasonable. Subject to feasibility, wire-free running would generally occur within the Parliamentary Zone, to a location to be determined during detailed design.

The JSCNCET recommended that wire-free running be within all Designated Areas (Table 3-1). This would include the alignment along Adelaide Avenue. However, the extent of wire-free running needs to consider current technology. This technology is developing rapidly, and the design may see wire-free running through Designated Areas as far as is reasonably practical.

The LRVs would be fitted with an on-board energy storage system to allow for wire-free running rather than using a continuous buried third rail (an additional underground rail system that acts as the electrical power supply).

Design development for the Project would clarify options for the wire-free operations and further investigate the most appropriate form of technology to be used.

#### 4.2.7 Drainage

The Project's drainage requirements are expected to include:

- Additional drainage for the light rail track zones to meet required design standards and not increase the risk of flooding
- Modifications to the existing drainage network to accommodate tracks and changes to road heights and kerb lines
- Modifications to existing surface drainage because of minor level changes, local catchment boundary changes, and increased runoff from paving previous permeable areas.

#### 4.2.8 Utilities

The Project would be near utilities and services that may either need protecting, adjusting or relocating. Specific requirements would be confirmed during design development. There are existing gas mains, electrical cables, water supply mains, sewerage and stormwater, street lighting and telecommunications infrastructure located in the road reserve that would need protecting and adjusting with additional infrastructure included to support the Project.

#### 4.2.9 Sustainability

Sustainability is a very important feature of the design, construction and operation of an infrastructure project.

Key principles of ESD are set out in most project legislation and in various other plans, policies and guidelines which are relevant for major infrastructure projects. For example, the Project will need a DA under the Planning Act, and the Planning Act defines "ecologically sustainable development" as:

*development involving the effective integration of the following principles:*

- (a) the protection and enhancement of ecological processes and natural systems at local, territory and broader landscape levels*
- (b) the achievement of economic prosperity*
- (c) the maintenance and enhancement of cultural, physical and social wellbeing of people and communities*
- (d) the precautionary principle*
- (e) the inter-generational equity principle.*

The Project will also need a Works Approval under the PALM Act and the associated provisions of the NCP. While the PALM Act does not specify design or assessment requirements relevant to ESD principles, the NCP provides that the application of "sustainability" includes consideration of:

- the development of a city that both respects environmental values and reflects national concerns with the sustainability of Australia's urban areas
- protection of the nationally significant open-space network, visual backdrop and landscape setting of the National Capital.

The EPBC Act includes ESD as a key consideration in the referral, assessment and approval determination processes. ESD also features in several other policies discussed in Section 2.3.3.

MPC will apply the principles of ESD in the design, construction and operation of the Project.

## 4.3 Construction

### 4.3.1 Construction activities

Construction activities would be required within and near the proposed rail corridor. Construction planning would be further informed by early works which would include activities such as surveys, service adjustments, property adjustments and geotechnical investigations.

Indicative construction activities for the Project would likely include:

- Early and enabling works including establishment of construction compounds and environmental controls, as well as utility relocation and protection
- Transport network and public domain modifications to roads, public transport, car parking, property access and pedestrian and cyclist facilities including traffic signal prioritisation
- Building a bridge over Lake Burley Griffin at Commonwealth Avenue and other crossings and/or viaducts along the alignment where required
- Earthworks and civil works for construction and installation of the light rail track route and slabs
- Construction of light rail stops, including access, facilities, security, CCTV, lighting, and furniture, and other customer facilities (e.g., passenger information display systems)
- Footpath verge surfaces and road pavements
- Upgrade and expansion of the existing stabling depot and maintenance facility in Mitchell
- Providing power supply, including TPSs, inground service routes, and overhead lines
- Installation of rail systems, signalling and testing.

### 4.3.2 Construction compounds

Construction compounds would be needed to support construction of the Project. Construction compounds would be used to temporarily store materials, equipment, and waste; carry out certain maintenance work; and house site offices and worker amenities.

Compounds would be located and installed in line with relevant guidance documentation and would consider those included within the *NSW Roads and Maritime Site facilities: Specification D&C G4* (2019) as there is no similar guidance document in the ACT.

The construction compounds would be located to minimise impacts to the following sensitive locations where feasible and reasonable:

- Areas of environmental, cultural, and social sensitivity, including MNES or triggers listed in the Planning Act 2023.
- Areas identified in the land release program prior to the estimated completion date for the Project
- Heavily used surface car parks
- Areas of imminent future development.

Potential locations for construction compounds within the Project footprint include:

- Acton Waterfront car parks at Corkhill Street and Albert Street
- Commonwealth Avenue south-western clover leaf on the south side of Lake Burley Griffin and the areas adjacent to the existing bridges
- Lotus Bay boat ramp and jetty off Alexandrina Drive
- Langton car park opposite the Treasury Building
- 21 Queen Victoria Terrace Parking
- Parkland on the corner of Kings Avenue and King George Terrace

- Parkland east of Yarra Glen/Yamba Drive roundabout
- Callam Office car park in Woden.

The final number and location of construction compounds would be confirmed during further construction planning and in consultation with the relevant stakeholders including the construction contractor once appointed.

Additional or alternative construction compounds would be subject to the following criteria:

- Not located next to sensitive land use(s) (such as residences), without consultation with the landowner/landholder
- No trigger of a "controlled action" designation for the Project as a result of impacts from the construction compounds on matters protected by the EPBC Act including:
  - National Heritage properties
  - nationally threatened species and ecological communities
  - migratory species
  - the environment, where actions proposed are on, or will affect Commonwealth Land
- Where relevant, consistency assessment under the EPBC Act
- No trigger of environmental assessment items under Schedule 1 of the *Planning (General) Regulation 2023* including:
  - sites where the works could impact any MNES
  - sites where the works could impact heritage listed assets under the *Heritage Act 2004*
  - sites located in a nature reserve
  - sites where works have the potential to impact on significant environmental research
  - sites where works have the potential to impact water supply catchments or waterways subject to environmental values
  - contaminated sites
- Where these compounds require planning approval and are not exempt from the requirement for planning approval under the *Planning (Exempt Development) Regulation 2023*, the relevant approvals will be sought for such compounds in accordance with the *Planning Act 2023*.

## 4.4 Operation

### 4.4.1 Services

The Project would be an extension of the existing Light Rail network (including Stage 1 and Stage 2A). The Project is expected to achieve an operational frequency of at least every five minutes during peak periods and at least every 10 minutes between 7am and 6pm on weekdays. Outside these hours on weekdays and all other times on Saturdays, Sundays and Public Holidays, the frequency would be at least every 15 minutes. LRVs would typically have priority over other traffic.

### 4.4.2 Light rail vehicles

The Project would introduce additional LRVs to the Light Rail network. The new LRVs would be in similar appearance, size, and performance to those that currently operate on the Light Rail network. Each LRV would consist of the following features:

- Capacity for about 200 customers
- Maximum speeds of 70 km/h (wired) and 50-60 km/h (wire-free)
- A width of about 2.65 metres (m)
- A length of about 33 m but expandable to 45 m

- Capability for wire-free operation
- Heating, ventilation, and air conditioning
- On-board space provision to carry up to four bicycles
- Real-time passenger information displays
- Public announcement system
- Wi-Fi service
- CCTV surveillance
- Features to reduce energy consumption.

The additional LRVs will be fitted with battery technology to allow wire-free operation. Battery storage capacity has been proposed to reduce visual impacts in landscape and visual sensitive zones, such as Commonwealth Avenue, and the National Triangle. To provide wire-free running, an on-board power supply would be included on new LRVs.

The Project would include an upgrade and expansion of the existing stabling depot and maintenance facility in Mitchell to accommodate additional LRVs and facilities such as workshops and parking. The expansion of the depot would be contained to within the existing site boundary.

## 5.0 Preliminary risk assessment

This chapter describes the preliminary risk assessment relating to the predicted impacts from constructing, operating, and maintaining the Project.

### 5.1 Overview

A preliminary risk assessment was carried out to identify the issues that may result from constructing, operating, and maintaining the Project in accordance with the *Proponent's Guide to EIS's* (ACT Government, 2017) (see Appendix A). In accordance with the Guide, risks were rated according to Australian Standards as a combination of the likelihood of the risk occurring (probability) and the consequence if the risk were to occur (magnitude). In rating the risk(s), precaution was adopted where there was uncertainty consistent with the principles of ecologically sustainable development.

For the preliminary risk assessment, both unmitigated and mitigated risks were determined. The unmitigated risk assessment assumed a worst-case consequence of an aspect of the Project without the implementation of mitigation measures. The mitigated risk assessment determined the remaining risk after the implementation of mitigation measures. Mitigation measures that were identified during the preliminary risk assessment to reduce the potential risks of the Project are listed in Appendix A, Table 11-4. Further mitigation measures would be investigated as part of the Project assessment, including preparation of the EIS, to manage Project risks. As shown in Table 5-1 potential risks would be reduced following the implementation of mitigation measures.

The environmental assessment provided in Chapters 6.0 and 7.0 considers issues identified in the preliminary risk assessment in more detail with the purpose of informing the Commonwealth Minister for the Environment and the ACT Minister for Planning and Land Management in their consideration of further assessment requirements.

Results of the risk assessment identified:

- Key environmental issues for consideration (Chapter 6.0). These were issues that were assessed as being unlikely to be effectively managed and controlled using standard measures to mitigate risks
- Other environmental issues for consideration (Chapter 7.0). These were issues that were assessed as being likely to be effectively managed and controlled using standard measures to mitigate risks.

### 5.2 Summary of the risk assessment outcomes

The risk assessment was completed for the construction and operational stages of the Project, prioritising the impacts according to their associated risk level and thereby forming the focus of this PEA. The preliminary risk assessment presented in Appendix A identifies the impact likelihood, consequence, and significance of the Project's impacts for different environmental issues.

Unmitigated and mitigated risk ratings for each environment factor assessed are summarised in Table 5-1.

**Table 5-1 Preliminary risk assessment summary**

Environmental aspect	Unmitigated risk rating	Post mitigation risk rating
Construction		
Biodiversity	Significant	High
Heritage (Aboriginal and Non-Aboriginal)	Significant	Very high
Noise and vibration	Significant	Very high
Trees	Very high	High
Urban design, landscape character and visual amenity	High	Medium
Traffic and transport	Very high	Medium



Environmental aspect	Unmitigated risk rating	Post mitigation risk rating
Air quality and greenhouse gas	Low	Low
Surface and groundwater	Low	Very low
Contamination, soils and geology	Medium	Low
Social and economic	High	Medium
Utilities and services	High	Low
Waste, energy and resources	Medium	Low
Land use	High	Low
Climate change	Medium	Low
Hazard and risks	Medium	Low
Bushfire	Medium	Low
<b>Operation</b>		
Biodiversity	Low	Negligible
Heritage (Aboriginal and Non-Aboriginal)	High	Medium
Noise and vibration	High	Medium
Trees	Low	Very Low
Urban design, landscape character and visual amenity	High	Medium
Traffic and transport	Very high	High
Air quality and greenhouse gas	Low	Very low
Surface and groundwater	Medium	Low
Contamination, soils and geology	Nil	Nil
Social and economic	Beneficial	Beneficial
Utilities and services	High	Medium
Waste, energy and resources	Medium	Very low
Land use	Medium	Low
Climate change	Very high	Medium
Hazard and risks	High	Medium
Bushfire	Medium	Low

### 5.3 Identification of key and other environmental issues

Based on the risk levels determined by the preliminary risk assessment, the following key environmental issues were identified:

- Non-Aboriginal heritage (Section 6.1)
- Aboriginal heritage (Section 6.2)
- Traffic and transport (Section 6.3)
- Biodiversity (Section 6.4)
- Noise and vibration (Section 6.5)
- Urban design, landscape character and visual amenity (Section 6.6)

Detailed assessment of these issues would be carried out as part of the EIS for the Project. Other issues that would be considered in the EIS include:

- Social and economic (Section 7.1)
- Climate change (Section 7.2)
- Hydrology, flooding and water quality (Section 7.3)
- Property and land use (Section 7.4)
- Geology, soils and contamination (Section 7.5)
- Air quality (Section 7.6)
- Greenhouse gas (Section 7.7)
- Resource use and waste management (Section 7.8)
- Utilities (Section 7.9)
- Hazards and risk (Section 7.10).

## 6.0 Key environmental issues

This chapter describes the context of the existing environment of the Project and discusses potential risks during construction and operation. This preliminary assessment will inform the environmental assessment process that would be carried out for the EIS.

### 6.1 Non-Aboriginal heritage

#### 6.1.1 Existing environment

This section includes a summary of the Preliminary Heritage Advice – Proposed Routes (GML, 2023) hereafter referred to as ‘heritage report’ which has been attached separately to the referral. The purpose of the heritage report is to provide preliminary heritage advice regarding the Project corridor option determination, based on the identification of potential heritage issues and constraints, and to understand the extent of potential impacts on the heritage places along the proposed alignment options.

Listed and nominated non-Aboriginal heritage places located within proximity to the Project are summarised in Table 6-1. These items are also shown on Figure 6-1, Figure 6-2 and Figure 6-3 (for ACT Heritage Register and National Heritage Register items) and Figure 6-4 and Figure 6-5 (for Commonwealth Heritage List items). The heritage report details the heritage significance of each item listed in Table 6-1.

**Table 6-1 Non-Aboriginal heritage places and objects within proximity to the Project**

Place name	Location/ curtilage	Heritage register	Status/ID
Aboriginal Tent Embassy	King George Terrace	National Heritage List Commonwealth Heritage List	Nominated (105836) (Listed within Parliament House Vista)
Albert Hall	Commonwealth Avenue, Yarralumla	ACT Heritage Register	Registered
Barton Conference Centre	Brisbane Avenue and National Circuit Barton	ACT Heritage Register	Nominated
Barton Housing Precinct	5 Belmore Gardens, Barton	ACT Heritage Register	Registered
Burns Memorial	28 National Circuit, Forrest	ACT Heritage Register	Registered
Canberra Croquet Clubhouse and Lawns	Commonwealth Avenue, Yarralumla	ACT Heritage Register	Registered
Commencement Column Monument	Federation Mall	Commonwealth Heritage List	Listed (105347)
Communications Centre at the John Gorton Building	King Edward Terrace, Parkes	Commonwealth Heritage List	Listed (105618)
East Block Government Offices	Queen Victoria Terrace, Parkes	Commonwealth Heritage List	Listed (105349)
Edmund Barton Offices	Kings Avenue, Barton	Commonwealth Heritage List	Listed (105476)
Hyatt Hotel Canberra	Commonwealth Avenue, Yarralumla	ACT Heritage Register	Interim Heritage Listing
Hotel Kurrajong, Barton	8 National Circuit, Barton	ACT Heritage Register	Registered
John Gorton Building	Parkes Place, Parkes	Commonwealth Heritage List	Listed (105472)
King George V Memorial	King George Terrace, Parkes	Commonwealth Heritage List	Listed (105352)

Place name	Location/ curtilage	Heritage register	Status/ID
Lake Burley Griffin and Adjacent Lands	Adjoins the Parliamentary Zone, National Triangle and Commonwealth Avenue Bridge	Commonwealth Heritage List	Listed (105230)
National Library of Australia and Surrounds	Parkes Place, Parkes	Commonwealth Heritage List	Listed (105470)
National Rose Gardens	King George Terrace, Parkes	Commonwealth Heritage List ACT Heritage Register	Listed (105473)
Old Parliament House and Curtilage	King George Terrace, Parkes	Commonwealth Heritage List National Heritage List	Listed (105318) Listed (105774)
Old Parliament House Gardens	King George Terrace, Parkes	Commonwealth Heritage List	Listed (105616)
Parliament House Vista	Intersects the National Triangle	Commonwealth Heritage List	Listed (105466)
Patent Office (former)	Kings Avenue, Barton	Commonwealth Heritage List	Listed (105454)
St Andrew's Church Precinct	State Circle, Forrest	ACT Heritage Register	Registered
State Circle Cutting	State Circle, Parkes	Commonwealth Heritage List	Listed (105733)
Telopea Park School	New South Wales Crescent, Barton	ACT Heritage Register	Registered
The Brassey Hotel	12 Macquarie Street, Barton	ACT Heritage Register	Registered
The Lodge	5 Adelaide Avenue, Deakin	Commonwealth Heritage List	Listed (105452)
Treasury Building	King Edward Terrace	Commonwealth Heritage List	Nominated (106258)
Wesley Uniting Church Complex	20 National Circuit, Forrest	ACT Heritage Register	Nominated
West Block and the Dugout	Queen Victoria Terrace, Parkes	Commonwealth Heritage List	Listed (105428)
York Park North Tree Plantation	Kings Avenue, Barton	Commonwealth Heritage List	Listed (105242)

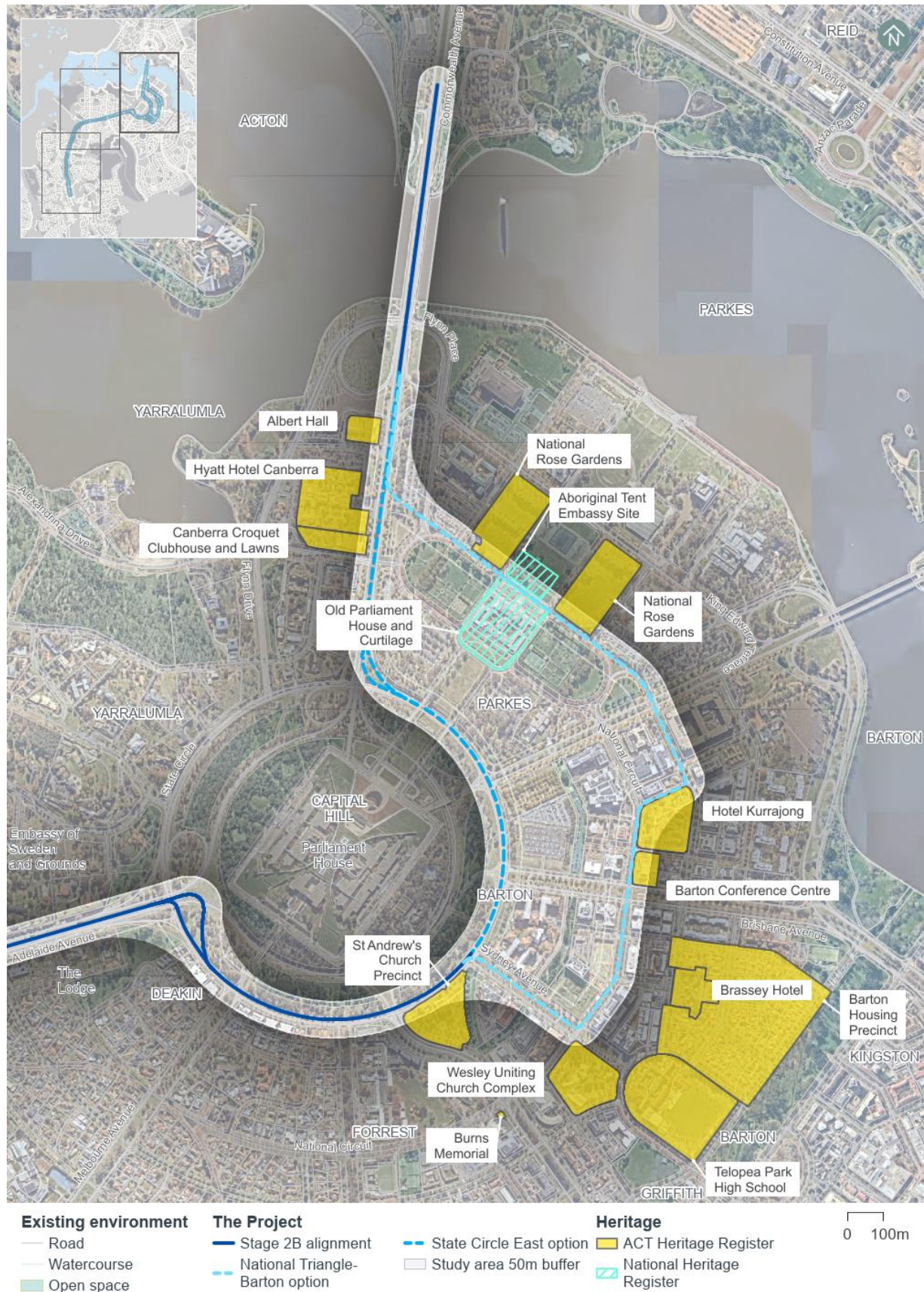


Figure 6-1 ACT Heritage Register and National Heritage Register items (1/3)



Figure 6-2 ACT Heritage Register and National Heritage Register items (2/3)

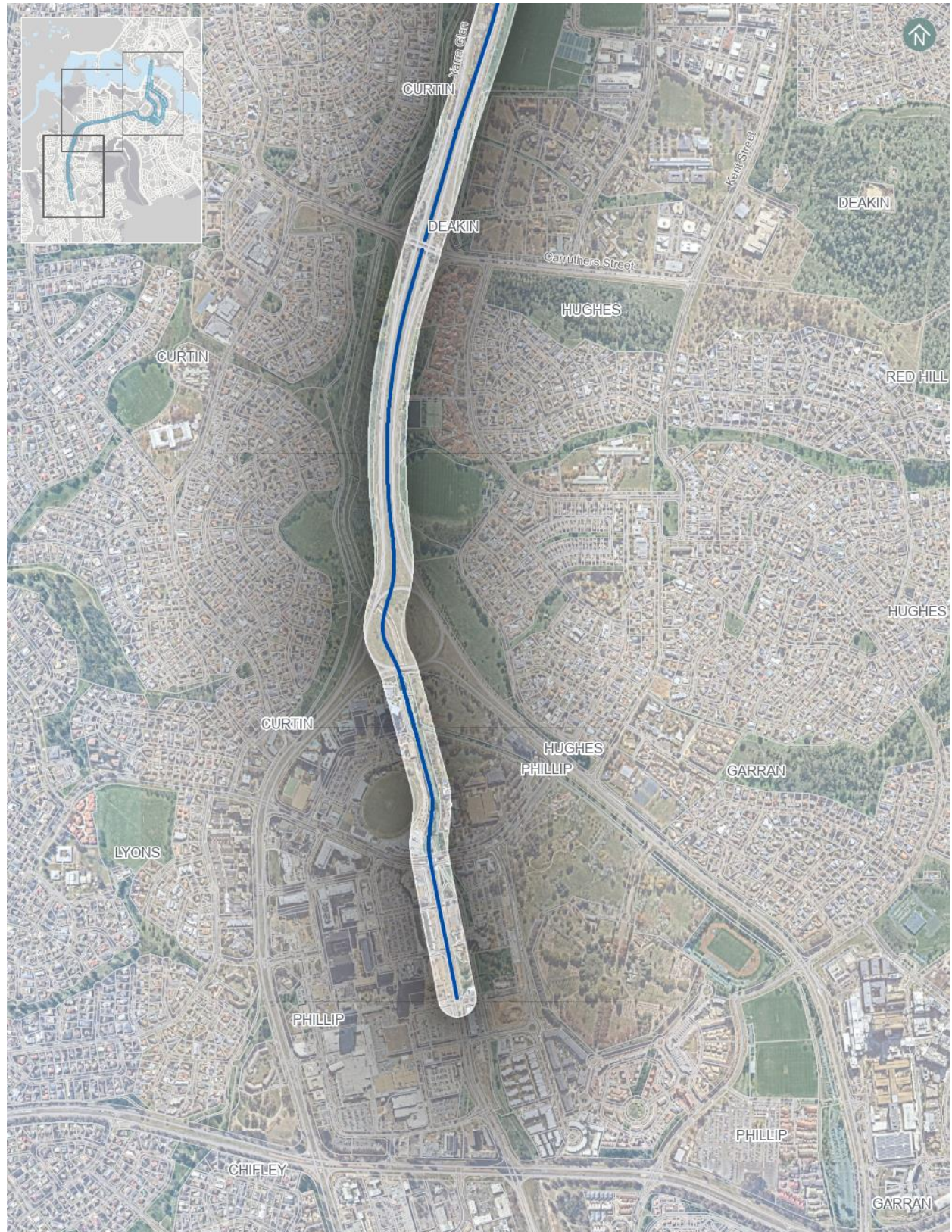


Figure 6-3 ACT Heritage Register and National Heritage Register items (3/3)



Figure 6-4 Commonwealth heritage items (1/3)





Figure 6-5 Commonwealth heritage items (2/3)

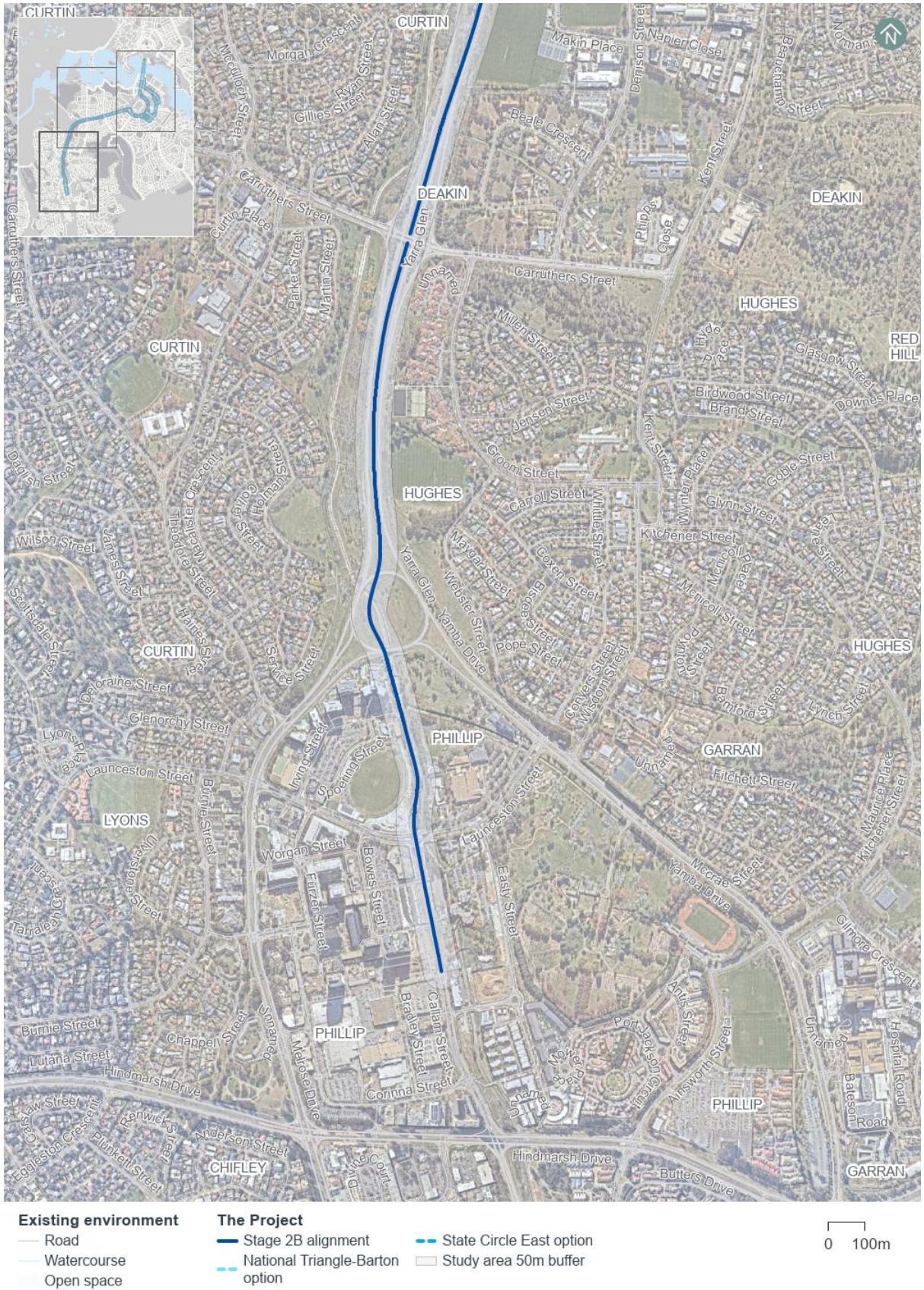


Figure 6-6 Commonwealth heritage items (3/3)

## 6.1.2 Summary of potential impacts

### 6.1.2.1 Indirect impacts

Design development for the Project is progressing with the aim of avoiding or minimising impacts to non-Aboriginal heritage values. The Project would have indirect impacts on the heritage values identified in proximity to the Project due to:

- The large scale and extent of the Project
- The community perception about future 'changes' to the heritage environment, which is culturally, socially or symbolically significant. For example, there may be indirect impacts on the symbolic and intangible nature of the heritage values in the study area. These could be impacts on community-held values. The impacts may be 'actual' or a community perception that change, of any kind, is negative if it relates to a significant heritage environment such as the central national area of Canberra. Therefore, communication about the positive benefits to the heritage values would be necessary.

Physical and visual heritage impacts may arise from:

- Physical construction of the Light Rail, including all ancillary infrastructure, roads, bridges, stations, platforms, lights, etc)
- Proposed removal of existing established mature, historic trees, planted along avenues, or individually, or other significant tree species for their cultural and natural heritage values. This would have a significant impact on the heritage values of the study area, not just isolated impacts.

### 6.1.2.2 Direct impacts

The Project would have direct impacts on the heritage values identified in proximity to the Project and potential areas of archaeology including:

- Civil works associated with existing roads, and constructing and rebuilding bridges
- Alteration of existing road alignments
- Civil and landscape works associated with the creation of new rail corridors through green space and/or undeveloped areas
- Removal of established mature and culturally significant trees, individual trees, or avenues of trees (planted by Weston in the 1920s, generally following Griffin's earlier design plans for Canberra)
- Physical and visual heritage impacts would arise from:
  - Altering the form of the existing road network and historic road alignments
  - Changing the function and character of the areas may have an impact on cultural, social, and symbolic heritage values
  - Proposed replacement of trees with new species that may not be suitable for the compatibility with the historic planned landscape of the study area. For example, it is important to design new plantings so they are complementary to the heritage values (ie the form, character, aesthetic should make a positive contribution).

### 6.1.3 Proposed further assessment

The following tasks are proposed as further assessment for potential non-Aboriginal heritage impact of the Project:

- Heritage analysis of the detailed design documentation, including proposed mitigation measures already in place
- Assessment of the degree and intensity of heritage impacts, associated with a particular alignment/alignments and design features for construction, all associated infrastructure, road and verge realignments, tree removals, stations, platforms, signalisation, wire-free or otherwise, following the methodology established in the heritage report

- View analyses and 3D modelling, examining the visual impacts, to and from heritage places and throughout the Parliamentary Zone, Barton, and Capital Hill
- Further exploration, documentation and confirmation of mitigation measures and alternative options in consultation with NCA.

## **6.2 Aboriginal heritage**

### **6.2.1 Existing environment**

#### **6.2.1.1 Cultural context**

The Project would be located on Ngunnawal Country, situated between Black Mountain, Mount Ainslie, and Mount Pleasant and over Lake Burley Griffin. Aboriginal heritage sites have been recorded within the vicinity of these landscape features, including along the banks of the Molonglo River prior to the establishment of Lake Burley Griffin. These landscape features are part of Aboriginal culture and have been previously identified as significant Aboriginal places. The area of Lake Burley Griffin holds a high level of cultural significance however, many sites of importance were flooded during the construction of Lake Burley Griffin and remain submerged.

#### **6.2.1.2 Existing and potential sites**

A search of the following databases was conducted on 4 August 2023:

- National Heritage List (NHL)
- Commonwealth Heritage List (CHL)
- ACT Heritage Register
- National Trust ACT Heritage Register
- Register of the National Estate (RNE).

The closest registered Aboriginal heritage item to the Project is the Aboriginal Tent Embassy, which would be located adjacent to the National Triangle-Barton alignment option (Figure 6-1). The Aboriginal Tent Embassy has dual heritage significance as an Aboriginal site listed on the NHL (NHL 105836) and the CHL (CHL 105466) (by association with the Parliament House Vista).

There are four known Aboriginal heritage sites located in proximity to the Project that are submerged on the bed of Lake Burley Griffin. This includes two Aboriginal artefact sites and two Aboriginal ceremonial sites that were recorded in association with the Molonglo River prior to Lake Burley Griffin construction. The specific location of these four sites is not known. There is the potential for additional items of Aboriginal cultural heritage to occur within the Lake Burley Griffin area.

The south-west corner of the existing stabling depot and maintenance facility in Mitchell also partially extends across an area recognised as containing a heritage object or place.

#### **6.2.1.3 Knowledge gaps**

To assess the Aboriginal heritage values of the proposed routes, consultation with recognised Representative Aboriginal Organisations in the ACT is normally required to afford them an opportunity to participate in the assessment and management of their own cultural heritage.

Furthermore, there is the potential for unregistered or unknown Aboriginal heritage items or places of cultural importance to be located within or near the Project. These include:

- Submerged cultural landscapes in Lake Burley Griffin
- Potential scar trees
- Areas with Aboriginal archaeological potential:
  - the alignment of historical watercourses
  - unrecorded Aboriginal burial locations
  - Capital Hill and surrounds

- Potential cultural landscapes:
  - original Molonglo River and associated sites now submerged in Lake Burley Griffin
  - Capital Hill (which may be part of a landscape identified as a women's area)
  - landscape connecting Mount Ainslie, Black Mountain, and Stirling Ridge/Parliament Hill.

## **6.2.2 Summary of potential impacts**

### **6.2.2.1 Construction**

There is the potential for construction of the Project to impact on unknown and known Aboriginal heritage sites including at the existing stabling depot and maintenance facility in Mitchell. There is also the potential for the presence of construction equipment, machinery, and plant to impact on Aboriginal cultural landscapes. It is anticipated that consultation with Registered Aboriginal Organisations and knowledge holders would assist with the identification of culturally important or sensitive locations, to avoid or minimise potential construction impacts to Aboriginal heritage.

If selected, the National Triangle-Barton alignment option would be located directly adjacent to the Aboriginal Tent Embassy. Construction may have potential temporary impacts on access to the Embassy, visual intrusion from construction plant, equipment and machinery, noise and vibration and potential safety risks should a protest be held within proximity to construction works.

### **6.2.2.2 Operation**

As stated above, if selected, the National Triangle-Barton option would be located directly adjacent to the Aboriginal Tent Embassy. During operation, LRVs near the embassy may reduce access, and pose potential safety risks during protests.

It is not anticipated that the operational Project would impact on Aboriginal heritage other than the Aboriginal Tent Embassy.

## **6.2.3 Proposed further assessment**

An Aboriginal heritage impact assessment would be prepared as part of the EIS. This assessment would identify the potential Aboriginal heritage impacts of both construction and operation of the Project.

The assessment would include (as a minimum):

- Consultation with Representative Aboriginal Organisations and the Aboriginal Tent Embassy community to determine the heritage values, and extent of potential impacts from the proposed works
- Qualitative assessment of potential Aboriginal heritage impacts during construction and operation of the Project including cumulative impacts
- Development of mitigation measures to avoid and/or minimise Aboriginal heritage impacts during construction and operation.

Consultation with the Representative Aboriginal Organisations and the Aboriginal Tent Embassy would also be undertaken to determine the heritage values and potential impacts on these values.

## **6.3 Traffic and transport**

### **6.3.1 Existing environment**

#### **6.3.1.1 Road network**

The existing road network is part of a key north-south transport alignment between the City Centre and Woden Town Centre, in particular, Commonwealth Avenue, State Circle, Adelaide Avenue and Yarra Glen. State Circle surrounds Capital Hill and intersects with key arterial roads including Commonwealth Avenue, Kings Avenue, Adelaide Avenue and Canberra Avenue, which provide connections to key destinations including the City Centre, Russell, Deakin, and Fyshwick, respectively.

### 6.3.1.2 Public transport

Multiple rapid buses (buses that provide services every six minutes during peak times and 15 minutes at all other times between key town centres and districts) use roads where the Project would be located, including the R4 (Tuggeranong – Woden – City – Belconnen) and R5 (Lanyon – Erindale – Woden – City). Rapid services R7 (Weston Creek – City) and R10 (Molonglo – City) use Commonwealth Avenue, Capital Circle and Adelaide Avenue<sup>1</sup>. The R2 (Fraser – Belconnen – City – Barton – Fyshwick) and R6 (Woden – Barton – City) use National Circuit where the National Triangle-Barton option would be located.

The Woden interchange is a key public transport interchange within the Project area, for both rapid buses (R4, R5, and R6) and local buses (17 services). The Woden Transport interchange is currently being upgraded and will be future proofed to include a Light Rail terminus, to allow for the increased patronage associated with the future Light Rail connection to Woden. It will be utilised as a bus stop until Light Rail becomes operational.

Existing Light Rail services are available between Gungahlin and the City Centre. After the completion of Stage 2A, Light Rail would extend south on Northbourne Avenue, west around London Circuit and south onto Commonwealth Avenue (Figure 1-1). The Stage 2A alignment would cease at Commonwealth Park Stop, near Commonwealth Park, north of Lake Burley Griffin.

### 6.3.1.3 Active transport infrastructure

As shown in the *Draft Active Travel Plan*, the current C4 City to Tuggeranong via Woden principal cycling route is located on Commonwealth Avenue Bridge, and continues west along the Lake Burley Griffin foreshores, before directing south to near the intersection of Adelaide Avenue and Kent Street<sup>2</sup>. The current C4 route from the intersection of Adelaide Avenue and Kent Street is generally adjacent to and follows the alignment of Yarra Glen towards Woden Town Centre. Investigation into a proposed future realignment of the existing C4 route from the Lake foreshore to Adelaide Avenue is currently being carried out.

The *ACT Transport Strategy – Local links, cycling network and walkable places*, identifies the National Triangle and Woden Town Centre as future ‘walkable places’ (ACT Government, 2023b). This means that these areas will see:

- High quality footpaths
- Seating to allow rest stops
- Safe opportunities to cross the road
- Clear walking priority at intersections.

### 6.3.1.4 Access

Pedestrian access is generally available around the National Triangle and Woden Town Centre and is restricted on Adelaide Avenue and Yarra Glen. This is to be expected as the National Triangle and Woden Town Centre are key employment, tourist, retail, commercial and educational destinations. Whereas Adelaide Avenue and Yarra Glen are arterial roads, with limited community infrastructure available directly adjacent to them. On Adelaide Avenue and Yarra Glen pedestrian access is generally absent, with nearby residences set back from the road, behind planted trees or behind raised road cuttings to separate the road corridors from adjacent land uses.

Commonwealth Avenue has separated pedestrian paths over Lake Burley Griffin to provide access to recreational areas and the Lake Burley Griffin foreshore. Other areas within the National Triangle are accessible via pedestrian paths including State Circle and the road corridors which the National Triangle-Barton option would be located within. Woden Town Centre is highly pedestrianised to offer access to offices, community services and retail premises within Woden Westfield.

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<sup>1</sup> Transport Canberra network map, Accessed at: [https://www.transport.act.gov.au/\\_data/assets/pdf\\_file/0005/1603688/2023\\_TC\\_network\\_map\\_420x792.pdf](https://www.transport.act.gov.au/_data/assets/pdf_file/0005/1603688/2023_TC_network_map_420x792.pdf)

<sup>2</sup> Cycle network map, Accessed at: [https://www.transport.act.gov.au/\\_data/assets/pdf\\_file/0010/1961722/Cycle-network-map.pdf](https://www.transport.act.gov.au/_data/assets/pdf_file/0010/1961722/Cycle-network-map.pdf)

Kerbside use is generally limited to local roads within the Project area. Kerbside parking is prohibited on Commonwealth Avenue, State Circle, Adelaide Avenue and Yarra Glen.

Parking near the Project is concentrated within the National Triangle and Woden Town Centre to provide access to key government precincts (such as the Treasury, National Library, Old Parliament House, and Attorney Generals Department) and facilities within Woden Town Centre (Woden Westfield, offices). There is also a park and ride facility located near Carruthers Street.

### **6.3.2 Summary of potential impacts**

#### **6.3.2.1 Construction**

Temporary traffic and transport impacts during construction of the Project would include:

- Increased congestion on roads during road and lane closures
- Increased travel times when lane closures are required
- Additional construction related light and heavy vehicles using the local road network
- Impacts to bus travel times, particularly during peak hours due to lane closures, or required route changes
- Pedestrian and cyclist detours
- Temporary road network changes, including detours and weekend closures
- Alternate routes and detours for road users
- Temporary loss of parking
- Additional heavy vehicles within the area, with the potential to conflict with pedestrians and cyclists.

#### **6.3.2.2 Operation**

The Project would be located within existing road reserves. Where the alignment is located within the median, the median may be raised to reduce the risk 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.

The Project would connect the City Centre to Woden Town Centre with Light Rail. The extension of the Light Rail would include new stops which would improve access to public transport.

The Project would benefit pedestrians and cyclists. It is anticipated that safety, walkability and cycling connectivity around the Project would improve due to the addition and enhancement of active transport facilities.

The Project would be integrated into the wider public transport network, including potential route and timetable changes to make use of any surplus bus fleet.

Potential adverse traffic and transport impacts as a result of the operation of the Project would include:

- Road network changes, including detours and closures
- Revised bus timetables to integrate with Light Rail services
- The proposed introduction of LRVs within the roadway may increase the severity of any possible vehicular, pedestrian or cyclist crash with the LRV.

### **6.3.3 Proposed further assessment**

A traffic and transport impact assessment would be prepared as part of the EIS. This assessment would identify the potential traffic and transport impacts of both construction and operation of the Project on the local and regional traffic network, including public transport, cyclists, and pedestrians.

The assessment would include (as a minimum):

- Assessment of construction traffic including number, frequency and size of construction related vehicles, potential routes for construction traffic and potential impact on existing traffic conditions

- Assessment of potential access constraints and impacts on general traffic, public transport, pedestrians, cyclists, and road network performance arising from construction
- Assessment of potential cumulative traffic impacts
- Assessment of how the transport network supports placemaking outcomes
- Assessment of road network and intersection performance during peak travel hours during operation
- Consideration of opportunities to improve public transport links to stops, redeployment of surplus fleet to enhance network services and to integrate cycling and pedestrian elements with surrounding networks during operations
- Identification of mitigation measures to manage the risk of identified impacts.

## 6.4 Biodiversity

### 6.4.1 Existing environment

#### 6.4.1.1 Vegetation

This section summarises key biodiversity issues associated with the Project as provided in the Interim Ecological Assessment – Commonwealth Park to Woden (Umwelt, 2023). This assessment is attached separately to the referral and scoping report application.

Biodiversity surveys undertaken around the Project identified the following vegetation in proximity to the Project:

- Tablelands Dry Tussock Grassland – Natural Temperate Grassland (High Diversity):
  - consistent with the EPBC Act listed *Natural Temperate Grassland of the South Eastern Highlands* which is critically endangered
  - consistent with the *Nature Conservation Act 2014* (NC Act) listed *Natural Temperate Grassland* which is critically endangered
- Exotic Grassland
- Non-Local Native Ground-cover
- Landscape Plantings – Exotic
- Landscape Plantings – Native.

#### 6.4.1.2 Protected and threatened fauna and flora

Biodiversity surveys undertaken around the Project confirmed that the following fauna and flora have the potential to occur within proximity to the Project:

- Superb Parrot (*Polytelis swainsonii*) which is vulnerable under the EPBC Act and NC Act:
  - potentially important foraging habitat is mapped between Launceston Street and Melrose Drive in Woden
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) which is listed as endangered under the EPBC Act and NC Act:
  - there are confirmed records of Gang-gang Cockatoo breeding within 200 m of the Project area in Hughes
- Swift Parrot (*Lathamus discolor*) which is listed as vulnerable under the EPBC Act and NC Act
- Golden Sun Moth (*Synemon plana*) which is listed as vulnerable under the EPBC Act and NC Act:
  - Golden Sun Moth were recorded near Commonwealth Park, around State Circle, and along Adelaide Avenue near the Cotter Road junction
- Perunga Grasshopper (*Perunga ochracea*) which is listed as Endangered under the NC Act



- Striped Legless Lizard (*Delma impar*) which is listed as Vulnerable under the EPBC Act and NC Act.

No individuals of any threatened flora species were detected within the Project area during targeted surveys.

#### **6.4.1.3 Other biodiversity values**

One hundred and four hollow-bearing trees were identified within the Project area, with most (59%) identified as native. The areas near State Circle and Adelaide Avenue had the highest number of hollow-bearing trees, largely comprising of native trees.

The Project area also contains a mix of maintained verge and amenity-planted trees that may provide habitat for common native flora and fauna. This vegetation habitat remains important to natural ecological processes of the area and region, but it is not listed or protected.

### **6.4.2 Summary of potential impacts**

#### **6.4.2.1 Construction**

Potential biodiversity impacts that could occur during construction of the Project would include:

- Clearing of listed and protected ecological communities
- Clearing of vegetation that is not listed or protected
- Clearing of habitat for listed and protected species, including hollow-bearing trees
- Spread of invasive species off-site (during construction and decommissioning)
- Injury and mortality of fauna species during vegetation clearing and/or because of collisions with construction plant and vehicles
- Indirect impacts such as from light, sedimentation, and noise
- Indirect impacts of fragmentation, edge effects and isolation of populations.

#### **6.4.2.2 Operation**

Potential biodiversity impacts that could occur during operation of the Project would include:

- The injury and/or mortality of fauna species, which could result from collisions with the LRV and/or maintenance vehicles
- Disturbance of fauna species due to indirect impacts such as light and noise.

### **6.4.3 Proposed further assessment**

A biodiversity impact assessment would be prepared as part of the EIS. This assessment would identify the potential biodiversity impacts of both construction and operation of the Project.

The assessment would include (as a minimum):

- Further targeted investigations to enable a complete assessment of the biodiversity constraints for the Project
- Identification and description of flora and fauna species, habitat, populations, and ecological communities that occur or are considered likely to occur within proximity of the Project
- Assessment of the direct, indirect and cumulative impacts of the Project on identified biodiversity values
- Assessment of the significance of the impacts of the Project on species, ecological communities and populations listed under the EPBC Act and the NC Act that occur or are considered likely to occur within proximity of the Project
- An assessment of significance for MNES in accordance with the EPBC Act Significant Impact Guidelines 1.1
- Identification of mitigation measures to manage the risk of identified impacts.

## **6.5 Noise and vibration**

### **6.5.1 Existing environment**

Land use along the Project varies and contains a mix of government precincts, community facilities (such as schools, places of worship, medical facilities, and childcare centres) and residential, recreational, commercial, and retail areas.

The existing environment is largely influenced by road traffic noise, from main avenues and arterial roads such as Commonwealth Avenue, Adelaide Avenue, and Yarra Glen. Other noise sources include local construction works and natural noises such as birds, dogs, and wind.

#### **6.5.1.1 Sensitive receivers**

People living, working, and visiting Canberra are likely to be sensitive to noise and this may affect their use and enjoyment of an area. Sensitive receivers related to the Project would include:

- Residential areas and hotel accommodation, adjacent to the Project
- Concert halls such as Albert Hall and Wesley Music Centre
- Childcare and education facilities
- Government buildings, cultural institutions and offices in the National Triangle and Woden
- Embassies
- The Lodge
- Places of worship
- Woden Cemetery.

There are also various vibration sensitive receivers near the Project area including:

- Hospitals (Barton Private Hospital, Calvary Hospital and Canberra Hospital)
- Music venues (such as Albert Hall and Wesley Music Centre)
- Heritage items (see Section 6.1)
- Buildings that may have sensitive security and/or alarm systems (such as the Australian Federal Police building and banks).

### **6.5.2 Summary of potential impacts**

#### **6.5.2.1 Construction**

Construction of the Project would result in noise and vibration impacts on surrounding land uses and sensitive receivers. Given the location of the Project within key avenues and arterial roads, some construction works may need to be conducted outside of standard working hours, to avoid potential traffic impacts, and safety risks for construction workers. Where works may be required to be conducted outside of standard working hours, associated noise may cause sleep disturbance to surrounding residences.

Vibration intensive equipment and activities may also impact the vibration sensitive receivers listed above.

Construction activities with the greatest potential to result in significant noise and vibration impacts include:

- Mobilisation and establishment of construction compound sites
- Relocation and treatment of utilities
- Construction of tracks and stops
- Construction of elevated structures, such as bridges.

The extent of construction related noise and vibration impacts on sensitive receivers would be dependent on existing background noise levels, work hours, plant and equipment, and the distance between works and sensitive receivers. Sensitive receivers closest to the proposed works are anticipated to experience high noise and vibration disturbance.

### 6.5.2.2 Operation

During operation, the Project is anticipated to generate noise and vibration impacts from:

- Operation of LRVs and associated noises including wheel squeal, particularly where the track curves, and LRV alarm bells
- Operation of stops such as from public address systems, noise from pedestrians, and noises to alert passengers of the arrival and departure of LRVs
- Changes to road traffic patterns and levels
- Operation of substations and other ancillary facilities
- Vibration from the operation of LRVs.

### 6.5.3 Proposed further assessment

A noise and vibration impact assessment would be prepared as part of the EIS. This assessment would identify the potential noise and vibration impacts of both construction and operation of the Project.

The technical assessment would include (as a minimum):

- Identification of sensitive receivers near the Project that are likely to be impacted by construction and operational noise and vibration
- Conduction of noise monitoring and attended noise measurements to determine relevant noise criteria, where applicable
- Assessment of noise and vibration impacts to nearby sensitive receivers using relevant guidelines and policies, and compare against relevant criteria
- Cumulative noise and vibration impact assessment
- Provision of indicative noise mitigation measures, options, or treatments where applicable.

## 6.6 Urban design, landscape character and visual amenity

### 6.6.1 Existing environment

The sensitivity of the existing visual environments and characteristics vary considerably along the Project corridor. Characteristics vary from low visual amenity within non-significant arterial transport corridors, to Territory significant precincts within the National Triangle, major avenues and Lake Burley Griffin which have high visual amenity and landscape character value. Key characteristics within the Project area are described in Table 6-2.

**Table 6-2 Key visual environments and landscape characteristics**

Visual environment	Description
National Triangle	<p>The National Triangle comprises a series of linear corridors with focal points including Parliament House, Old Parliament House and the Australian War Memorial. The strong linear elements are a major design feature of Canberra and assists with orientation and highlighting landmarks. This is further assisted with focal points being built on raised landforms.</p> <p>Commonwealth Avenue forms part of the National Triangle and connects the major topographic landforms of Capital Hill and City Hill. The symbolic weight of the Land Axis, the geometric axis connecting Mount Ainslie to Capital Hill, makes this an important space for cultural functions.</p>

Visual environment	Description
Land Axis and National Triangle	<p>As discussed in Section 2.3.3, the Griffin Plan is an important design legacy for Canberra. The Project interacts with nationally important vistas, viewsapes and corridors created in the Griffins' design. Two key aspects of the Plan are relevant to the Project:</p> <ul style="list-style-type: none"> <li>• Land Axis alignment: The land axis is a view corridor between Mount Ainslie and Mount Bimberi that follows the alignment of the War Memorial on ANZAC Parade and Parliament House on Capital Hill</li> <li>• National Triangle: is the ceremonial precinct of Canberra, containing some of Australia's most significant buildings and bounded by Constitution, Kings, and Commonwealth Avenues. The centre of this triangle is the convergence of the land and water axes which the Griffin Plan was planned around.</li> </ul> <p>The main principle of the Griffin Plan was to create symmetry and order through the systematic placement and arrangement of arterial roadways. This has been used to balance the city's planned and ordered design while forming ceremonial (government) areas and localised commercial and residential precincts.</p>
Major avenues and axis	<p>This visual environment comprises a series of linear corridors and focal points, including focal points of Parliament House, Commonwealth Avenue, Old Parliament House, and The Land Axis. This visual environment emphasises a major design component of Canberra, provides strong, linear elements that assist in orientation, highlight landmarks, and introduces drama and weight to areas within the landscape.</p> <p>Views along the avenues and axes are an integral element, with vegetation planted as an avenue on either side of the central viewing corridor (e.g. the Land Axis) or occasionally within the central median (Commonwealth Avenue).</p> <p>Built form is limited to a few key landmark buildings, including the current and former Parliament Houses, which act as focal points. Architectural style is varied, but typically monumental and formal in design.</p>
Lake Burley Griffin and foreshores	<p>Lake Burley Griffin and foreshores are comprised of the large, open expanse of water of Lake Burley Griffin and the parkland foreshore areas.</p> <p>The topography is relatively flat and low lying. The views across Lake Burley Griffin and landscape beyond are visible from most locations. Views include Black Mountain, Mount Ainslie and landmark buildings which surround Lake Burley Griffin.</p>
Landscape planting	<p>The landscape surrounding the Project includes planted trees and other features that inform and define the streetscape of Canberra. This is true of the landscaped corridors along Commonwealth Avenue and Kings Avenue that have established design theme of verges, medians, and formal tree plantings.</p> <p>Within the Parliamentary Triangle, tree planting is considered fundamental to the character and structure of the precinct. The original intent for street tree plantings along Commonwealth Avenue were for a backdrop of coniferous evergreen trees contrasting with deciduous trees at the street edge. King George Terrace also contains important tree plantings containing a mix of exotic evergreen and deciduous species. Tree replacements would be considered as part of the Project.</p> <p>Within the Barton precinct, York Park is earmarked as a prominent site within the Central National Area that forms part of the backdrop and approach to Parliament House and the edge of the National Triangle. Landscaping within York Park is a mix of formal and informal spaces to reinforce the landscape setting of Parliament House. The York Park North Tree Plantation (Oak plantation) is Commonwealth Heritage Listed and is significant as it is one of six plantations of its kind within Canberra remaining largely intact.</p>

Visual environment	Description
Woden Town Centre	Woden Town Centre is typical of a commercial and retail district. Built form is typically of mid-rise buildings. The Callam Offices and Woden Cemetery are listed under the ACT Heritage Register for meeting several heritage significance criteria, including exhibiting outstanding design and aesthetic quality.
Adelaide Avenue Corridor	Adelaide Avenue is a dual carriageway, providing connections between Yarra Glen and Parliament House. A mix of native and non-native road-side plantings are present on both sides of the road corridor, providing landscaping value whilst also blocking views of adjacent embassies and residential areas. Adelaide Avenue is not a significant visual landscape corridor, and land use within the corridor is for the purposes of transport.
Yarra Glen Corridor	Yarra Glen is a major arterial road connecting Woden and South Canberra. Verges comprise a mix of cleared grassed areas and native and non-native plantings. Nearby residential areas are generally set back from the corridor, or blocked by tree plantings, blocking direct views of Yarra Glen.

## 6.6.2 Summary of potential impacts

### 6.6.2.1 Construction

Design development for the Project is focused on urban design outcomes and a landscape led design that integrates the Project with the sensitive surrounding landscape.

Visually sensitive receivers would typically include residential dwellings, commercial premises (e.g., cafes, restaurants, and commercial buildings), numerous primary and secondary schools and educational facilities (such as Canberra Girls Grammar and Forrest Primary School), government precincts, culturally and historically significant buildings (Parliament House, and associated heritage within the National Triangle), and recreational facilities (Phillip Oval and Commonwealth Park).

The construction of the Project may cause temporary adverse impacts on landscape character and visual amenity for those who work, study, reside, visit, or access businesses/community services within the area.

These impacts may result from:

- The establishment of construction compounds, work sites and stockpiles
- Light spill from construction sites during out-of-hours construction
- The erection of fencing, barricades, gates, and security lighting to provide safe and secure work sites
- Construction vehicle movements both within construction work sites
- Traffic disruptions associated with traffic mitigation measures (road diversions/closures) and/or construction traffic
- Impacts to water users due to presence of construction in Lake Burley Griffin
- The removal of landscape and trees
- Parking and use of construction plant and equipment.

The impact on individual sensitive receivers would be dependent on the stage of construction, the location and severity of the impact.

### 6.6.2.2 Operation

Potential landscape character and visual amenity impacts that could occur during the operation of the Project include:

- Changes to visual impacts associated with the introduction of new stops, LRVs and other Light Rail related infrastructure
- Adverse impacts on landscape character due to the establishment of new infrastructure (such as new stops)
- Positive urban design, landscape, and visual impacts from the provision of high quality, and consistent landscape plantings, urban design features and hardscaping
- Light spill from stops.

The Project would introduce new visual elements within the heritage curtilage of the Parliament House Vista and more broadly the National Triangle.

### 6.6.3 Proposed further assessment

An urban design, landscape and visual impact assessment would be prepared as part of the EIS. This assessment would identify the potential urban design, landscape and visual impacts of both construction and operation of the Project.

The technical assessment would include (as a minimum):

- Description of the landscape character and unique qualities of the area along Project corridor, and key viewpoints
- Assessment of the impact of the Project to the landscape character and viewpoints
- Identification of the visual impacts of the Project during daytime and night-time conditions (including lighting), and during construction and operation
- Consideration of land use changes where they may influence the character of the existing urban design, landscape, and visual amenity
- Consideration of the heritage and other social values of the Project area to establish the potential sensitivity of receivers and visual absorption capacity
- Consideration of potential cumulative impacts associated with the construction/operation of other major projects
- Identification of measures to avoid, minimise and/or mitigate potential impacts.

A design, place and movement report would also be prepared as part of the EIS to describe the design, place, and movement framework for the Project, demonstrate how the Project has met the design, place and movement requirements and discuss how existing public domain and amenity has been prioritised and how the Project responds to the Griffin Legacy and NCP.

## 7.0 Other environmental considerations

### 7.1 Social and economic

#### 7.1.1 Existing environment

##### 7.1.1.1 Demography

The Project is located within three 'Statistical Area Level 3' areas as defined by the Australian Bureau of Statistics (ABS), those being North Canberra, South Canberra, and Woden Valley. The North Canberra Statistical Area captures the alignment from its northern extent to where the alignment crosses Lake Burley Griffin. The South Canberra Statistical Area captures the alignment from where it crosses Lake Burley Griffin to where Yarra Glen intersects with Carruthers Street. The Woden Valley Statistical Area captures the alignment from where the Yarra Glen intersects with Cotter Road to where the Project terminates in Woden Town Centre. A summary of demography within North Canberra, South Canberra and Woden Valley is provided in Table 7-1.

**Table 7-1 Demography within North Canberra, South Canberra, and Woden Valley**

Social and economic factor	North Canberra (ABS, 2021)	South Canberra (ABS, 2021)	Woden Valley (ABS, 2021)
People	61,188	31,592	39,279
Male, female	49.3%, 50.7%	48.3%, 51.7%	48.7%, 51.3%
Median age	31	40	39
Average number of motor vehicles per dwelling	1.4	1.6	1.7
Education	Within North Canberra, 14.2% of the population were attending primary school, 11.4% were attending secondary school and 53.9% were attending tertiary school. The population is highly educated with 53.6% of the population attaining a bachelor's degree level and/or above.	Within South Canberra, 21% of the population were attending primary school, 20.6% were attending secondary school and 31% were attending tertiary school. The population is highly educated with 57.7% of the population attaining a bachelor's degree level and/or above.	Within Woden Valley, 27.7% of the population were attending primary school, 21.1% were attending secondary school and 29.7% were attending tertiary school. The population is highly educated with 50.4% of the population attaining a bachelor's degree level and/or above.
Cultural diversity	The population is generally of European descent, with most people identifying as English (33.8%), Australian (30.4%), Irish (13.8%) or Scottish (11.3%).	The population is generally of European descent, with most people identifying as English (35%), Australian (29%), Irish (14.3%) or Scottish (11.8%).	The population is generally of European descent, with most people identifying as English (31.7%), Australian (29.4%), Irish (12.9%) or Scottish (10.7%).
Religious affiliation	Most of the population (55.5%) is not affiliated with a religion. However, there are people of Catholic (13.8%), Anglican (5.8%) and Buddhist (3.2%) faith.	Most of the population (45.8%) is not affiliated with a religion. However, there are people of Catholic (18.3%), Anglican (10.1%) and Hindu (2.8%) faith.	Most of the population (40.3%) is not affiliated with a religion. However, there are people of Catholic (21.3%), Anglican (8.4%) and Hindu (6.2%) faith.

Social and economic factor	North Canberra (ABS, 2021)	South Canberra (ABS, 2021)	Woden Valley (ABS, 2021)
Language used at home	About 25.6% of people used a language other than English at home.	About 22% of people used a language other than English at home.	About 27.5% of people used a language other than English at home.
Employment	61.2% of the population work full time, 29.4% work part-time, 5.0% were away from work and 4.4% are unemployed.	68.8% of the population work full time, 23.5% work part-time, 4.9% were away from work and 2.9% are unemployed.	63.6% of the population work full time, 27.9% work part-time, 5.0% were away from work and 3.6% are unemployed.
Occupation	The top responses for occupation were professionals (38.4%), managers (21.9%), and clerical and administrative workers (11.8%).	The top responses for occupation were professionals (41.8%), managers (23.9%), and clerical and administrative workers (11.6%).	The top responses for occupation were professionals (35.5%), managers (18.9%), and clerical and administrative workers (13%).
Industry of employment	Top industries of employment were central government administration (19.2%), Defence (9.8%), higher education (5.5%), and cafes and restaurants (3.6%).	Top industries of employment were central government administration (21.9%), Defence (8.8%), computer system design and related services (3.9%), hospitals (3.1%) and higher education (2.5%).	Top industries of employment were central government administration (19%), hospitals (6.9%), Defence (4.3%), computer system design and related services (3.7%) and cafes and restaurants (2.6%).
Method of travel to work	Most of the population travels to work by car as a driver or as a passenger (46%). 9.2% of the population reported travelling to work by public transport, 13.4% walked only and 7% cycled.	Most of the population travels to work by car as a driver or as a passenger (58.6%). Only 5.4% of the population reported travelling to work by public transport, 8% walked only and 3.7% cycled.	Most of the population travels to work by car as a driver or as a passenger (64.5%). Only 6.7% of the population reported travelling to work by public transport, 5.1% walked only and 1.6% cycled.

### 7.1.1.2 Social infrastructure

Social infrastructure near the Project, that is easily accessible from the road corridor, is generally concentrated within Commonwealth Park, Acton, the National Triangle and Woden Town Centre. Prominent social infrastructure located within and adjacent to the alignment includes, but is not limited to:

- The Acton Waterfront which includes Henry Rolland Park and access to the Lake Burley Griffin foreshore. The City Renewal Authority is delivering the Acton Waterfront project, which aims to provide new open spaces, improves connections with the City Centre and better access for water activities
- The National Triangle, which is an important cultural precinct and tourist destination, including attractions such as the National Gallery, Questacon, National Library and the National Portrait Gallery
- Woden Town Centre, which is a key retail and commercial district. It is the central focal point for social and community activity, and a key transport interchange within Woden Valley
- Calvary John James Hospital, which is a private general hospital, located in Deakin. The Calvary Hospital offers services such as maternity care, special nursery care, paediatric services, intensive care, and rehabilitation. It is also the only hospital in Canberra with a hydrotherapy pool. The



Calvary Hospital has an Indigenous Liaison Service to improve access to healthcare services for Aboriginal and Torres Strait Islander people from the ACT and Regional NSW

- Canberra Hospital which is the largest district general hospital in the region, and functions as an educational hospital. Canberra Hospital provides numerous social services including withdrawal care, trauma service, neuropsychology, and childbirth education. The area also includes National Capital Private Hospital, ANU School of Medicine and Psychology, and Canberra Hospital Emergency Department
- Health care services such as general practitioners, wellness clinics, sexual health centres, imaging services, aged care and rehabilitation clinics are generally concentrated within proximity to the Calvary John James Hospital, in Deakin and the Canberra Hospital in Garran
- Places of worship including
  - Catholic Churches, such as St. Peter Chanel's Church, and Holy Trinity Catholic Church. Across Woden Valley and South Canberra about one in five people are of Catholic faith
  - Anglican Churches, such as St Luke's Anglican Church, Good Shepherd Anglican Church, and Saint Alban's Anglican Church. Across Woden Valley and South Canberra about one in 10 people are of Anglican faith
  - Presbyterian Church of Saint Andrew
  - The Hare Krishna Temple Iskcon Canberra, which is in Hughes. It is likely that the population in South Canberra that are of Hindu faith (2.8% or around 885 people) would use the Hare Krishna Temple as a place of worship as it is the closest Mandir to South Canberra. Another Mandir is available within the Woden Valley, the Sri Vishnu Shiva Mandir, however it is in Mawson, a considerable distance from the proposed terminus at Woden Town Centre. Nonetheless, 6.8% of the population that are of Hindu faith within Woden Valley, may use either Mandir
- Educational facilities including
  - Preschools including Petit Early Learning Journey Barton, Papilio Early Learning Yarralumla and Gowrie NSW Discovery House Early Education and Care
  - Primary schools including Forrest Primary School, Canberra Girls Grammar Junior School, Holy Trinity Primary School, Hughes Primary School, Curtin Primary School, Saints Peter and Paul Primary School
  - Secondary schools including Telopea Park School, Canberra Girls Grammar Senior School, Alfred Deakin High School, Canberra College
  - Tertiary schools including Australian Federal Police College
- Major recreational areas near the Project which include Lake Burley Griffin and Commonwealth Park. Lake Burley Griffin is a prominent feature and key tourist and recreational destination within Canberra. Commonwealth Park is regularly used for holding special events, most famously, the annual spring Floriade. The Lotus Bay Boat Ramp and Jetty area near the Canberra Yacht club provide key access to water activities
- Important cultural destinations such as the Royal Australian Mint, Old Parliament House and Gardens, the National Rose Gardens, and the Aboriginal Embassy
- Active recreational areas including:
  - Deakin and Mint Ovals which provides spaces for soccer, cricket, Oz tag, touch football, and sundry and holds sporting events
  - Phillip Oval which provides space for Australian rules football and cricket and holds sporting events.

### 7.1.1.3 Employment infrastructure

Employment infrastructure near the Project, that is easily accessible from the road corridor, is concentrated within the National Triangle, Woden Town Centre and West Deakin. Prominent employment infrastructure located within and adjacent to the alignment include, but is not limited to:

- The National Triangle, which is an important employment centre and government district, and includes Parliament House. Key places of employment include Department of Prime Minister and Cabinet, Australian Federal Police, Office of National Intelligence, the Treasury, Attorney General's Department, Department of Foreign Affairs and Trade, Department of Finance, Department of Humans Services and various embassies and high commissions
- Woden Town Centre which is a key employment centre and includes the Department of Social Services, ACT Health, and Australian Public Service Commission. Given that Woden Town Centre is also a key retail and commercial district there are numerous retail and hospitality employment opportunities available. The Canberra Hospital is also located near Woden Town Centre, a key location for healthcare opportunities
- West Deakin is a key employment district, particularly for the healthcare industry where numerous medical facilities are located, including Calvary John James Hospital, Deakin Private Hospital, and other specialised clinics such as dental, audiology, and orthopaedic clinics. Other opportunities include clerical work, for example in private legal and accounting firms within the area.

## 7.1.2 Summary of potential impacts

### 7.1.2.1 Construction

#### 7.1.2.1.1 Social

Potential social and community impacts that could occur during construction of the Project would include:

- Amenity impacts – community facilities are potentially more sensitive to amenity impacts such as noise, vibration, air quality and visual changes. The ability of residents and certain community facilities to function, or the community's enjoyment of them, may be reduced where they are located close to construction sites
- Temporary disruptions and/or changes to access – construction sites and activities may result in loss of access, changed or restricted access to and from residences and community facilities
- The potential human health impacts associated with long term construction noise
- Disruption to special events near the Project area, particularly near Commonwealth Park.

#### 7.1.2.1.2 Economic

Potential positive business impacts that could occur during construction of the Project would include:

- Increase in passing trade – depending on their location, some businesses adjacent to the National Triangle-Barton option may benefit from a net gain in passing trade during construction from an influx in construction workers
- Trade increase – trade could increase for businesses located close to construction areas
- Demand for services, such as construction recruitment agencies, construction companies and resource suppliers
- Employment and training opportunities.

Some businesses would also experience negative impacts during construction, including:

- Changes to the road network causing temporary impacts to users within the existing road network, such as impacts to nearby street parking
- Decline in accessibility to and use of social infrastructure and services
- Delays and changes to public transport

- Decline in health and wellbeing from increased noise and dust emissions.

### **7.1.2.2 Operation**

The Project is anticipated to result in several positive social impacts due to improved public transport facilities, improved active transport infrastructure, and greater connectivity between key centres. These benefits may include:

- Contributing towards reducing anticipated future traffic congestion
- Increased access to jobs, businesses, services, social facilities, and key town centres
- Enhanced social cohesion through improvements to public space networks Improvements to the aesthetic value of the Project corridor.

### **7.1.3 Proposed further assessment**

A social and economic impact assessment would be undertaken as part of the preparation of the EIS. This assessment would identify the potential social and economic impacts of both construction and operation of the Project.

The technical assessment would include (as a minimum):

- Identification of locations where businesses would be directly impacted by the Project
- Identification of locations where businesses may be indirectly impacted by the construction and/or operation of the Project
- Identification of community facilities adjacent to construction sites and operational infrastructure that may be impacted by reduced amenity
- Identification of where access may be lost or restricted because of construction of the Project. In this instance, the assessment would identify if suitable alternative access can be provided
- A local business survey to understand the perceived potential impacts on local businesses during construction and operation
- A community survey to understand perceived potential impacts on community groups during construction and operation
- Assessment of the potential impacts of the Project on businesses and the community, during construction and operation including cumulative impacts
- Consideration of the potential health, access, movement, amenity, social and economic benefits associated with public transport
- Identification of measures to avoid or mitigate the potential impacts.

## **7.2 Climate change**

### **7.2.1 Overview**

The Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC, 2021) states with high confidence that Australia is already experiencing impacts from recent climate change, including a greater frequency and severity of extreme weather events, an increase in record hot days, a decrease in record cold days and increases in global GHG concentrations. Australia is likely to experience a range of ongoing changes into the future including:

- Continued increases in air temperatures, more heat extremes, and fewer cold extremes
- Continued decrease in cool season rainfall across many regions of southern and eastern Australia, likely leading to more time in drought, yet more intense, short duration heavy rainfall events
- A consequential increase in the number of dangerous fire weather days and a longer fire season for southern and eastern Australia.

## 7.2.2 Summary of potential impacts

### 7.2.2.1 Construction

Climate change risks during construction of the Project would be primarily associated with the occurrence of extreme weather events, such as heavy rainfall and heatwaves. Potential risks include:

- Reduced access to construction areas
- Potential risk to workers exposed to extreme weather such as heat stroke, and injury
- Increased pressure on erosion and sediment control measures
- Increased flooding risk to the construction area.

These risks are anticipated to be adequately managed with mitigation measures, such as increasing the capacity of erosion and sediment controls and monitoring weather events.

### 7.2.2.2 Operation

Potential impacts of climate change on the operational Project include:

- Extreme rainfall impacting on drainage infrastructure and surrounding areas resulting in flooding
- Extreme events requiring Light Rail to temporarily cease (such as flooding or fire within the Light Rail corridor)
- The impact of drought, extreme heat, and changes in rainfall patterns on landscaping
- Increased average temperatures and frequency of heatwaves, which may affect the integrity of Project infrastructure and affect customer and staff comfort.

### 7.2.3 Proposed further assessment

A climate change assessment would be undertaken as part of the EIS which would include (as a minimum) identification of potential effects and risks associated with climate change. The assessment would also identify possible treatment options and risk management measures that could be incorporated into the design, construction, and operation of the Project.

## 7.3 Hydrology, flooding and water quality

### 7.3.1 Existing environment

#### 7.3.1.1 Hydrology

The section of the Project north of where Yarra Glen intersects with Adelaide Avenue, is located within the Molonglo River Catchment and the southern end is located within the Southern ACT catchment. Lake Burley Griffin is a prominent hydrological feature within the Project area. Lake Burley Griffin is a manmade lake, created by damming the water of the Molonglo River in 1964 (NCA, 2009). Yarralumla Creek intersects with the Project near the intersection of Yarra Glen and Melrose Drive.

The Project area is a highly modified urban environment and the existing road corridor is paved. Existing vegetation within the road corridor is generally limited to grassed medians, shoulders, and street trees. Surrounding land uses include a mixture of residential, urban, and commercial precincts. Stormwater runoff enters a system of underground stormwater pipes, discharging at various outlets into Lake Burley Griffin and into the Molonglo River.

Groundwater is at a depth of between two and eight metres below ground.

#### 7.3.1.2 Flooding

A desktop assessment in July 2023 using ACT Mapi indicated that several areas near the Project area are flood prone including:

- Commonwealth Avenue south, part of the Capital Hill flood modelling catchment
- Queen Elizabeth Terrace, alongside Lake Burley Griffin
- Yarra Glen between the Mint Interchange and Melrose Drive roundabout.

Available groundwater information indicates that the water table under the Project area is 200 m below ground (BoM, 2023).

### 7.3.1.3 Water quality

Algal blooms are a primary water quality concern for Lake Burley Griffin (AECOM, 2022). Other activities in the Molonglo River and Southern ACT catchments that are likely to affect water quality include:

- Other proposed construction projects in the area
- Commercial and high-density residential urban land uses, which:
  - Facilitate higher levels of waste generation than other land use zones (e.g., the City Centre and Woden Town Centre)
  - Often feature landscaped gardens where pesticides and fertilisers are used
  - Are more likely to have nearby construction projects.
- Discharges from Queanbeyan wastewater treatment plant.

### 7.3.2 Summary of potential impacts

#### 7.3.2.1 Construction

Construction of the Project has the potential for the following hydrology, flooding and water quality impacts:

- Accidental spills of fuels, oils or other chemicals from construction vehicles or equipment
- Release of hazardous materials due to wind or water erosion of contaminated spoil/fill materials
- Stormwater and surface water quality from uncontrolled runoff
- Onsite flooding or flooding downstream from earthworks temporarily modifying drainage direction and overland flow paths, and the potential for construction sediment to enter the stormwater network
- Interception of and potential reduction of groundwater levels
- Potential release, disturbance, or exposure to contaminated groundwater.

Spills and leaks would be managed by maintaining equipment and conducting activities with the potential to cause a spill in a safe manner.

The proposed construction works are not likely to change existing flow patterns or the flooding regime.

#### 7.3.2.2 Operation

The Project is not anticipated to impact on the frequency and extent of flooding events once operational as landform and flow direction of runoff would not significantly change. The Project would be designed to achieve this outcome. Stormwater treatment would be incorporated into the Project design as detailed in Section 4.2.7.

Potential contaminants include general litter and waste, sediment, minor leaks of hydrocarbons from vehicles (such as engine oil leaks), and wear products from vehicle parts (such as tyres and brakes). Potential contaminants would build up on impervious surfaces over time and during rainfall events may be discharged into Lake Burley Griffin and Yarralumla Creek.

### 7.3.3 Proposed further assessment

A hydrology, flooding and water quality assessment would be undertaken as part of the EIS which would include (as a minimum):

- Desktop review of the existing hydrological environment
- Review of historical water quality data for Lake Burley Griffin and Yarralumla Creek
- Construction and operational impact assessment
- Cumulative hydrology, flooding and water quality impact assessment

- Development of mitigation measures.

## 7.4 Property and land use

### 7.4.1 Existing environment

The alignment is located within an urban environment that includes residential properties, mixed use, government precincts, commercial premises, educational facilities, and recreational areas. Table 7-2 summarises the major land uses and key buildings/areas along the Project corridor.

**Table 7-2 Land uses along the Project corridor**

Land use	Key feature
Residential	<p>There are several medium density residential areas within proximity to the Project, predominately within the city, Woden, Barton, and Forrest. Lower density residential areas are found in Yarralumla, Deakin, Forrest, Curtin, and Hughes which are generally characterised by single dwellings.</p> <p>There are also retirement villages along the alignment including Grange Deakin Retirement Village, St Andrews Retirement Village in Hughes, and Bellerive Retirement Village in Woden.</p>
Mixed use	<p>Mixed use precincts generally comprise a combination of uses and activities including commercial, residential, retail, education, health and special use development and recreational areas.</p> <p>Deakin, Barton, and Woden are mixed use areas along the alignment.</p>
Education and Community	<p>Educational institutions along the alignment include Canberra Girls Grammar School, Canberra College, and Forrest Primary. There are also early learning centres and day care facilities along the alignment. CIT Woden, which is planned to be operational in 2025, would provide opportunities to access tertiary education.</p> <p>Places of worship along the alignment include Saint Andrew's Presbyterian, Telopea Park School, Yarralumla Uniting Church, Saint Luke's Anglican Church, and The Church of the Pentecost. The Project would also be near the Woden Cemetery.</p>
Government precincts	<p>Government buildings within the Project area include Old and New Parliament House, various embassies, The Lodge as well as offices, cabinets, and other government buildings throughout Parkes and Barton.</p>
Commercial precincts	<p>Commercial precincts include Woden Town Centre, and the Deakin Office Precinct.</p>
Recreational areas	<p>Major recreation areas include Lake Burley Griffin and adjoining parklands of Commonwealth Park. The Lotus Bay Boat Ramp and jetty area near the Canberra Yacht Club which provide access to water activities. There are several ovals, parks and playing fields along the alignment including the Mint Oval, Clarrie Holmes Park, and Phillip Oval.</p> <p>Nearby tourist destinations particularly within the National Triangle such as Old and New Parliament House, National Library of Australia, Questacon, and the National Portrait Gallery.</p>

## 7.4.2 Summary of potential impacts

### 7.4.2.1 Construction

Potential property and land use impacts during construction of the Project may include:

- The temporary leasing of property to enable the establishment of construction compounds and/or the construction work
- The temporary loss of public open space for construction sites
- Disruption to services, utilities, and other transport assets/infrastructure to enable the construction of the Project.

### 7.4.2.2 Operation

Potential property and land use impacts during operation of the Project may include:

- Property acquisition to enable the establishment and operation of Project infrastructure
- Changes to access and travel patterns (including impacts and improvements)
- Potential land use changes and indirect positive impacts associated with opportunities for urban renewal.

The Project also presents an opportunity to realise the strategic outcomes of the NCP and for the Territory.

### 7.4.3 Proposed further assessment

A qualitative assessment of potential property and land use impacts of the Project would be prepared as part of the EIS. The assessment would include (as a minimum):

- Identification and description of property and land uses within and adjacent to the Project
- Qualitative assessment of potential property and land use impacts during construction and operation of the Project
- Cumulative property and land use impact assessment
- Development of standard mitigation measures to minimise property and land use impacts during construction and operation.

## 7.5 Geology, soils and contamination

### 7.5.1 Existing environment

#### 7.5.1.1 Geology

A review of the Canberra 1:100,000 Geological Map for the Project area identified that the section from Lake Burley Griffin to Hobart Avenue is mainly underlain by the Canberra Formation which is characterised by: mudstone, siltstone, minor sandstone, limestone, hornfels (a type of metamorphic rock), dacitic ignimbrite (a type of igneous rock made of hardened volcanic ash called tuff) and volcanoclastic sediments (containing at least 25% by volume of volcanic pyroclastic fragments) (GeoScience NSW, 1992).

Within the alignment from Adelaide Avenue to Woden the subsurface geology is dominated by calcareous and tuffaceous (rock made of greater than 50% volcanic rock) mudstone and siltstone with minor limestone, calc-silicate hornfels and quartz sandstone of the Yarralumla Formation.

#### 7.5.1.2 Soils

The overlying soil landscape is characteristic of the underlying geology that has been modified by earthworks as part of previous agriculture and present urban uses. These soils would also have some localised infilling.

There is an extremely low/very low probability for acid sulphate soils (Australian Soil Resource Information System, 2023) and the overall salinity hazard for the South Canberra Hydrogeological Landscape is low (ACT Government, 2016b).

### 7.5.1.3 Contamination

A desktop contaminated site assessment was conducted by utilising the Environmental Protection Agreements/Authorisations (EPAA), Contaminated Sites Database (CSD), and the Register of Contaminated Sites within 200 m of the Project, as summarised in Table 7-3. The potential contamination sources, pathways and receptors for the Project are summarised in Table 7-4.

**Table 7-3 Recorded contaminates of potential concern located within 200 metres of the Project**

Address	Section/Block	Information Source	Land use	Commentary
Mitchell	16/1,2,3	Register of Contaminated Sites	Capital Metro alignment	Former Totalcare Facility
Hobart Ave, Forrest	13/5	EPAA	Childcare centre	EPAA for the management of Contaminated Land (Asbestos Management).
	13/11			
Hobart Ave, Forrest	13/1	EPAA	School	EPAA for the management of an underground petroleum storage systems.
29 Hopetoun Ct, Deakin	12/7	EPAA	Petrol Station	Authorisation Agreement for Storage of Petroleum.
5 Adelaide Avenue, Deakin	3/1	CSD	Industrial/Commercial	CSD suggests history of hydrocarbon storage.
5 Kintore Crescent, Yarralumla	66/1	CSD	Industrial/Commercial	CSD suggests history of hydrocarbon storage.
Barrine Drive, Parkes	-	EPAA	Industrial/Commercial	Usage of commercial products for pest control or turf management
70 Constitution Avenue, Parkes	49/2	EPAA	Petrol Station	Authorisation Agreement for Storage of Petroleum.
17 Strangways Street, Curtin	63/1	EPAA	Petrol Station	Authorisation Agreement for Storage of Petroleum.
1 Echo Place, Lyons	38/7	EPAA	Industrial/ Commercial	Usage of commercial products for pest control or turf management
56 Port Arthur Street, Lyons	23/13	EPAA	Industrial/ Commercial	Usage of commercial products for pest control or turf management
168 Melrose Drive, Phillip	25/22	EPAA	Petrol Station	Authorisation Agreement for Storage of Petroleum.



Address	Section/Block	Information Source	Land use	Commentary
172 Melrose Drive, Phillip	25/19	EPAA	Petrol Station	Authorisation Agreement for Storage of Petroleum.
Unit 714, Woden Business Depot, Dundas Street, Phillip	-	EPAA	Industrial/ Commercial	Usage of commercial products for pest control or turf management
86 Parramatta Street, Phillip	49/40	EPAA	Petrol Station	Authorisation Agreement for Storage of Petroleum.
Unit 2/32 Townshend Street, Phillip	-	EPAA	Industrial/ Commercial	Usage of commercial products for pest control or turf management
Phillip	28/17	Register of Contaminated Sites	Petrol Station	Outside of the 200m investigation zone, however, Register of Contaminated Sites indicates both on and offsite groundwater issues.
Phillip	53/3	Register of Contaminated Sites	Services Zone	Former ACT Government Depot.
9/11 Irving Street, Phillip	23/8	Register of Contaminated Sites	Yamba Club	Listed but issue currently unknown from currently available information.
Justinian Street, Phillip	109/1	-	Woden Cemetery	Potential risk to groundwater.
50 Launceston Street, Phillip	79/4	Documents associated with DA	Former Pitch and Putt Course	Preliminary site investigation suggested that there was the potential of historical uncontrolled fill was identified the site and that further testing would be completed.
Launceston Street, Phillip	79/1	EPAA	Canberra College (Woden Campus)	EPAA with Education and Training Directorate for the management of contaminated land.
	79/16			

**Table 7-4 Potential contamination sources, pathways, and receptors**

<b>Potential Sources</b>	<ul style="list-style-type: none"> <li>• Potentially contaminated fill material in the subsurface</li> <li>• Hydrocarbon contamination associated with the storage of petroleum</li> <li>• Coal tar, bitumen, road base and vehicle emissions from the site and adjacent roads</li> <li>• Asbestos from sites under asbestos management, Mr Fluffy, and unknown sources (including contaminated fill or utility conduits)</li> <li>• Uncontrolled filling with materials from unknown source location containing various contaminants</li> <li>• Leaching of volatile organic compounds and other organic contaminants from Woden Cemetery.</li> </ul>
<b>Potential Pathways</b>	<ul style="list-style-type: none"> <li>• Migration of contaminants from potential sources vertically into underlying soils and groundwater</li> <li>• Surface water flow and lateral migration of contaminated water through preferential pathways such as drainage lines, sewers, and infrastructure trenches.</li> </ul>
<b>Potential Receptors</b>	<ul style="list-style-type: none"> <li>• Lake Burley Griffin</li> <li>• Recreational users of Lake Burley Griffin</li> <li>• Tributaries of the Molonglo River (Yarralumla Creek)</li> <li>• Adjacent residents</li> <li>• Site infrastructure workers and utility/construction personnel undertaking construction works and ongoing maintenance</li> <li>• Human receptors from exposure to impacted soil during below ground infrastructure maintenance works (direct contact with soils and perched groundwater through dermal contact, ingestion, and inhalation).</li> </ul>

## 7.5.2 Summary of potential impacts

### 7.5.2.1 Construction

#### *Soil erosion*

Construction of the Project would expose the natural ground surface and sub-surface through the removal of vegetation, overlying structures (such as roadways and footpaths) and excavation of construction footprints for stops, structures and foundations. The exposure of soil to water runoff and wind could increase soil erosion potential. There is the potential that exposed soils and other unconsolidated materials (such as spoil, sand, and other aggregates) could be transported from the construction sites into surrounding waterways via stormwater runoff.

#### 7.5.2.1.1 Contamination

There is the potential for contamination to be encountered at a few locations throughout the areas to be impacted by the Project.

The exposure of any contaminated materials during construction may increase the potential for contaminant mobilisation and may create additional exposure pathways to sensitive receptors including workers, the public, surface water bodies, groundwater bodies and terrestrial ecosystems. If required, land would be remediated to make it suitable for the intended transport use, which would have long term environmental benefits.

Construction also has the potential to result in contamination of soils and/or groundwater due to spills and leaks of fuel, oils, and other hazardous materials. These impacts are anticipated to be readily manageable through standard environmental mitigation measures.

#### *Lakebed disturbance*

There is the potential for construction to disturb the lakebed of Lake Burley Griffin from marine construction activities, including barges, boat movements, concrete works and piling. Lakebed disturbance may result in increased turbidity due to the suspension of disturbed material such as silt or mud in the water. High turbidity can affect the colour of water, which may deter recreational users from

accessing Lake Burley Griffin, and can also have ecological impacts such as reducing oxygen in the water (due to reduction in light penetration decreasing photosynthesis of aquatic plants), which may lead to algal blooms.

### 7.5.2.2 Operation

Operation of the Project has the potential to result in contamination of soils and surface water due to spills and leaks of fuel, oils, and other hazardous materials from the LRVs, maintenance vehicles and other light rail infrastructure. These impacts are anticipated to be readily manageable through standard environmental mitigation measures.

### 7.5.3 Proposed further assessment

A qualitative assessment of potential geology, soils and contamination impacts of the Project would be prepared as part of the EIS. The assessment would include (as a minimum):

- Identification and description of existing geology, soils, and contamination within the Project area
- Qualitative assessment of potential geology, soils and contamination impacts during construction and operation of the Project
- Cumulative soils and contamination impact assessment
- Development of mitigation measures to minimise impacts to geology, soils and contamination during construction and operation.

## 7.6 Air quality

### 7.6.1 Existing environment

The air quality around the Project is rated as 'very good', which is the most positive rating used in the ACT Government Air Quality Index (2023c). Sources of air pollution within the Project area include emissions from the combustion of diesel fuel from nearby traffic.

A search of the National Pollutant Inventory database on 4 August 2023 identified that the closest regulated pollution source was the Black Mountain CSIRO site more than 1 km north-east from the Project.

There are numerous ecological (habitats that may be sensitive to dust) and human (any location where a person or property may be sensitive to air quality impacts) receptors near the Project that have the potential to be impacted by air quality from the Project, including but not limited to those listed in Table 7-5.

Table 7-5 Ecological and human receptors within the Project area

Ecological	Human
<ul style="list-style-type: none"> <li>• Lake Burley Griffin</li> <li>• Molonglo River</li> <li>• York Park</li> <li>• National Rose Garden</li> <li>• Street trees and landscape plantings adjacent to the alignment</li> <li>• Native grasslands (potential Striped Legless Lizard habitat)</li> <li>• Gang-gang Cockatoo foraging habitat</li> <li>• Superb Parrot foraging habitat</li> <li>• Potential and confirmed Golden Sun Moth Habitat</li> <li>• Box Gum Woodland.</li> </ul>	<ul style="list-style-type: none"> <li>• Employment and government premises</li> <li>• Tourist and recreational destinations</li> <li>• Residential areas</li> <li>• Childcare centres</li> <li>• Educational facilities</li> <li>• Medical facilities</li> <li>• Pedestrians.</li> </ul>

## 7.6.2 Summary of potential impacts

### 7.6.2.1 Construction

Temporary air quality impacts that have the potential to occur during construction include increases in dust and emissions associated with excavation and the combustion of diesel fuel and petrol from construction plant and equipment. Anticipated sources of dust and emissions include:

- Demolition works
- Earthworks
- Drilling and trenching works
- Loading and transfer of excavated material from trucks
- Operation of plant and construction vehicles, travelling within, to and from the construction footprint.

Construction would occur across a large construction footprint and several construction compounds, and would involve earthworks, trenching and excavations. Given the proximity of ecological and human receptors to the Project, and the scale of construction activities, there is the potential for sensitive receivers to be impacted by dust and emissions from construction of the Project. Potential impacts would be temporary and for the duration of construction.

### 7.6.2.2 Operation

Minor vehicle emissions are expected from operation and maintenance of the Project and would be associated with workers travelling to and from work by light vehicle and combustion emissions from maintenance vehicles and equipment.

The potential air quality emissions attributed to the operation of the Project are anticipated to be negligible.

## 7.6.3 Proposed further assessment

A qualitative assessment of air quality impacts of the Project would be prepared as part of the EIS. The assessment would include (as a minimum):

- Qualitative assessment of potential air quality impacts during construction and operation of the Project
- Cumulative air quality impact assessment
- Development of mitigation measures to minimise potential air quality impacts during construction and operation.

## 7.7 Greenhouse gas

### 7.7.1 Summary of potential impacts

#### 7.7.1.1 Construction

Construction would result in the generation of the following potential GHG sources:

- Combustion of liquid fuels from stationary and mobile plant equipment and other vehicles, and international shipping from import of LRVs and steel rails
- Power consumption from the electrical grid
- Embodied energy (indirect emissions created over the lifecycle of a material) of:
  - construction materials
  - construction and demolition waste
  - LRVs and batteries
- Vegetation clearing of urban street trees

- Transportation of construction materials
- Construction workers travelling to and from work using private vehicles
- Replanting of street trees (carbon sink).

It would not be possible to completely avoid the generation of GHG emissions during construction, however opportunities for reducing GHG emissions would be identified within the EIS.

#### 7.7.1.2 Operation

Potential sources of GHG during operation of the Project include:

- Power consumption from the electrical grid to power the LRVs, stop infrastructure (such as lighting, CCTV, signalling), stabling depots and other infrastructure
- Maintenance activities over the asset life including
  - fuel combustion associated regular street sweeping of light rails
  - embodied energy associated with replacement of LRVs and LRV batteries
  - embodied energy of operational materials.

LRVs would operate utilising renewable energy and would not result in direct GHG emissions. Furthermore, the Project would improve public and active transport connections which would likely result in increased public and active transport uptake and reduced private vehicle use within the Project area. This may contribute towards a reduction in GHG because of mode-shift.

#### 7.7.2 Proposed further assessment

An assessment of GHG impacts of the Project would be prepared as part of the EIS. The assessment would include (as a minimum):

- Quantitative and qualitative GHG impacts during construction and operation of the Project
- Cumulative GHG impact assessment
- Development of mitigation measures to minimise potential GHG impacts during construction and operation.

## 7.8 Resource use and waste management

### 7.8.1 Summary of potential impacts

#### 7.8.1.1 Construction

A variety of solid and liquid wastes would be generated during construction. The main construction activities anticipated to generate waste and along with the likely waste materials produced are outlined in Table 7-6. Construction waste likely to be generated by the Project would be confirmed in the EIS.

Resources anticipated to be used during construction are summarised in Table 7-7. Environmental mitigation measures would be developed to reduce the demand on resources. While construction would increase demand on local and regional resources, it is unlikely that this would result in any resource becoming scarce or in short supply.

**Table 7-6 Waste anticipated to be generated during construction**

Waste	Description
Demolition waste	Concrete, steel, asphalt, copper, slurry from hydrovac excavations, bricks, pavers, timber, and gravel.
General construction waste	Plastic and cardboard packaging, and excess construction material (such as concrete, timber, plastic, and steel/metal).
Green waste	Organic waste from grubbing and vegetation removal.

Waste	Description
Dangerous goods and hazardous substances	Waste oils and lubricants, excess corrosive substances (e.g. paints, chemicals and cement washout), asbestos containing material (from demolition), and contaminated soil material (e.g. in the event of an accidental spill).
Domestic waste	Food scraps, glass and plastic bottles, cardboard/paper and plastic containers from site personnel.
Wastewater	Site run-off, water used to control dust, grey water, and slurry from vacuum excavation trucks.
Sewage	Sewage from onsite toilets.
Spoil	Excavated material and excess fill material including topsoil, contaminated spoil and clean spoil.
Office waste	Paper, e-waste, plastics, food-waste, printing products and office equipment.

Table 7-7 Resources and materials required for construction

Category	Resources and materials required (indicative)
Stops and precincts	<ul style="list-style-type: none"> <li>Imported engineering fill as well as reuse of site-won spoil</li> <li>Concrete</li> <li>Utility related infrastructure</li> <li>Street furniture such as seating at stops, signs, traffic lights, lights, and bollards</li> <li>Bins</li> <li>Integrated service cabinets</li> <li>Fabricated card reader poles</li> <li>Ticketing machine</li> <li>Drinking fountains</li> <li>Driver facilities</li> <li>Passenger information displays</li> <li>Roof systems</li> <li>Wall systems</li> <li>Ceramic tile</li> <li>Bike racks</li> <li>Stairs, lifts, and handrails.</li> </ul>
Roads and infrastructure	<ul style="list-style-type: none"> <li>Paving finishes, including asphalt, concrete and pavement finishes</li> <li>Kerb (including kerb, kerb ramps gutter and modified kerb)</li> <li>Cyclist ramps</li> <li>Retaining walls.</li> </ul>
Drainage	<ul style="list-style-type: none"> <li>Reinforced concrete pipe</li> <li>Composite steel reinforced drainage pipe</li> <li>Drainage pits and inlets.</li> </ul>
Track works	<ul style="list-style-type: none"> <li>Concrete ballast</li> <li>Paved track</li> <li>Green track (vegetation)</li> <li>Track</li> <li>Garden bed</li> <li>Street trees including supporting infrastructure such as strata vaults and structural soils.</li> </ul>
Resources	<ul style="list-style-type: none"> <li>In addition to the requirement for construction materials, daily activities would require the consumption of potable water, electricity, and fuel.</li> </ul>

### 7.8.1.2 Operation

Resource consumption and waste generation during the operational phase of the Project are anticipated to be minimal. The operation of the Project would generate various waste streams, which are described in Table 7-8. Table 7-9 summarises the anticipated resources and materials required for the operation of the Project.

**Table 7-8 Waste anticipated to be generated during operation**

Waste	Description
Domestic waste	Food scraps, glass and plastic bottles, cardboard/paper and plastic containers from passengers and staff. Recyclable collection points at light rail stops would be provided.
Sewage	Sewage from onsite staff toilets.
General	Waste associated with the cleaning, repair and maintenance of light rail stops, LRVs, the alignment, ancillary infrastructure, and street furniture.
Green waste	Green waste from vegetation and green track maintenance.

**Table 7-9 Resources and materials required for operation**

Category	Resources and materials required
General operation	Daily operation would require the consumption of potable water, non-potable water, electricity (including solar-generated electricity) and fuel. It would also generate paper (ticketing), and plastic for MyWay passes.
Maintenance and repair	Repairs and maintenance would require resources and materials such as fuel, oils, lubricants, paints, electrical components, plastics, steel, etc.

### 7.8.2 Proposed further assessment

A resource use and waste management assessment would be undertaken as part of the EIS and would include (as a minimum):

- Identification of potential resources that would be used during construction and operation of the Project
- Identification of potential waste that would be produced during construction and operation of the Project
- Qualitative assessment of potential resource and management waste risks during construction and operation of the Project
- Cumulative resource management and waste impact assessment
- Development of standard mitigation measures to minimise resource use, and waste generation
- Development of standard mitigation measures to minimise potential resource management and waste risks during construction and operation.

## 7.9 Utilities

### 7.9.1 Existing environment

There are numerous existing utilities within the Project area. Surveys would be undertaken to determine existing utilities that may be impacted by the Project. Surveys may require non-intrusive (scanning) and non-destructive (vacuum truck) investigations to locate existing services to help inform design development.

## **7.9.2 Summary of potential impacts**

### **7.9.2.1 Construction**

It is anticipated that existing utilities within the Project area would be impacted to various degrees (such as no impact, temporary protection, permanent protection, relocation, and replacement). It is likely that utility works would be programmed early in the Project construction period.

### **7.9.2.2 Operation**

It is likely that the Project would include the provision of new utilities, such as electricity supply to LRVs, lighting and stops. Inground service routes would be installed and would provide a common cable containment system that houses communications, signalling and power cabling for the operation of the Project. The Project also includes three TPSs that would require electrical connections to the Project.

## **7.9.3 Proposed further assessment**

A utilities assessment would be undertaken as part of the EIS and would include (as a minimum):

- Identification of existing utilities that may be impacted by the Project
- Determination of utility treatments required
- Qualitative assessment of impacts during construction and operation of the Project
- Development of standard mitigation measures to minimise potential utility impacts during construction and operation.

## **7.10 Hazards and risk**

### **7.10.1 Existing environment**

Any development includes various environmental hazards and risks. Key potential impacts relate to the typical hazards of an urban environment and include traffic movements, utility interruptions, public interference, and safety concerns. Natural hazards, including storms, bushfires and floods would also need to be considered.

A review of the ACT Mapi (ACT Government, 2023d) identified that the following areas of the alignment are located within bushfire prone land:

- Northeast of Capital Hill in Yarralumla (Figure 7-1)
- The suburbs of Red Hill, Deakin, and Yarralumla (Figure 7-2)
- Within the Project area on Adelaide Avenue near Kent Street (Figure 7-2)
- The eastern area of the intersection of Yarra Glen and Carruthers Street (Figure 7-3).





Figure 7-1 Bushfire prone land (1/3)

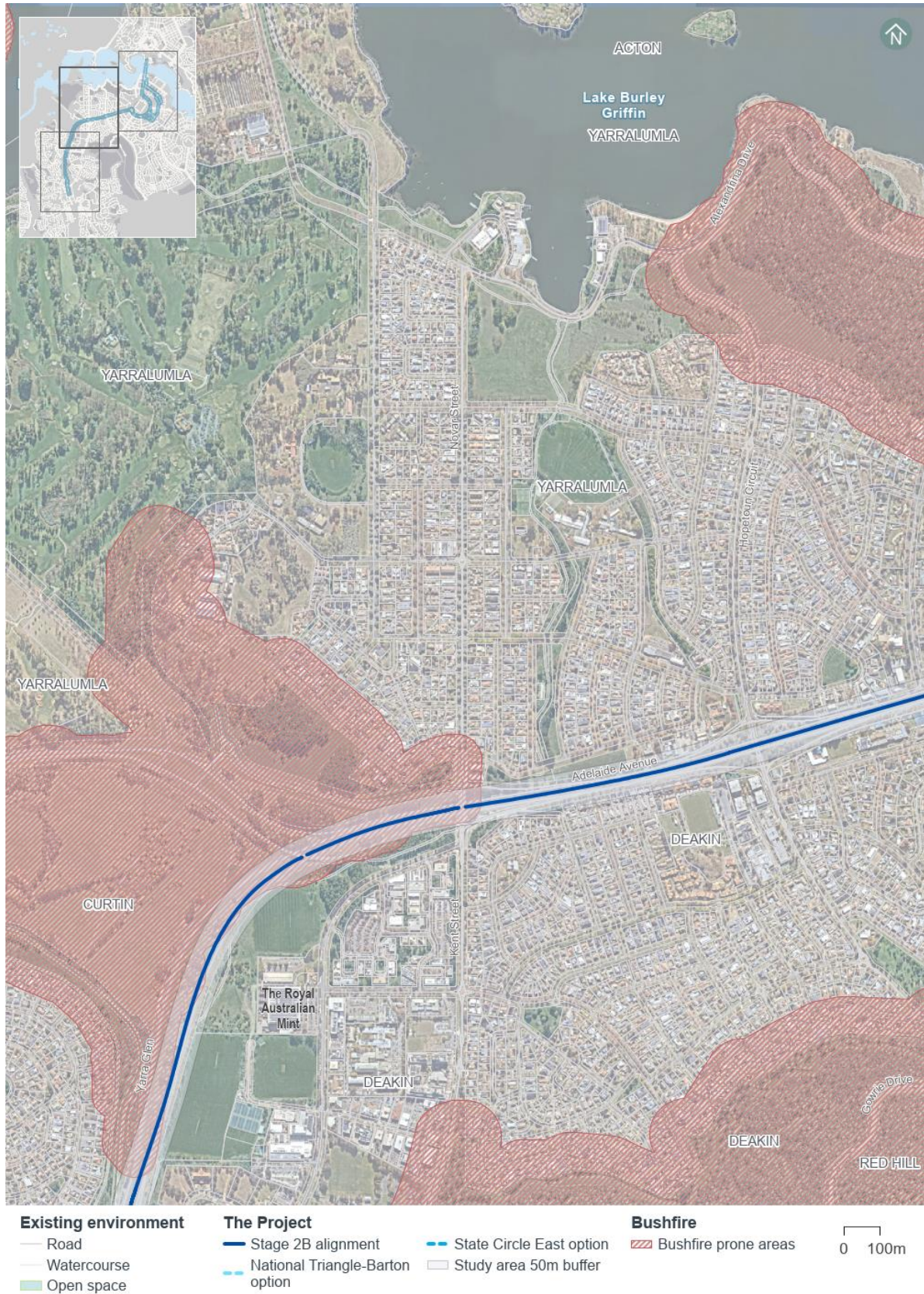


Figure 7-2 Bushfire prone land (2/3)

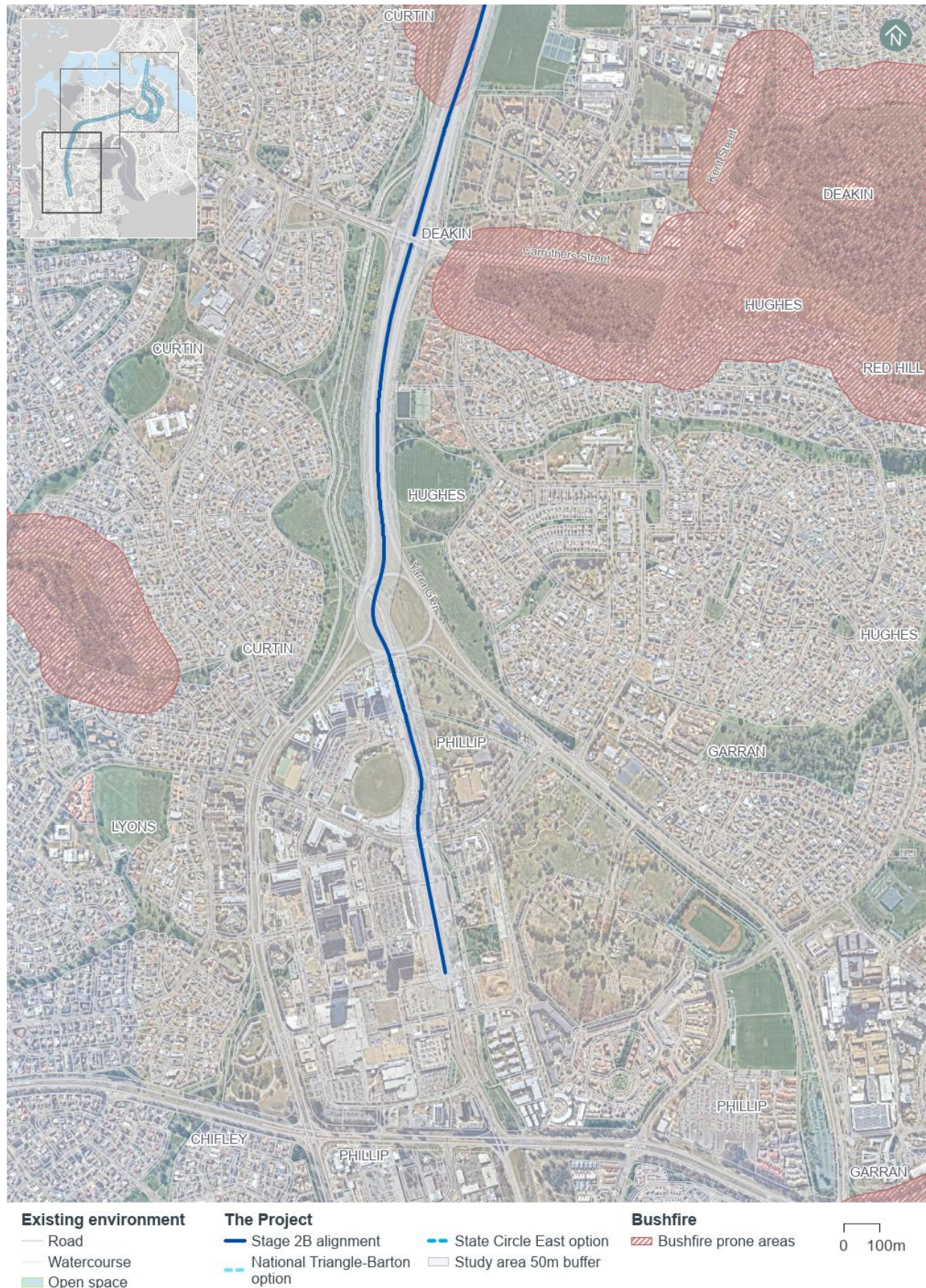


Figure 7-3 Bushfire prone land (3/3)

## 7.10.2 Summary of potential impacts

### 7.10.2.1 Construction

The following hazards have the potential to occur during construction:

- The onsite storage, use and transport of chemicals, fuels, and materials. To manage this risk, all hazardous substances that may be required for construction would be stored and managed in accordance with the *Work Health and Safety Act 2011* and the *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover, 2005)
- The rupture of, or interference with, underground services. To manage this risk, Before You Dig Australia searches would be undertaken, and non-destructive digging used to identify the presence of services at the start of construction
- Construction works resulting in an uncontrolled interaction with a major hazard facility
- Hazards associated with track welding operations such as hot works and grinding, which include inhalation of fumes, exposure to ultraviolet radiation, burns, fire, and vision damage
- Potential risks to public safety during construction in proximity to construction sites.

### 7.10.2.2 Operation

Potential hazards and risks during operation would be low and manageable using standard measures. The potential types of hazards and associated risks that may be encountered during operation include:

- Onsite storage, use and transport of chemicals, fuels and materials. To manage this risk, all hazardous substances that may be required during operation would be stored and managed in accordance with the *Work Health and Safety Act 2011* and the *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover, 2005)
- Potential for hazards to customer and public safety and security. Measures would be incorporated to eliminate security and public safety risks as much as practicable, including implementation of the principles from crime prevention through environmental design. Key safety characteristics would include security cameras, emergency help points and passenger information signage
- Emergency situation – derailment, fire or deliberate sabotage. While the risk of an emergency is very low, emergency response procedures would be implemented as required
- General worker health and safety issues for drivers and maintenance staff. Maintenance activities and other works within the rail corridor would be undertaken in accordance with standard operating procedures, reducing the potential for impacts to the health and safety of workers, visitors, and customers
- Risk of bushfire to reduce access to the Project and surrounding areas, either directly (fires near the Project) or indirectly (smoke deterring passengers from using public transport).

### 7.10.3 Proposed further assessment

A hazards and risk assessment would be undertaken as part of the EIS. The assessment would include a qualitative assessment of potential hazards and risks associated with the Project and development of standard mitigation measures to minimise potential hazards and risks during construction and operation.

## 8.0 EPBC Referral

Through this PEA, it has been identified that there is the potential to impact MNES as listed under the EPBC Act, which are:

- Listed threatened species and communities:
  - The construction of the Project has the potential to particularly affect Golden Sun Moth (*Synemon plana*) habitats within modified grasslands near State Circle as well as between Yarra Glen and Dudley Street. This species is listed as Vulnerable under the EPBC Act, noting populations have: limited area available for occupancy; are severely fragmented; and, continuous decline in the area of occupancy, quality of habitat, number of locations or subpopulations, and the number of mature individuals. Any impact is predicted to be significant in accordance with the Commonwealth Government *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (DCCEEW, 2013). This is consistent with the conclusion that any “loss, disturbance or fragmentation of small or fragmented areas of habitat as being potentially significant”.
  - The construction of the Project has the potential to affect Gang-gang Cockatoo through the removal of individual trees or clumps of trees within the Project area that contribute to the integrity of the connectivity corridors used by the Gang-gang Cockatoo to move across the landscape. The Gang-gang Cockatoo is listed as Endangered under the EPBC Act and confirmed Gang-gang Cockatoo habitat is located throughout the Project corridor. Habitat loss is identified as a moderate risk to the Gang-gang Cockatoo in accordance with Commonwealth Government Conservation Advice for *Callocephalon fimbriatum* (Gang-gang Cockatoo) (DCCEEW, 2022). Priority conservation and management priorities include ceasing land clearing and retaining hollow-bearing trees in all known Gang-gang Cockatoo areas.
  - There is the potential for the Project to impact Superb Parrot, primarily through the removal of native and exotic vegetation that plays a key role in habitat connectivity. The Superb Parrot is listed as Vulnerable under the EPBC Act. Key threats to the Superb Parrot include loss and degradation of habitat, and competition for nest hollows, as identified in the Commonwealth Government Conservation Advice *Polytelis Swainsonii* (Superb Parrot) (DCCEEW, 2016). A primary conservation action for the Superb Parrot is conservation of hollow-bearing trees.
  - The construction of the Project has the potential to affect the Striped Legless Lizard through the removal of native grasslands which comprise their habitat. The Striped Legless Lizard is Vulnerable under the EPBC Act. The EPBC Act referral guidelines for the Striped Legless Lizard outlines that if a population is not detected, but a potential Striped Legless Lizard habitat occurs on Natural Temperate Grasslands, then a referral is recommended (DCCEEW, 2011)
  - The construction of the Project has the potential to impact a total of 5.1 hectares of the native vegetation which meets the minimum criteria for listing as EPBC Act *Natural Temperate Grassland of the South Eastern Highlands*. The community is listed as a critically endangered ecological community (CEEC) under the EPBC Act. This community provides habitat for at least nineteen threatened species, including Striped Legless Lizard, Golden Sun Moth, and Button Wrinklewort (DCCEEW, 2017). It has been listed as a CEEC as its extent has declined by more than 90% and has a highly fragmented distribution. Activities such as large new developments, works or infrastructure need to be considered under the EPBC Act, where the community is in relatively good condition.
- National and Commonwealth heritage items:
  - There are two NHL places within proximity to the Project following the National Triangle-Barton alignment option whose values have the possibility of being impacted based on the criteria listed under the *EPBC Significance impact guidelines 1.1* (DCCEEW, 2013). Specifically, in relation the possibility of the item’s “values to be notably altered, modified, obscured or diminished”.
  - There are 14 CHL places within proximity to the Project following the National Triangle-Barton alignment option and eight CHL places within proximity to the Project following the State

Circle east alignment option. These CHL items are either on Commonwealth or National Land within proximity to the Project whose values would be potentially significantly impacted in accordance with the criteria listed under *EPBC Significant impact guidelines 1.2* (Department of Sustainability, Environment, Water, Population and Communities, 2013). This is specifically in relation the Project having the possibility to “*involve the erection of buildings or other structures adjacent to, or within important sight lines of, a heritage place which are inconsistent with the heritage values of the place*”.

- Finally, given the rich value of the heritage of the National Triangle, regardless of the listing or nomination of each building, they collectively create an area of unique cultural and social values that represents Australia’s history. Therefore, in accordance with the above guidelines the Project is predicted to significantly affect these values as represented in the NCP. In some instances, the impacts may be beneficial through modernising the amenity of the area and providing access, while in others it may detrimentally affect the context and setting of the precinct.
- As an extension of the above, it is also likely that the Project by its nature, scale and location would significantly impact on the wider values associated with the Commonwealth land in proximity to the Project. This is consistent with the ‘whole-of-Project’ criteria set out in the *EPBC Significant impact guidelines 1.2* (Department of Sustainability, Environment, Water, Population and Communities, 2013).

More information on the ecological and heritage constraints is included in:

- Interim Ecological Assessment – Commonwealth Park to Woden (Umwelt, 2023)
- Light Rail – City to Woden: Preliminary Heritage Advice – Proposed Routes (GML, 2023).

These specialist assessments have been carried out to assess the significance of the impact on the heritage and biodiversity values protected as MNES under the EPBC Act to support the referral made to the Commonwealth Minister for the Environment. These are appended separately to the referral and summarised in this document.

## 9.0 Scoping Document Application

The triggers for environmental impact assessment under the *Planning (General) Regulation 2023* and whether they are applicable to the Project are outlined in Table 9-1.

**Table 9-1 Triggers for environmental impact assessment under the Planning (General) Regulation 2023**

Item	Trigger	Applicability
1	proposal for construction of a transport corridor including a major road, a dedicated bus way, a railway, or a light rail corridor, on any land, other than land in a future urban area or transport and services zone, if the proposal is likely to have a significant adverse environmental impact on— (a) air quality so as to be detrimental to the health of people in an adjoining residential, commercial or community facility zone; or (b) ambient noise or vibration so as to be detrimental to the health of people in an adjoining residential, commercial or community facility zone	Not applicable
16	proposal that is likely to have a significant adverse environmental impact on 1 or more of the following: (a) a critically endangered species; (b) an endangered species; (c) a vulnerable species; (d) a conservation dependent species; (e) a regionally threatened species; (f) a regionally conservation dependent species; (g) a provisionally listed threatened species; (h) a listed migratory species; (i) a threatened ecological community; (j) a protected native species; (k) a Ramsar wetland; (l) any other protected matter	Applicable
17	proposal involving— (a) the clearing of more than 0.5ha of native vegetation in a native vegetation area, other than on land in a future urban area; or (b) the clearing of more than 5.0ha of native vegetation in a native vegetation area on land in a future urban area	Applicable
21	proposal that is likely to have a significant adverse environmental impact on the heritage significance of a place or object registered under the <i>Heritage Act 2004</i> , unless the proposal is the demolition of a building that is affected residential premises, and the heritage council has approved a statement of heritage effect in relation to the proposal	Potentially applicable
23	proposal involving land included on the register of contaminated sites under the <i>Environment Protection Act 1997</i>	Applicable
25	proposal that is likely to result in a key threatening process under the <i>Nature Conservation Act 2014</i>	Applicable

## 10.0 Conclusion and further assessment

The second stage of the Light Rail City to Woden route would be delivered through Light Rail Stage 2B Commonwealth Park to Woden. The Project would extend an important north-south public transport alignment, stimulate urban renewal and growth, improve transport connectivity, and provide a sustainable transport option that utilises renewable energy. The Project is anticipated to reduce private vehicle use and provide improved active transport connections and facilities for pedestrians and cyclists, thereby reducing emissions.

The Project will require or rely on the following statutory environmental and planning approvals:

- A Works Approval from the NCA under the PALM Act to carry out certain works in Designated Areas under the NCP
- A DA from the territory planning authority or the Minister under the Planning Act, for works on Territory land subject to the Territory Plan
- Approval from the Commonwealth Minister for the Environment under the EPBC Act to carry out the Project. This PEA is to support the determination of whether the Project is a controlled action under and the appropriate method for assessing the environmental impacts
- Approval from both Houses of Parliament, for works within the Parliamentary Zone, as defined in the *Parliament Act 1974* (Cth).

An EPBC Referral was previously submitted for a different proposal for Stage 2B, which provided an alignment on the eastern side of State Circle through the National Triangle (ie. Referral 2019/8491). This PEA has been prepared to allow consideration of two alternative alignment options as described earlier in this report, to assist:

- The Commonwealth Minister for the Environment to determine whether the Project is a controlled action under the EPBC Act and the appropriate method for assessing the environmental impacts
- The ACT Minister for Planning and Land Management to define the scope of environment assessment needed to support an application for a DA made under the Planning Act.

This PEA and risk analysis has identified the following key environmental issues:

- Non-Aboriginal heritage (Section 6.1)
- Aboriginal heritage (Section 6.2)
- Traffic and transport (Section 6.3)
- Biodiversity (Section 6.4)
- Noise and vibration (Section 6.5)
- Urban design, landscape character and visual amenity (Section 6.6).

Detailed assessment of these issues would be carried out as part of the EIS for the Project. Other issues that will be considered in the EIS include:

- Social and economic (Section 7.1)
- Climate change (Section 7.2)
- Hydrology, flooding and water quality (Section 7.3)
- Property and land use (Section 7.4)
- Geology, soils and contamination (Section 7.5)
- Air quality (Section 7.6)
- Greenhouse gas (Section 7.7)
- Resource management and waste (Section 7.8)
- Utilities (Section 7.9)



- Hazards and risk (Section 7.10).

The EIS will be prepared in accordance with regulatory requirements and technical guidelines and will include:

- A full description of the Project, including its components and construction activities
- A description of the existing environment and an assessment of potential direct and indirect impacts on the key environmental issues during construction and operation of the Project
- Consideration of other potential environmental issues
- Identification of measures to be implemented to avoid, minimise, manage, mitigate, offset and/or monitor potential impacts of the Project
- Identification and consideration of issues raised by stakeholders and the community.

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# Appendix A

## Preliminary Risk Assessment

## Appendix A Preliminary risk assessment

### Approach

This preliminary risk assessment was carried out to identify the potential risks of constructing, operating, and maintaining the Project in accordance with the *Proponent's Guide to EIS's* (ACT Government, 2017). The preliminary risk assessment identifies unmitigated risks prior to mitigation, suitable mitigation measures to manage or mitigate the identified risks and analysis of the post-mitigation risks. The risk assessment for the Project is presented in Table 11-4.

Results of the risk assessment identified:

- Key environmental issues for consideration. These were issues that were assessed as being unlikely to be effectively managed and controlled using standard measures to mitigate risks
- Other environmental issues for consideration. These were issues that were assessed as being likely to be effectively managed and controlled using standard measures to mitigate risks.

In accordance with the Guide, risks were rated according to Australian Standards as a combination of the likelihood (see Table 11-1) of the risk occurring (probability) and the consequence (see Table 11-2) if the risk were to occur (magnitude). In rating the risk(s), precaution was adopted where there was uncertainty consistent with the principles of ecologically sustainable development.

Table 11-1 Evaluating likelihood

Likelihood	Description	Probability	Community attitude
Remote	May occur in exceptional circumstances	<1%	Few people interested
Unlikely	Not expected to occur in most circumstances	1-20%	Some people affected
Possible	May occur	21-49%	Many people affected
Likely	Probably would occur	50-85%	Most people affected
Almost certain	Expected to occur	>85%	Almost everyone affected

Table 11-2 Evaluating consequence

Consequence	Environment	Economic	Social
<b>Beneficial</b>	Enhancing, improving, or positively impacting the environment, economy and/or society		
<b>Insignificant</b>	No environmental damage	Minimal losses	No noticeable change experienced by people in the locality
<b>Minor</b>	Minor instances of environmental damage that could be reversed (e.g., negative impact on a 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
<b>Moderate</b>	Isolated but significant instances of environmental damage that might be reversed with intense efforts	Half million dollars 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
<b>Major</b>	Severe loss of environmental amenities and a danger of continuing	One million dollars 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

<b>Catastrophic</b>	Major widespread loss of environmental amenity and progressive irrecoverable environmental damage	Several million dollars in lost revenue or remediation costs	Substantial negative change experienced in community wellbeing, livelihood, amenity, infrastructure, services, and/or health, permanent displacement of at least 20% of a community
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### Risk assessment

The risks associated with the impacts are analysed as a function of the likelihood of the risk occurring and the consequences associated with this risk occurring. The risks and impacts identified are assigned likelihood and consequence ratings generally based on the definitions set out in the *Proponent’s Guide to Environmental Impact Statements* (published by ACT planning and land authority). These combine to identify the risk rating as set out in the matrix presented in Table 11-3.

Table 11-3 Risk assessment matrix

Likelihood	Consequence					
	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
Remote	Beneficial	Negligible	Negligible	Very Low	Low	Medium

Table 11-4 Preliminary risk assessment

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
<b>Biodiversity</b>										
B.1	Impact on EECs	Potential impact on endangered ecological communities (EEC) within the Project area.	Construction	Likely	Catastrophic	Significant	<ul style="list-style-type: none"> <li>Design team to define all relevant components of the Project along the route including transport corridor, location of stops and associated infrastructure (substations and utilities)</li> <li>Field surveys have been completed by a suitably qualified ecologist. Findings of the survey are to inform design to minimise potential biodiversity impacts</li> <li>Sensitive area maps are to be produced to inform design development and avoid environmentally sensitive areas, including defining exclusion zones</li> <li>Ensure that an ecologist is engaged to conduct pre-clearance surveys and is on-site during clearance works and confirm any areas of significance</li> <li>Determine if biodiversity offsets would be required for any of the locations where clearing would occur.</li> </ul>	Unlikely	Major	Medium
B.2	Impact on threatened flora species	Potential impact on threatened flora species within the Project area.	Construction	Likely	Major	Very High	<ul style="list-style-type: none"> <li>Pre-clearance field surveys have been completed by a suitably qualified ecologist. The survey findings are to inform design development, to ensure impacts to biodiversity are avoided or minimised where possible. A suitably qualified ecologist is also to be on-site during clearance works and confirm any areas of significance, in particular for listed species and endangered ecological communities</li> <li>Engage arborist to confirm presence/absence of threatened trees prior to clearing and include identification of hollows</li> <li>Where relevant, include the requirement for internal Project tree clearing permits to be actioned</li> <li>Implement specialist advised measures to mitigate impacts to protected species preconstruction and/or during construction</li> <li>Implement exclusion areas i.e., clearly delineated no-go zones to avoid impacting sensitive environmental areas (notably the Natural Temperate Grassland.</li> </ul>	Unlikely	Major	Medium
B.3	Impact on threatened fauna	Potential impact on threatened fauna species within the Project area.	Construction	Likely	Catastrophic	Significant	<ul style="list-style-type: none"> <li>As per B.2</li> </ul>	Possible	Major	High
B.4	Impacts from general clearance activities	Clearing of vegetation during construction activities to integrate new infrastructure into the existing environment.	Construction	Likely	Major	Very High	<ul style="list-style-type: none"> <li>Design team to define all relevant components of the Project along the route including transport corridor, location of stops and associated infrastructure (substations and utilities)</li> <li>Field surveys have been completed by a suitably qualified ecologist. The results of the survey are to be used to inform design development, to avoid or minimise biodiversity impacts where feasible</li> <li>Liaise with the design team to provide information on potential constraints and areas which may need to be avoided</li> </ul>	Possible	Moderate	Medium

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
						High	<ul style="list-style-type: none"> <li>Engage ecologist to identify potential Golden Sun Moth and natural temperate grassland habitats to minimise the impact of the Project</li> <li>Obtain required internal clearing and grubbing permits.</li> </ul>			High
B.5	Construction impacts to fauna	Direct impacts to non-threatened fauna during construction works.	Construction	Likely	Minor	Medium	<ul style="list-style-type: none"> <li>Implement standard pre-clearing protocols (e.g., check for fauna before clearing begins) as part of initial construction activities</li> <li>Identification of suitable habitat for threatened fauna susceptible to impacts associated with excavation to be delineated and identified as no-go zones.</li> </ul>	Unlikely	Insignificant	Negligible
B.6	Impact to migratory species and habitat	Clearing of potential habitat for migratory species identified within the wider locality of the Project.	Construction	Possible	Minor	Low	<ul style="list-style-type: none"> <li>As per B.4.</li> </ul>	Unlikely	Insignificant	Negligible
B.7	Fauna death or injury	Fauna strike by light rail vehicles (LRV).	Operation	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Consider risk minimisation as part of the ongoing design process including installation of wildlife safety routes.</li> </ul>	Unlikely	Insignificant	Negligible
B.8	Unexpected findings	Impacts to unexpected threatened or endangered species, endangered ecological communities (EEC), or native flora and fauna that were not presented in the ecological study.	Construction	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Preconstruction surveys to be carried out by a suitably qualified and experienced ecologist before construction to identify all known areas and likelihood of unexpected finds such as cryptic species</li> <li>Sensitive area mapping to be included in Construction environmental management plan (CEMP) to identify known species and potential habitat for threatened and endangered species, and EECs</li> <li>Unexpected finds procedure to be included in the CEMP to identify process to follow to mitigate impacts in the event of an unexpected find.</li> </ul>	Unlikely	Insignificant	Negligible
<b>Heritage (Aboriginal and Non-Aboriginal)</b>										
C.1	Indirect impacts on heritage places and/or objects	Potential changes to the heritage and landscape character of the area and significant views during construction.	Construction	Almost certain	Major	Significant	<ul style="list-style-type: none"> <li>Design team to define all relevant components of the Project along the route including transport corridor, location of stops and associated infrastructure (substations and utilities)</li> <li>Incorporate urban design and architectural design measures into the design of the Project to minimise impacts through discussion with design team</li> <li>Develop a detailed understanding of sympathetic design with respect to heritage listings.</li> </ul>	Likely	Major	Very High
C.2	Direct impacts on heritage places and/or objects	Potential for direct impacts to heritage because of establishing Project infrastructure in the vicinity of heritage items.	Construction	Almost certain	Moderate	Very High	<ul style="list-style-type: none"> <li>Design team to define all relevant components of the Project along the route including transport corridor, location of stops and associated infrastructure (substations and utilities).</li> <li>Design team to consider potential impacts of the Project in line with existing NHL and CHL heritage items and nominated NHL and CHL items.</li> <li>Undertake ongoing consultation with the Heritage Council to ensure Project design is compatible with existing heritage values and items to minimise any impacts.</li> <li>Ensure that access to the Aboriginal Tent Embassy is maintained throughout construction works</li> </ul>	Likely	Moderate	High



Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
							<ul style="list-style-type: none"> <li>Prepare a detailed Heritage Impact Assessment to consider the potential impacts of the Project.</li> </ul>			
C.3	Loss or damage to Aboriginal archaeological places with cultural values	Potential for construction to impact Aboriginal heritage artefacts and/or sites because of land clearing and/or excavation works.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Define all relevant components of the Project area and the potential impact areas of these components through liaison with the design team</li> <li>Undertake further investigation of potential Aboriginal heritage sites through preparation of a predictive model and an archaeological assessment</li> <li>Commence consultation with relevant Aboriginal groups.</li> </ul>	Possible	Insignificant	Very Low
C.4	Impact to burial sites during construction	Discovery of historic/European and/or Aboriginal burials.	Construction	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Define all relevant components of the Project area and the potential impact areas of these components through liaison with design team</li> <li>Undertake further investigation of potential heritage sites through preparation of a predictive model and an archaeological assessment</li> <li>Recognise and apply unanticipated discovery protocols as guided within the Heritage Act.</li> </ul>	Unlikely	Moderate	Low
C.5	Impact on historical archaeology	Potential for impacts on historical archaeology.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Undertake preliminary research into identified historical archaeology sites within the Project area</li> <li>Undertake archaeological assessment and historical research as part of future environmental assessment processes for the Project. The archaeological assessment would recommend any further mitigation measures.</li> </ul>	Possible	Insignificant	Very Low
C.6	Impact on sites/items of cultural significance outside of National Heritage List and Commonwealth Heritage listings.	Potential for impacts to sites/items of cultural significance because of changes to the heritage and landscape character of the area.	Construction	Possible	Major	High	<ul style="list-style-type: none"> <li>Undertake ongoing consultation with the Heritage Council to ensure Project design is compatible with existing heritage values and items to minimise any impacts</li> <li>Prepare a detailed Heritage Impact Assessment to consider the potential impacts of the Project.</li> </ul>	Unlikely	Moderate	Low
C.7	Potential for the Project to compromise views of heritage landscapes and items	The Project would introduce vertical infrastructure, particularly around stops, that has the potential to obstruct views of heritage landscapes such as Lake Burley Griffin and the Parliament House Vista	Operation	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Project design would be in consultation with relevant stakeholders to deliver unobtrusive infrastructure that is consistent with the surrounding heritage values</li> </ul>	Possible	Moderate	Medium
C.8	Introduction of new elements within heritage landscapes and curtilage	The Project would introduce rail track and stop infrastructure within or directly adjacent to heritage curtilage such as Commonwealth Avenue and the Parliament House Vista	Operation	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Project design would be in consultation with relevant stakeholders to deliver unobtrusive infrastructure that is consistent with the surrounding heritage values</li> <li>In consultation with key stakeholders and technical specialists, develop detailed designs that are consistent with the Light Rail Commonwealth Avenue Master Plan</li> </ul>	Unlikely	Moderate	Low
<b>Noise and vibration</b>										
D.1	Increase in noise impacts	Noise generated from construction plant, equipment, trucks, and vehicles on receivers along the alignment.	Construction	Almost certain	Major	Significant	<ul style="list-style-type: none"> <li>Develop mitigation measures including preparation and implementation of a construction noise and vibration management plan (or similar)</li> <li>Undertake baseline noise monitoring to inform EIS and design</li> </ul>	Almost certain	Moderate	Very High

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
						High	<ul style="list-style-type: none"> <li>Assess noise impacts and consultation, including a review of the proposed construction methodology, particularly any noisy or out-of-hours works that may be required (or identify areas where out of-hour works may be beneficial)</li> <li>Proactive communication methodology and process to be implemented.</li> </ul>			High
D.2	Increase in vibration/ground borne impacts	Construction vibration that exceeds adopted criteria for human comfort and adopted criteria for cosmetic damage to buildings.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Identify potential vibration sensitive receivers and their proximity to the Project area based on a final impact footprint</li> <li>Define all relevant components of the Project along the corridor, through liaison with the design team</li> <li>Undertake vibration assessment to determine potential impacts and identify potential mitigation measures</li> <li>Identify safe working distances for vibration impacts to ensure levels remain below cosmetic damage criterion for buildings</li> <li>Building condition surveys to be undertaken before and after works at potentially affected properties</li> <li>Proactive communication methodology and process to be implemented.</li> </ul>	Unlikely	Moderate	Low
D.3	Increase in noise impacts	Increased noise due to operation of LRVs and fixed Project elements on sensitive receivers.	Operation	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Define the extent of the Project including elements such as bus and light rail integration</li> <li>Consideration of track form type and design with aim of reducing potential noise impacts (e.g., ballast track or other noise reducing forms). Discussion of preferred/best for Project outcome within the Project team</li> <li>Identify potential Project elements that may result in areas closer to sensitive receivers which may require specific mitigation measures (e.g., substations)</li> <li>Consider citing of substation(s) to meet relevant noise criteria at receivers, and/or consider sound insulating enclosure design where required</li> <li>Identify the frequency of LRV movements and duration of noise exposure (e.g., LRV length) as a means of identifying potential impacts to sensitive receivers (conservative estimate)</li> <li>Engage Environment Protection Authority (EPA) as part of ongoing discussions early in the design process</li> <li>Design development to consider potential ground-borne noise during operation, including consideration of engineering design solutions such as floating slab in high-risk areas</li> <li>Identify nearby sensitive receivers to the Project and address in Noise and Vibration Management Plan and Community Consultation Strategy to mitigate impacts during construction.</li> </ul>	Possible	Moderate	Medium
D.4	Increase in vibration/ground borne impacts	Potential for increased levels of vibration due to operation of LRV that could impact buildings, vibration sensitive equipment etc.	Operation	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Identify potential vibration sensitive receivers and their proximity to the Project area based on a final impact footprint</li> <li>Consideration of vibration attenuating track forms in high-risk areas, and design with aim of reducing potential vibration impacts as part of the ongoing Project design</li> </ul>	Unlikely	Moderate	Low

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
							<ul style="list-style-type: none"> <li>If required, consultation with equipment/facility operators and undertake detailed analysis of mitigation proposed during design development for particularly sensitive locations.</li> </ul>			
<b>Trees</b>										
E.1	General impact to trees	Removal of existing trees along the alignment of the Project that make a significant contribution to the visual character/amenity of the receiving environment.	Construction	Almost certain	Moderate	Very High	<ul style="list-style-type: none"> <li>Undertake assessment of trees including review of existing survey information where available</li> <li>Development of urban design and landscaping strategies to minimise/mitigate impacts such as incorporation of infrastructure elements such as overhead wiring poles</li> <li>Consider the integration of Project elements such as stop shelters and existing trees as part of the design development of the Project</li> <li>Consideration of tree species which are compatible with light rail operations as part of the development of urban design and landscaping strategies</li> <li>Community engagement strategy development to engage community early</li> <li>Engage with NCA and other stakeholders with respect to the development of the urban design strategy</li> <li>Consider staged tree removal/replacement where feasible to avoid clear felling along the entire alignment</li> <li>Design team to identify potential substation locations which avoid known areas of registered trees.</li> </ul>	Possible	Moderate	Medium
E.2	Direct impacts to significant trees	Direct impacts to significant trees listed/registered under the <i>Tree Protection Act</i> .	Construction	Likely	Major	Very High	<ul style="list-style-type: none"> <li>Define all relevant components of the Project area, e.g., the light rail along the transport corridor, all stops, substations, and associated infrastructure</li> <li>engage with relevant stakeholders (such as TCCS) to manage any potential impacts to significant trees</li> <li>Identify known significant trees within the Project area that may be impacted by the Project.</li> </ul>	Possible	Major	High
E.3	Risk of planted and retained trees developing disease or dying	Planted and retained trees within the Project corridor may be at risk of developing a disease or dying	Operation	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Operational tree management plans would be developed and implemented.</li> </ul>	Unlikely	Minor	Very low
E.4	Overgrowth of trees within the Project corridor	Risk of tree overgrowth within the Project corridor, requiring tree maintenance	Operation	Possible	Minor	Low	<ul style="list-style-type: none"> <li>As per E.3</li> </ul>	Unlikely	Minor	Very low
<b>Urban design, landscape character and visual amenity</b>										
F.1	Visual impact during construction	Visual impacts that could include vegetation clearing and construction activities (e.g., the placement and movement of plant and other equipment).	Construction	Almost certain	Minor	High	<ul style="list-style-type: none"> <li>Implement standard mitigation measures during construction</li> <li>Design team to identify opportunities for existing vegetation around the perimeter of construction sites to be retained where feasible and reasonable to act as a visual screen during construction</li> <li>Undertake regular maintenance of site hoardings and perimeter site areas during construction</li> <li>Investigate opportunities for inclusion of public art etc. on hoardings to minimise visual impacts.</li> </ul>	Likely	Minor	Medium

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
F.2	Changes to established processes	Light rail infrastructure impacting on established parliamentary processes (e.g., Ceremonial route) and both route options.	Operation	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Determine all established parliamentary (and other) processes and ensure design solution is generally suitable/compatible for both route options.</li> </ul>	Unlikely	Minor	Very Low
F.3	Addition of new infrastructure in the visual landscape	The placement of the rail line, new stops, lighting, substations, and LRVs along the corridor.	Operation	Almost certain	Minor	High	<ul style="list-style-type: none"> <li>Ensure design solution is generally suitable/compatible with the existing environment</li> <li>Develop detailed urban design mitigation measures, including those for specific elements such as substations to minimise their impacts on the existing environment</li> <li>Ensure design complies with <i>Australia Standard AS4282 – Control of the Obtrusive Effects of Outdoor Lighting</i></li> <li>Early community and stakeholder engagement and interaction, including the NCA</li> <li>Development of tools to assist with community consultation such as visualisations, photomontages, etc</li> <li>Implemented visual mitigation measures as soon as feasible and reasonable to minimise duration of visual impact and allow the community to adjust to changes over time as the construction of the Project progresses.</li> </ul>	Likely	Minor	Medium
<b>Traffic and transport</b>										
G.1	Reduction in road network performance	Temporary reduction in road network performance, carrying capacity and increased travel times resulting from construction vehicle movements and lane/road closures. Notably at: <ul style="list-style-type: none"> <li>Kings Ave</li> <li>Woden Interchange.</li> <li>Yarra Glen roundabout</li> </ul>	Construction	Almost certain	Minor	High	<ul style="list-style-type: none"> <li>Consider/develop construction traffic management measures in consultation with design team as part of the environmental assessment process</li> <li>Consider staggering road construction to minimise impacts</li> <li>Undertake consultation with relevant stakeholders</li> <li>Establish effective means of communication to the public conveying that the general changes to road are in line with the City Plan's strategy (i.e., moving from free flowing to arterial along Lake Burley Griffin)</li> </ul>	Likely	Minor	Medium
G.2	Changes to existing public and/or private property accesses along the alignment	Changes to existing public and/or private property accesses along the alignment	Construction	Almost certain	Moderate	Very High	<ul style="list-style-type: none"> <li>Undertake early community engagement with affected property owners and ongoing education process with community members who access affected sites</li> <li>Install additional signage and community notification during construction to minimise impacts to the community and property owners.</li> </ul>	Likely	Minor	Medium
G.3	Disruptions to emergency access	Disruptions to emergency access routes results from potential changes to road/lane changes/closures during construction.	Construction	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Undertake ongoing consultation with emergency services to advise of all planned changes to traffic arrangements prior to applying the changes</li> <li>Access for emergency vehicles to be maintained across the Project area</li> <li>Preparation and approval of Temporary Traffic Management Plan (TTMP) for works.</li> </ul>	Unlikely	Moderate	Low
G.4	Disruption to pedestrians/ cyclists	Disruption to pedestrian/cyclist facilities during construction works.	Construction	Likely	Minor	Medium	<ul style="list-style-type: none"> <li>Site specific pedestrian management to be developed to manage proposed changes to existing pedestrian movements</li> <li>Existing cycle routes to be maintained where the Project footprint allows for this. Alternative routes to be identified where required as part of the design of the Project</li> <li>Preparation and approval of TTMP for works.</li> </ul>	Possible	Insignificant	Very Low

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
G.5	Reduction in road network performance	Reduction in road network performance resulting from the potential changes to existing phasing for traffic signals or additional traffic signals.	Operation	Likely	Major	Very High	<ul style="list-style-type: none"> <li>Develop a network management plan to identify key management measures that would ensure journey times are maintained at acceptable levels</li> <li>Consider development of targeted traffic management upgrades to improve general traffic circulation in the vicinity of the Project</li> <li>Undertake comprehensive traffic modelling (including Macro, Meso and Micro-scopic modelling) to understand implication on broader traffic network and ensure highlighted consideration in design.</li> </ul>	Likely	Moderate	High
G.6	Removal of parking spaces along the alignment	Potential loss of some parking along the alignment limiting accessibility to surrounding businesses, or entertainment venues.	Operation	Almost certain	Minor	High	<ul style="list-style-type: none"> <li>Define all relevant components of the Project area, e.g., the light rail along the transport corridor, all stops, substations, and associated infrastructure</li> <li>Identify current uses of existing parking including and those used for special events</li> <li>Identify and consider external projects that may impact on potential parking and future requirements</li> <li>Undertake consultation with local businesses and relevant stakeholders to identify parking needs and potential constraints.</li> </ul>	Likely	Minor	Medium
G.7	Changes to existing access along the alignment	Changes to existing public and/or private property access along the alignment.	Operation	Almost certain	Minor	High	<ul style="list-style-type: none"> <li>Identify design solutions/options regarding access to properties affected in consultation with the design team</li> <li>Undertake traffic surveys to identify frequency/quality of existing uses</li> <li>Undertake early community engagement with affected property owners and ongoing education process with community members who access affected sites</li> <li>Preparation and approval of TTMP for works.</li> </ul>	Likely	Minor	Medium
G.8	Disruptions to existing public transport services	Disruptions to bus routes.	Both	Likely	Moderate	High	<ul style="list-style-type: none"> <li>In consultation with service providers, design team to identify potentially impacted areas</li> <li>Design team to identify solutions for temporary impacts during construction</li> <li>Strategies to be agreed with transport service providers during both phases.</li> </ul>	Likely	Minor	Medium
G.9	Disruptions to emergency access	Disruptions to emergency access routes results from potential changes to road/lane changes/closures during construction.	Operation	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>Undertake ongoing consultation with emergency services to advise of all planned changes to traffic arrangements prior to applying the changes</li> <li>Access for emergency vehicles to be maintained across the Project area.</li> </ul>	Unlikely	Moderate	Low
G.10	Disruption to pedestrians/cyclists	Disruption to pedestrian/cyclist facilities during construction works.	Operation	Possible	Minor	Low	<ul style="list-style-type: none"> <li>As per G.2.</li> </ul>	Possible	Insignificant	Very Low
G.11	Disruption to traffic movement	Changes to established journey patterns/routines.	Both	Almost certain	Moderate	Very High	<ul style="list-style-type: none"> <li>Communication with the public and business to inform of changes.</li> </ul>	Likely	Minor	Medium
G.12	Future Access	Impediments to future developments through constraining access to development sites.	Operation	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Consult with land agencies to understand impacts of Project on future land uses.</li> </ul>	Possible	Insignificant	Very Low
G.13	Public transport	Expansion of a reliable, efficient mode of public transport,	Operation	Almost certain	Positive	Beneficial	<ul style="list-style-type: none"> <li>No mitigation/action required/proposed.</li> </ul>	Almost certain	Positive	Beneficial

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
		anticipated reduction in future private vehicle use, traffic, and air pollution.								
<b>Air quality and greenhouse gas</b>										
H.1	Increase in air pollution	Increased GHG emissions and other pollution due to construction plant, machinery, equipment, trucks, and vehicles. These emissions directly contribute to climate change.	Construction	Likely	Insignificant	Low	<ul style="list-style-type: none"> <li>Develop standard mitigation measures to minimise impacts including dust and air quality management plans to be implemented during the construction of the Project. A CEMP is to be adopted for the Project.</li> </ul>	Possible	Minor	Low
H.1	Impact of construction activities on sensitive receivers	Impact of the generation of air quality impacts (such as dust and/or other air pollution) on sensitive receivers along the alignment.	Construction	Likely	Insignificant	Low	<ul style="list-style-type: none"> <li>Develop standard mitigation measures to minimise impacts including dust and air quality management plans to be implemented during the construction of the Project.</li> </ul>	Possible	Minor	Low
H.3	Increase in air pollution	Reduction in ambient air quality during operations due to particulate (dust) emissions from entrainment of surface particles, wheel and rail wear, and traction sanding.	Operation	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Investigate opportunities for incorporation of mitigation strategies during operations.</li> </ul>	Possible	Insignificant	Very Low
H.4	Generation of greenhouse gas (GHG) emissions	Potential reduction of GHG emissions during operation, due to reduced private vehicle traffic.	Operation	Likely	Positive	Beneficial	<ul style="list-style-type: none"> <li>No mitigation/action required/proposed.</li> </ul>	Likely	Positive	Beneficial
<b>Surface and groundwater</b>										
I.1	Impact to existing bores	Bores located within the construction footprint of the alignment may be destroyed during construction.	Construction	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Define all relevant components of the Project area and the potential impact areas of these components through liaison with design team</li> <li>Undertake a field survey to confirm the existence, usage and condition of any bore located within the construction footprint of the Project, or potentially affected by the Project (e.g., those located in the vicinity of proposed excavations).</li> </ul>	Unlikely	Minor	Very Low
I.2	Impact to groundwater	Potential for impacts to groundwater from any deep excavations and pollutant spills entering aquifer(s).	Construction	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Design team to advise of the requirement for deep excavations</li> <li>All groundwater encountered during the construction of the Project to be managed in accordance with all relevant guidelines</li> <li>Hazardous material procedures (including procedures for managing spills, and the refuelling and maintenance of vehicles/equipment) would be developed and implemented prior to commencement of construction to minimise impacts from pollutant spills entering aquifer(s).</li> </ul>	Unlikely	Minor	Very Low
I.3	Water quality degradation from installation of piles	The current bridges were constructed before the lake was established, the Project has the potential to impact water quality when piling.	Construction	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Develop mitigation and contingency measures for construction works over and within the lake (including installation of turbidity barriers)</li> <li>Hazardous material procedures (including procedures for managing spills, and the refuelling and maintenance of vehicles/equipment) would be developed and implemented</li> </ul>	Unlikely	Minor	Very Low

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
							prior to commencement of construction to minimise impacts from pollutant spills entering aquifer(s).			
I.4	Potential risk of flooding impact to operation of the light rail due to flooding	Potential risk of flooding affecting operation of the light rail. Potential for flooding/stormwater overflows to impact on/inundate light rail operations and/or light rail stops, resulting in disruption to services.	Operation	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Obtain flood modelling to understand existing flood conditions</li> <li>Design the Project to ensure that there is no increase in flood risk compared to the existing environment</li> <li>Design to meet desired ARI events</li> <li>Develop contingency measures.</li> </ul>	Unlikely	Minor	Very Low
I.5	Exacerbation of existing localised stormwater flooding	Potential for the Project to result in exacerbation of existing localised stormwater flooding events during operation.	Operation	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>As per I.4.</li> </ul>	Unlikely	Minor	Very Low
I.6	Increase in contaminants where rainwater cannot infiltrate the soil	Increased surface runoff which nonpermeable areas could carry changes to surface drainage which could increase velocity of water runoff and cause flooding.	Operation	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Design the Project elements to minimise nonpermeable footprint(s) and incorporate surface water management measures to control quantity and quality.</li> </ul>	Unlikely	Minor	Very Low
<b>Contamination, soils, and geology</b>										
J.1	Encountering contaminated land	Potential of encountering contaminated land along the potential alignment from previous land uses.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Undertake a Phase 2 contamination assessment to investigate contamination remediation action plan</li> <li>Develop unexpected finds protocol to address materials that potentially can be identified outside of the areas where there is a site history or investigated as part of the Phase 2.</li> </ul>	Possible	Minor	Low
J.2	Potential contamination risks to groundwater aquifers/local waterways	Contamination of groundwater aquifers due to accidental chemical spills or leakage from construction and maintenance plant, vehicles, equipment, and storage areas.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Develop mitigation measures to minimise impacts which would be implemented during the construction of the Project.</li> </ul>	Possible	Minor	Low
J.3	Fuel spill	Spill during refuelling of plant during construction.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Develop mitigation measures to minimise impacts which would be implemented during the construction of the Project.</li> </ul>	Possible	Minor	Low
J.4	Erosion and sedimentation causing pollution of waterways	Removal of vegetation can cause erosion and sediment runoff to waterways.	Construction	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Develop mitigation measures to minimise impacts which would be implemented during the construction of the Project.</li> </ul>	Possible	Insignificant	Very Low
J.5	Geotechnical constraints	Potential to encounter geotechnical constraints during construction. (e.g., unsuitable substrates, acid sulphate soils).	Construction	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Targeted investigation to determine existing geotechnical constraints within the Project area.</li> </ul>	Unlikely	Minor	Very Low
J.6	Risks associated with the encountering and disposal of potentially contaminated groundwater	Environmental issues associated with the disposal of groundwater during the construction phase.	Construction	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Develop mitigation measures to minimise impacts which would be implemented during the construction of the Project.</li> </ul>	Possible	Insignificant	Very Low

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
<b>Social and Economic</b>										
K.1	Impacts to amenity	Impact on local communities during construction, including reduction in amenity (such as noise, dust, and visual impacts).	Construction	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Implementation of standard procedures within a formalised CEMP</li> <li>Consultation with businesses and residents; major event coordination requirements during construction.</li> </ul>	Possible	Moderate	Medium
K.2	Economic impacts to businesses	Amenity and access impacts to local businesses which could affect passing trade.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Undertake early community and stakeholder consultation and engagement with local businesses along the alignment</li> <li>Ensure construction planning addressed maintaining access to businesses and pedestrian thoroughfares and pedestrian signage to provide way finding to existing business</li> <li>Design team to advise the extent of the Project footprint – impacted businesses to then be identified – how (duration, type of impact, mitigation measures).</li> </ul>	Possible	Moderate	Medium
K.3	Community	Impacts to values held by Aboriginal stakeholders.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Consultation with registered Aboriginal organisations.</li> </ul>	Unlikely	Moderate	Low
K.4	Community	Potential confrontations with non-amenable community members.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>All landholders to be consulted with in advance.</li> </ul>	Unlikely	Moderate	Low
K.5	Community	Impact to community safety..	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Community engagement to take place during EIS preparation.</li> </ul>	Unlikely	Moderate	Low
K.6	Demand on labour	Increased demand on labour (e.g., construction workers, traffic professionals, planners etc) resulting in reduced availability of resources for the local community.	Construction	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Contingency planning.</li> <li>Unexpected finds protocol on site to enable speedy resolution.</li> </ul>	Unlikely	Moderate	Low
K.7	Facilitate broader development plans of other Government entities	The Project would act as an enabling Project for: <ul style="list-style-type: none"> <li>CRA to progress with the city to the Lake</li> <li>NCA to transform Commonwealth Avenue into a pedestrian friendly boulevard</li> <li>CRA to revitalise Woden Town Centre into an economic hub.</li> </ul>	Operation	Almost certain	Positive	Beneficial	<ul style="list-style-type: none"> <li>Close consultation and collaboration with Government Stakeholders to ensure integration and consistency of designs, programs, and public messaging/consultation.</li> </ul>	Almost certain	Positive	Beneficial
K.8	Development of transport infrastructure: increasing accessibility	Creates the potential for local access to residential, business community facilities along the alignment.	Operation	Almost certain	Positive	Beneficial	<ul style="list-style-type: none"> <li>No mitigation/action required/proposed.</li> </ul>	Almost certain	Positive	Beneficial
<b>Utilities and services</b>										
L.1	Disruption to existing services	Disruption to asset owner access to services and utilities.	Construction	Likely	Minor	Medium	<ul style="list-style-type: none"> <li>Design team to undertake search(es) to identify existing utilities</li> <li>Design team to consider existing service locations as part of the design of the Project to avoid where possible</li> <li>Services or utilities that may be impacted by the Project should be protected and/or relocated using an identified</li> </ul>	Possible	Minor	Low



Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
							hierarchy including design away from services; protection; and relocation.			
L.2	Damage to services and utilities (or finding additional services)	Damage to services and utilities during construction of the Project (including associated safety risks).	Construction	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Design team to undertake search(es) to identify existing utilities</li> <li>Construction contractor(s) to check the locations of existing underground utilities and services prior to commencing construction works.</li> </ul>	Unlikely	Minor	Very Low
L.3	Unexpected finds during utility works	Asbestos containing materials (including pipes) and acid sulphate soils uncovered during utility works (including contaminated fill).	Construction	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Mitigation measures to be developed by the construction contractor(s) to reduce demand on resources. Which would include an unexpected find procedure.</li> </ul>	Possible	Minor	Low
L.4	Buried cables and stray leakage currents from the running rails into surrounding earth	Electrolysis corrosion risks caused by potential stray leakage currents from the running rails into surrounding earth causing cause electrolysis corrosion of nearby buried metalwork.	Construction	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Electrolysis corrosion risks caused by potential stray leakage currents from the running rails into surrounding earth to be managed through the design of the track bed cable duct insulation by the design team.</li> </ul>	Unlikely	Minor	Very Low
L.5	Damage to services	Accidental damage to services associated with the light rail during the operation by contractor (excavations near the route) or major event (e.g., vehicle accident).	Operation	Possible	Major	High	<ul style="list-style-type: none"> <li>Design team to undertake search(es) to identify existing utilities</li> <li>New utilities for the Project to be installed in line with relevant standards including visual marking to prevent accidental damage</li> <li>Emergency Response Action Plan implemented to ensure continuation of light rail services (if safe).</li> </ul>	Possible	Moderate	Medium
<b>Waste, Energy, and Resources</b>										
M.1	Increased waste to land fill during construction	Inappropriate classification of construction waste and environmental hazards associated with disposal of construction waste, including potentially hazardous/contaminated materials (e.g., asbestos, contaminated soil, etc).	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>All waste assessed, classified, managed, and disposed of in accordance with relevant guidelines</li> <li>Procedures to be included within Project CEMP</li> <li>Consider the requirements of the sustainability strategy.</li> </ul>	Unlikely	Moderate	Low
M.2	Demand on resources	Inadequate resources to support construction of the Project.	Construction	Unlikely	Minor	Very low	<ul style="list-style-type: none"> <li>Mitigation measures to be developed by the construction contractor(s) to reduce demand on resources</li> <li>Procedures to be included within Project CEMP</li> <li>Consider the requirements of the sustainability strategy.</li> </ul>	Unlikely	Minor	Very Low
M.3	Increased energy usage during construction	Increase in energy consumption associated with manufacturing building materials and infrastructure during construction to a level that would strain the grid.	Construction	Unlikely	Minor	Very low	<ul style="list-style-type: none"> <li>Consider energy consumption in specifications for building materials</li> <li>Consider the requirements of the sustainability strategy.</li> </ul>	Remote	Minor	Negligible
M.4	Increased energy usage during operation	Increase in energy consumption associated with operation of light rail infrastructure.	Operation	Likely	Minor	Medium	<ul style="list-style-type: none"> <li>Design team to optimise the location of required substations to minimise energy loss resulting from the Project</li> <li>Consider the requirements of the sustainability strategy</li> </ul>	Possible	Minor	Very Low

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
							<ul style="list-style-type: none"> <li>Consider the implementation of energy efficiency technology during design development.</li> </ul>			
M.5	Reuse of construction beneficial reuse of materials	Potential for the beneficial reuse of material from site-won material, within the construction site, or for other nearby projects.	Construction	Possible	Positive	Beneficial	<ul style="list-style-type: none"> <li>Identify potential for reuse of construction material onsite</li> <li>Reuse topsoil within the construction site where feasible.</li> </ul>	Likely	Positive	Beneficial
<b>Land use</b>										
N.1	Impacts on public property during construction	Potential for construction activities to effect public property including footpaths and open spaces along the potential alignment.	Construction	Almost certain	Minor	High	<ul style="list-style-type: none"> <li>Define all relevant components of the Project area and the potential impact areas of these components</li> <li>Project construction footprint to be minimised as reasonably practical</li> <li>Construction methods would minimise impacts to footpath widths and crossing facilities to ensure sufficient pedestrian capacity is provided in a safe environment</li> <li>Consultation with relevant stakeholders would be undertaken to identify issues and review specific mitigation measures to reduce impacts on existing land uses, public property, and open space areas</li> <li>Identify appropriate post-construction configuration and facilities for open space land.</li> </ul>	Likely	Minor	Medium
N.2	Impacts on private property along the alignment	Potential for temporary reduction in property amenity and value due to construction impacts.	Construction	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Define all relevant components of the Project area that may impact on private property, e.g., the light rail tracks, all stops, substations, and associated infrastructure</li> <li>Minimise the construction footprint as reasonably practical</li> <li>Early consultation with affected property owners.</li> </ul>	Unlikely	Minor	Very Low
N.3	Land ownership	Development near international Embassy's land may be subject to different processes.	Construction	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Define all relevant components of the Project area that may impact on Embassy buildings and land</li> <li>Direct consultation with relevant stakeholders would be undertaken to identify and review specific mitigation measures to reduce impacts on existing land uses.</li> </ul>	Unlikely	Minor	Very Low
N.4	Impacts to proposed land uses	Impact to identified land developments within the NCP.	Operation	Likely	Minor	Medium	<ul style="list-style-type: none"> <li>Define all relevant components of the Project area that may impact on proposed development areas in strategic master plans</li> <li>Undertake early consultation with the NCA to identify the process for amending strategic plans to consider the Project.</li> </ul>	Possible	Minor	Low
N.5	Acquisition of private land	Acquisition of private land for infrastructure elements including alignment, or substations.	Operation	Possible	Minor	Low	<ul style="list-style-type: none"> <li>Land acquisitions to be identified, where possible through land use surveys.</li> </ul>	Possible	Insignificant	Very Low
N.6	Loss of public open space (e.g., parks)	Loss of public open space and associated social impacts.	Operation	Unlikely	Minor	Very Low	<ul style="list-style-type: none"> <li>Consider potential alternate public open space(s) which could be developed during design development in consultation with the design team.</li> </ul>	Unlikely	Minor	Very Low
N.7	Land value capture	Potential for the ACT Government to reinvest a portion of the financial gains through land developer levies for the purchase of land adjacent to public transport.	Operation	Possible	Positive	Beneficial	<ul style="list-style-type: none"> <li>No mitigation/action required/proposed. Consider application of special</li> <li>Community Infrastructure Levy.</li> </ul>	Possible	Positive	Beneficial

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
N.8	Impacts on property along the alignment	Potential for increase in property amenity and value due to new light rail infrastructure.	Operation	Possible	Positive	Beneficial	<ul style="list-style-type: none"> <li>No mitigation/action required/proposed.</li> </ul>	Possible	Positive	Beneficial
<b>Climate change</b>										
O.1	Adaptation to climate change	Potential impacts to the Project resulting from climate change impacts such as: <ul style="list-style-type: none"> <li>Predicted increased frequency, severity, and duration of extreme temperature (days exceeding 35°C)</li> <li>Predicted increased frequency and severity of extreme wind events.</li> </ul>	Operation	Likely	Major	Very High	<ul style="list-style-type: none"> <li>Identify potential climate change risks to the Project</li> <li>Undertake specific climate change risk assessment for the Project</li> <li>Consider possible design responses to address climate change risks during Project design in consultation with the design team.</li> </ul>	Possible	Moderate	Medium
O.2	Construction related climate change risk	There is a risk of climate change related hazards such as heat waves, and increased severity of extreme rainfall to impact construction works and poses a risk to construction worker safety	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Construction-related climate change risks (e.g., heatwaves or increased frequency and severity of extreme rainfall events) would be considered during the development of environmental management measures as part of the CEMP and other management plans, as relevant.</li> </ul>	Unlikely	Moderate	Low
<b>Hazard and risk</b>										
P.1	Impacts on high security buildings/areas	Construction works would occur close to highly secure government buildings that may have inherent access restrictions.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Identify the high security receivers as part of the land use studies undertaken for the Project and communicate this to the design team</li> <li>Undertake consultation with receivers to identify any specific requirements/potential impacts</li> <li>Workforce planning, inductions, training, construction compound locations and construction vehicle parking to avoid potential conflicts with secure facilities.</li> </ul>	Unlikely	Moderate	Low
P.2	Environmental incident	Inadequate environmental controls lead to an environmental incident.	Operation	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Additional controls to reference relevant environmental management plan and specialist environmental management sub-plans containing mitigation measures for each relevant environmental constraint</li> <li>Controls to include incident response procedures within the construction contractors CEMP as well as for the overall Project.</li> </ul>	Unlikely	Moderate	Low
P.3	Injury or fatality due to collisions with pedestrians	Injury or fatality due to collisions between pedestrians and LRVs at signalised crossings and where pedestrians may cross the light rail corridor at undesignated crossings.	Operation	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Consider safety design elements during design of the Project</li> <li>Identify mitigation strategies through design development of the Project in consultation with the design team</li> <li>Develop and implement appropriate signage during design development</li> <li>Develop and implement appropriate community education as part of the initial operation of the Project.</li> </ul>	Remote	Catastrophic	Medium
P.4	Injury or fatality due to vehicle collisions	Injury or fatality due to collisions between road and LRVs at signalised crossings and locations where road traffic	Operation	Unlikely	Catastrophic	High	<ul style="list-style-type: none"> <li>Consider safety design elements during design of the Project</li> <li>Community engagement strategy development to engage community early</li> </ul>	Remote	Catastrophic	Medium

Risk #	Risk event	Description	Project phase	Pre-mitigation			Controls	Post-mitigation		
				Likelihood	Maximum consequence	Risk		Likelihood	Maximum consequence	Risk
		would be maintained adjacent to the Project.					<ul style="list-style-type: none"> <li>Implement appropriate community education as part of the initial operation of the Project.</li> </ul>			
P.5	Electromagnetic Force (EMF) impacts	Potential impacts of EMF resulting from the operation of the light rail, including potential impact to sensitive equipment along the alignment.	Operation	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Identify potential sensitive receivers as part of the land use studies undertaken for the Project and communicate this to the design team</li> <li>Design team to consider EMF impacts as part of the overall development of the Project</li> <li>Undertake consultation with potentially affected receivers to identify any specific requirements/potential impacts.</li> </ul>	Possible	Minor	Low
P.6	Impact on high security buildings	Operations would occur close to highly secure buildings that may have inherent access restrictions.	Operation	Unlikely	Moderate	Low	<ul style="list-style-type: none"> <li>Identify the high security receivers as part of the land use studies undertaken for the Project and communicate this to the design team</li> <li>Undertake consultation with receivers to identify any specific requirements/potential impacts.</li> </ul>	Unlikely	Minor	Very Low
<b>Bushfire</b>										
Q.1	Bushfires impacts on the operation	Potential impact of bushfires from areas adjacent to the alignment impacting the operation of the Project.	Operation	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>A bushfire risk assessment would be undertaken as part of the development of the EIS to determine the potential risk to the existing and future land uses surrounding the Project</li> <li>The bushfire risk assessment would be undertaken in accordance with the ACT Government Planning for bushfire risk mitigation guideline (ACT Government, 2006)</li> <li>A Bushfire Action Plan would be implemented during the operation of the Project.</li> </ul>	Remote	Major	Low
Q.2	Bushfire impacts on construction	Potential impact of bushfires from areas adjacent to the alignment impacting the construction of the project	Construction	Unlikely	Major	Medium	<ul style="list-style-type: none"> <li>A bushfire risk assessment would be undertaken as part of the development of the EIS to determine the potential risk to the existing and future land uses surrounding the Project</li> <li>The bushfire risk assessment would be undertaken in accordance with the ACT Government Planning for bushfire risk mitigation guideline (ACT Government, 2006)</li> <li>A Bushfire Action Plan would be implemented during the construction of the Project.</li> </ul>	Remote	Major	Low
<b>General</b>										
R.1	Resolution of route options	MPC and relevant government agencies to confirm route options to avoid potential gaps in planning.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Consult relevant Stakeholders (including the general public as well as government departments) to receive feedback</li> <li>Confirmation of route options to be provided as early as possible in the Project.</li> </ul>	Unlikely	Moderate	Low
R.2	Ancillary facilities & site compounds not adequately scoped	Potential impact of inadequate planning for ancillary facilities and site compounds leading to gaps in approvals, CEMP, last minute locations changes.	Construction	Possible	Moderate	Medium	<ul style="list-style-type: none"> <li>Details of ancillary facilities and compounds to be determined at details design and included within the EIS.</li> </ul>	Unlikely	Moderate	Low

