Australian Capital Territory

Planning and Development (Environmental Impact Statement Assessment Report – Capital Metro Light Rail Stage 1) Notice 2015 (No 1)*

Notifiable instrument NI2015-592

made under the

***Planning and Development Act 2007*, s 225A (EIS assessment report)**

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1 Name of instrument

This instrument is the *Planning and Development (Environmental Impact Statement Assessment Report – Capital Metro Light Rail Stage 1) Notice 2015 (No 1).*

2 Commencement

This instrument commences on the day after notification.

3 Environmental Impact Statement Assessment Report

I make the Environmental Impact Statement (EIS) Assessment Report in the schedule.

Note 1: A copy of the Assessment Report can be obtained from the Environment and Planning Directorate website at: http://www.planning.act.gov.au

Note 2: The EIS assessment report expires 18 months after the day the notice is notified.

Dorte Ekelund
Chief Planning Executive
29 September 2015

*Name amended under Legislation Act, s 60

Capital Metro Light Rail Stage 1

Environmental Impact Statement Assessment Report

SEPTEMBER 2015

ACT Government
Environment and Planning

Pursuant to Section 222 of the *Planning and Development Act 2007* (**PD Act**), this report evaluates the revised environmental impact statement for the following application:

Ref no: 201400239

Date lodged: 7 September 2015

Project: Capital Metro Light Rail Stage 1

Applicant: Capital Metro Agency

As required by section 225A of PD Act, the planning and land authority (**the authority**) has prepared this Assessment Report (**the report**) for the Minister for Planning. This report confirms that the planning and land authority is satisfied that:

- each matter raised in the scoping document for this proposal is addressed;
- the EIS takes into account any timely representation;
- the EIS demonstrates how timely representations have been taken into account.

Contents

Glossary and definitions

ACT	Australian Capital Territory
AEP	Annual Exceedance Probability
Australian Government Minister	The Australian Government Minister administering the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) and includes a delegate of the Minister.
CEMP	Construction environmental management plan
DA	Development application
EMP	Environmental management plan
EPD	Environment and Planning Directorate
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
GHG	Greenhouse gas
LRV	Light rail vehicle
OPESP	Operating Phase Environment and Sustainability Plan
RAO	Registered Aboriginal Organisation
TAMS	Territory and Municipal Services Directorate
WSUD	Water sensitive urban design

1 Introduction

This report is to the ACT Minister for Planning on the assessment of the Environmental Impact Statement (EIS) in relation to the Capital Metro Light Rail Stage 1 project. The report:

- confirms that the planning and land authority (the authority) is satisfied that the EIS:
    - addresses each matter raised in the scoping document for the proposal;
    - takes any timely representation on the Draft EIS into account; and
    - demonstrates how any timely representation has been taken into account.
- contains any other relevant additional information about how the authority came to be satisfied in relation to those matters.

A development application will be required to be lodged in the impact track when the EIS is complete. The development application process under the *Planning and Development Act 2007* (PD Act) also includes a statutory public notification period.

Under the PD Act the authority is only responsible for approving parts of the project on Territory land. The National Capital Authority (NCA) is responsible for works approval on designated area. **Figure 2** shows which parts of the project are Territory Land and therefore fall within the scope of this Assessment Report and any subsequent DA approval/s.

1.1 Project background

Capital Metro Agency is proposing to build a 12 kilometre light rail service from Gungahlin to Canberra City (see **Figure 2**). Capital Metro Agency is an independent statutory authority that was established by the ACT Government to deliver the Capital Metro project.

The EIS states that the City to Gungahlin corridor is an important part of the *Transport for Canberra* policy, which maps out ways to deliver faster, more convenient and sustainable transport options for Canberra over the next 20 years. Stage 1 of the proposal is intended to be the primary transport corridor connecting Canberra's growing northern suburbs with Canberra's City and the south.

The project that is the subject of the EIS and this Assessment Report is for Stage 1 of Canberra's light rail only. The EIS shows an indicative light rail master plan network for the Canberra region connecting town and group centres more broadly. Future stages of Canberra's light rail service will be required to follow appropriate regulatory processes under the PD Act and are outside the scope of this Assessment Report.

Figure 1: Territory land and NCA land

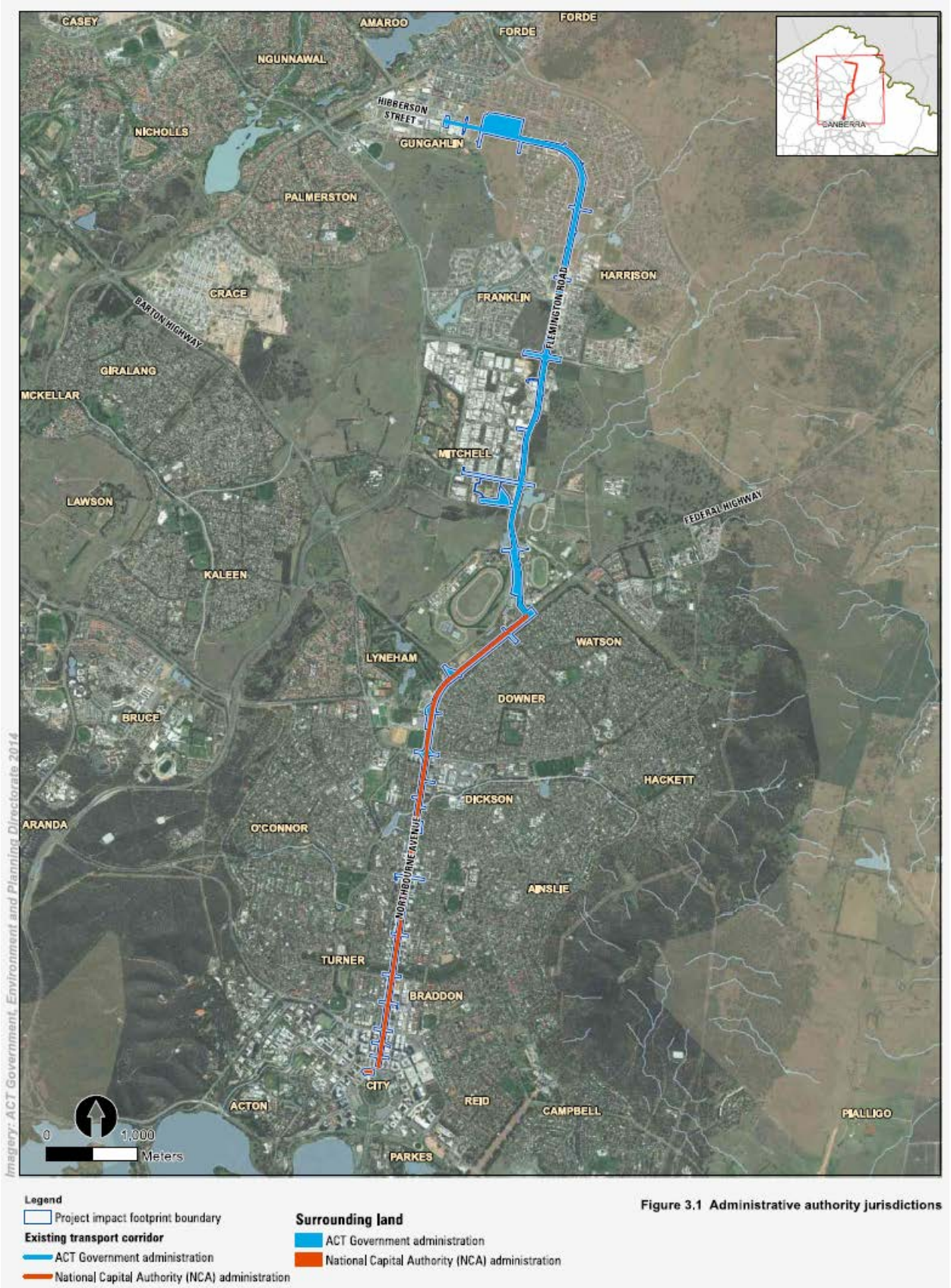


Figure 3.1 Administrative authority jurisdictions

Figure 2: Map of proposed Light Rail Stage 1 alignment

1.2 Project description

The Capital Metro Light Rail Stage 1 project involves the construction of approximately 12 kilometres of light rail track from Gungahlin to the City, primarily within the central median strip of the existing road corridor. Other associated works include:

- 13 stops including major transport interchanges at Gungahlin, the City and Dickson;
- Stop platforms;
- a light rail and pedestrian only zone at Hibberson Street in Gungahlin;
- 45-metre long Light Rail Vehicles (LRVs);
- overhead line equipment;
- electrical substation facilities;
- upgrade to existing bridge structures and construction of a new bridge along Flemington Road;
- a series of crossovers and turnback facilities to allow LRVs to turn back at certain points;
- the provision of new traffic signals at intersections;
- passenger information systems at stops and on LRVs;
- a stabling depot and maintenance facility;
- upgrades to the road layout at some sections of the route;
- upgrades of existing underground and overhead utilities and new drainage infrastructure;
- changes to some parking conditions along the route; and
- public domain works including paving, street trees, lighting and street furniture.

Construction will begin at multiple sites along the alignment and is expected to commence in the fourth quarter of 2016 if relevant regulatory approvals are in place. An indicative construction program and methodology has been provided in the EIS.

The Capital Metro Light Rail Stage 1 project is expected to take three years to construct and become operational in the fourth quarter of 2019 or early 2020.

The light rail is proposed to operate between 6.00am and midnight Monday to Thursday, 6.00am and 1.30am on Fridays and Saturdays and between 8.00am and midnight on Sundays. Vehicle frequencies are stated to be between 6 minutes and 15 minutes depending on time of day. The journey time is expected to be 25 minutes with no significant difference between peak and off-peak periods.

The project impact boundary which shows the area that has been considered as part of the EIS is set out on pages 42 to 46 of the Draft EIS.

1.3 Alternatives to the project

A number of alternatives to the project were considered as part of the EIS, including:

- continuing the existing transport arrangement;
- conversion of existing traffic lanes into transit lanes or bus lanes;
- bus rapid transit;
- light rail;
- other transport modes such as monorail, metro rail and heavy rail; and
- other non-transport strategic options, such as road pricing.

Some of these options were shortlisted for further investigation, including the existing transport arrangement, bus rapid transit and light rail. An analysis of each of the three shortlisted options is included in the EIS. In summary, the findings were:

- maintaining the status quo is unrealistic and intervention is needed to improve traffic flow between Gungahlin and the City.
- both light rail and bus rapid transit would result in a significant mode shift to public transport along the corridor compared to the status quo.
- light rail would have a higher estimated capital investment cost, but would provide greater overall benefits due to its ability to achieve broader development and community and social benefit outcomes, for example driving increased urban development densities.
- Increasing the number of buses by bus rapid transit would result in increased noise and air pollution, compared to light rail.
- a light rail service could improve journey times and reliability compared to bus rapid transit, and would increase the capacity of the transport system by approximately three fold.

Other options were considered to result in congestion in the network, increased traffic on suburban roads or be financially unviable and were therefore not shortlisted for further investigation.

Alternative locations for the placement of project components, such as tracks, stops and the stabling depot and maintenance facility were also considered as part of the EIS. Details on each of these options and the reasons for selecting each preferred option is available in the EIS documentation.

2 The environmental impact assessment process

Under section 127 of the PD Act, a development application for a development proposal in the impact track must include a completed EIS in relation to the proposal (unless the application is exempted under section 211 of the Act).

Section 123 of the PD Act states that the impact track applies to a development if, amongst other reasons, the Minister makes a declaration under section 124 that the impact track applies to the development. On 20 August 2014 the Minister for Planning declared the impact track to be applicable to Light Rail Stage 1 therefore requiring an EIS to be completed. This was due to the unique nature of the project in a Canberra context and to ensure a transparent and thorough assessment of all potentially significant project impacts.

It is important to note that the EIS process is not an approval process. It ensures potential impacts and possible mitigation measures for certain development proposals have been investigated and documented in accordance with the requirements of a scoping document.

The EIS is used as a key assessment tool for any development application lodged for the proposal. The EIS also recommends key considerations for where a development application is lodged for the proposal. **Figure 3** outlines the EIS process.

2.1 Scoping document

On 14 October 2014 the planning and land authority issued a scoping document for the EIS pursuant to section 212 of the PD Act. The scoping document set out the matters to be addressed in the EIS and contained, at a minimum, the requirements in section 213 of the PD Act and section 54 of the PD Regulations.

The authority consulted with relevant entities in developing the scoping document, as prescribed by section 51 of the *Planning and Development Regulations 2008* (PD Regulations). The authority also sought advice from a number of other entities, businesses and community groups.

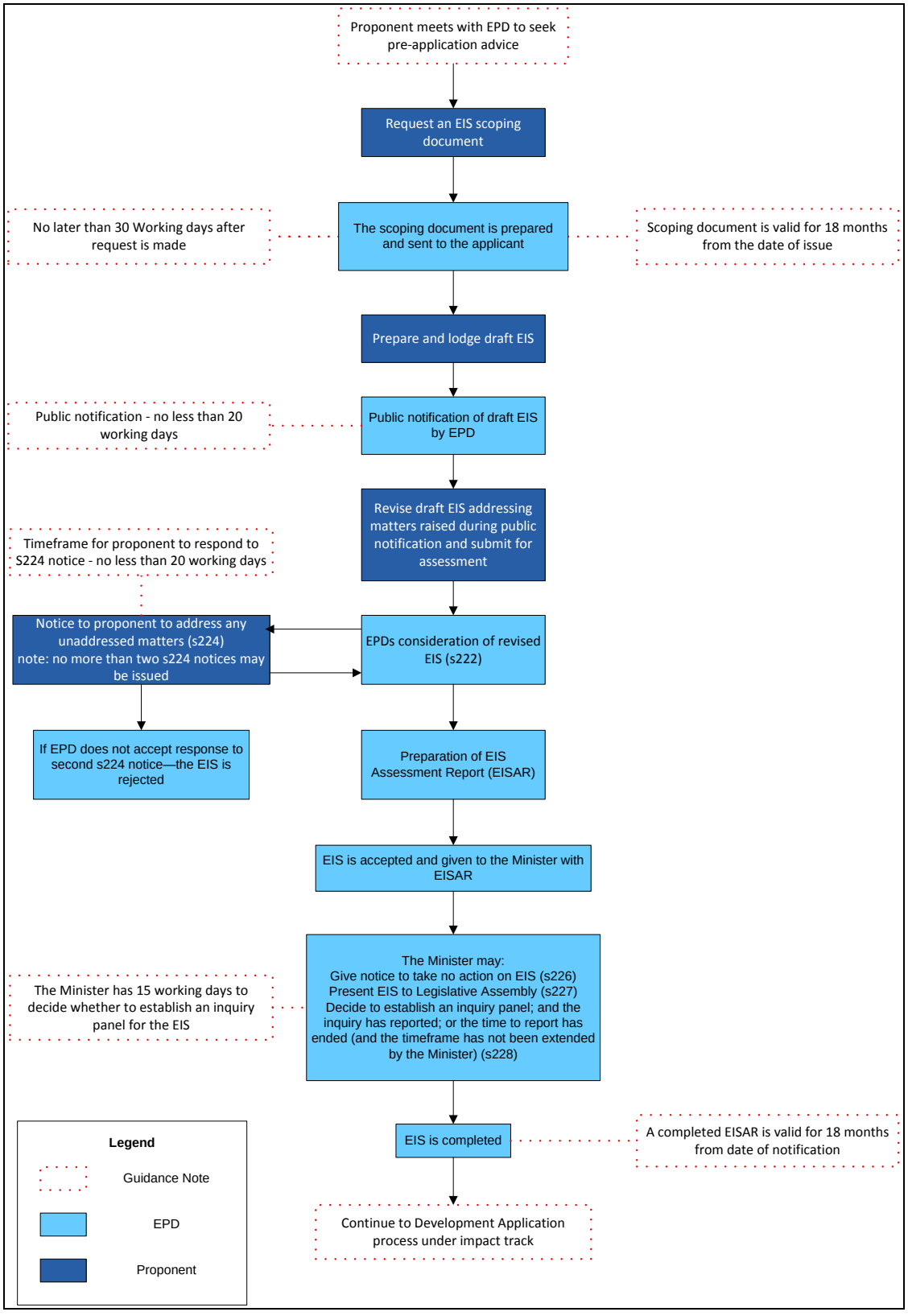
In developing the final scoping document a risk-based approach was used so that the EIS could focus on those matters that potentially result in a significant environmental impact.

The scoping document was notified under the *Legislation Act 2001* on 17 October 2014. Under section 215 of the PD Act, the final scoping document is effective for 18 months from the day after the date on the final scoping document notice.

After receiving the final scoping document the proponent is required to:

- prepare a Draft EIS that addresses each matter raised in the final scoping document for the proposal; and
- give the Draft EIS to the authority for public notification.

Figure 3: key steps in the EIS process



2.2 Draft EIS

On 17 June 2015 Capital Metro Agency gave the authority a Draft EIS, under section 216(2) of the PD Act.

2.2.1 Public notification of Draft EIS

Pursuant to section 217 of the PD Act, the authority publicly notified the Draft EIS from 20 June 2015 to 17 July 2015, being 20 working days, by putting a notice in The Canberra Times on Saturday 20 June 2015 and maintaining a notification on the authority's website.

Copies of the Draft EIS were also available for inspection at EPD's Customer Service Centre during the notification period. In addition, Capital Metro Agency ran information sessions during the notification period for the community.

This process provided interested stakeholders and the community with the opportunity to make representations on the proposal or in respect of specific environmental issues of concern.

A total of 59 representations were received from the public within the public notification period. A summary of the key issues raised during public notification were:

- Parking, in particular parking associated with the London Circuit car park

  The authority notes that the London Circuit car park is in a designated area and not on Territory Land and although Capital Metro Agency considered impacts to this car park as part of its Draft EIS and Revised EIS it is outside the scope of this Assessment Report.

- Impacts to local businesses

- Project construction impacts

- Removal of trees to facilitate construction of the project (Particularly along Northbourne Avenue)

  Northbourne Avenue is a designated area and although Capital Metro considered impacts as part of its Draft EIS and Revised EIS it is outside the scope of this Assessment Report.

- The need for ongoing consultation through design and construction.

An overview of those comments received and the proponent's response to those comments during the public consultation process was provided by Capital Metro Agency in the Revised EIS which will be made available with this Assessment Report.

As required by section 220 of the PD Act, copies of all public representations were provided to the proponent and made available on the authority's website. The representations will remain on the website until either the EIS is completed, or the representations are withdrawn.

2.2.2 Entity referral on Draft EIS

Whilst not a requirement of the PD Act, on 23 June 2015 the Draft EIS was referred to each of the entities which provided comments on the scoping document plus some additional relevant entities. The entities at Table 1 were invited to provide written comments during the public notification period.

Table 1: Entity comments on the Draft EIS

Entity consulted	Entity response
National Capital Authority	On 20 July 2015 the National capital Authority responded noting that the NCA will deal directly with Capital Metro with regard to any comments it may have on the Draft EIS.
ACTEW AGL, including Icon Water	On 24 June 2015 ActewAGL responded noting that it supports the Capital Metro development and has no comments in regards to the EIS.
Conservator of Flora and Fauna	On 7 July 2015 the Conservator of Flora and Fauna provided general comments in relation to ecological impacts and more specific comments on fire protection zones, the Superb Parrot, Block 230 in Gungahlin, wildlife connectivity, threatened grassland fauna and the protection of grassland.
Emergency Services Agency (ESA)	On 9 July 2015 ESA provided notes on technical paper number 12 of the Draft EIS in relation to bushfire.
Environment Protection Authority (EPA)	On 14 July 2015 the EPA provided comments in relation to noise and vibration, contamination, water licensing and groundwater.
ACT Heritage Council	On 17 July 2015 the ACT Heritage Council provided advice stating that the proposed development will impact upon heritage values, and that additional information should be included in the EIS heritage Assessment Report prior to finalisation.
ACT Health	On 16 July 2015 ACT Health provided comments in relation to treated greywater plumbing and irrigation systems and rainwater tank taps. ACT Health noted that it has no health concerns regarding the proposal.
Territory and Municipal Services (TAMS)	On 16 July 2015 TAMS provided comments around the landscape and built environment and roads and traffic management.

Chief Minister, Treasury and Economic Development Directorate	On 17 July 2015 Territory Venues and Events provided comments on the Exhibition Park event stop, noise and vibration, impacts to the road network during construction and the socioeconomic environment.
Education Directorate	No response provided.
Australian Federal Police	No response provided.
Land Development Agency	No response provided.
ACT Office of Regulatory Services	No response provided.
Housing and Community Services	No response provided.
Exhibition Park Corporation	No response provided.
Gungahlin Community Council	No response provided.
North Canberra Community Council	No response provided.
Other utilities services	On 14 July 2015 Telstra responded and provided comments around impacts on Telstra assets. No other utilities services (other than Actew mentioned above) provided a response.

The representations received from entities during the consultation period are discussed in this report as they relate to each trigger or potential impact.

The authority provided its preliminary review of the Draft EIS, entity comments and public representations to the proponent for addressing in the Revised EIS.

Consistent with the requirements of the PD Act, the proponent revised the Draft EIS to take into consideration all matters raised in representations made during public consultation, comments from the planning and land authority and comments from entities to demonstrate how the matters have been taken into account in the Revised EIS.

2.3 Revised EIS

On 7 September 2015 Capital Metro Agency submitted a Revised EIS to the authority pursuant to section 221 of the PD Act.

The authority reviewed the Revised EIS for:

- adherence to the final scoping document and legislative requirements;
- consideration and incorporation of the authority's and entity comments provided on the Draft EIS; and
- consideration and response to public representations received during notification of the draft and other consultation processes.

The authority is satisfied Capital Metro Agency addressed each matter raised in the representations received. The Revised EIS will be made available with this Assessment Report.

2.4 Giving the EIS to the Minister for Planning

The authority has accepted the proponent's EIS under section 222 of the PD Act. The findings and outcomes of the review of the EIS are included in this report, which is provided to the Minister for Planning with the EIS in accordance with section 225. Once the Minister has received the EIS options include:

- under section 226 – choose to take no action on the EIS
- under section 227 – present the EIS to the Legislative Assembly
- under section 228 – establish an inquiry panel to inquire about the EIS.

Under section 209 of the PD Act, an EIS is completed if the Minister:

- gives the authority a notice of no action under section 226;
- has not decided to establish an inquiry panel to inquire about the EIS; or
- establish an inquiry panel for the EIS and:
  i) the Panel has reported the results of the inquiry; or
  ii) the time for reporting under section 230 has ended.

2.5 Lodging a development application

Once the EIS has been completed the proponent can lodge a development application in the impact track. Any subsequent development application related to the EIS must include the completed EIS. The EIS expires five years after the day it is completed.

2.6 EPBC Act process

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act* (EPBC Act) a person must not take an action that has, will have, or is likely to have a significant impact on a matter of national environmental significance without approval from the Australian Government Minister for the Environment.

It is the responsibility of the person proposing the action to refer the project to the Australian Government Minister if the action proposed is likely to have a significant impact on an matter of national environmental significance, the environment in general (for actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land).

On 28 November 2014 Capital Metro Agency referred the Capital Metro Light Rail Stage 1 project (EPBC 2014/7379) to the Australian Government Minister under the EPBC Act. The referral was publically notified for 10 workings days in accordance with the EPBC Act.

On 23 December 2014, a delegate for the Australian Government Minister for the Environment determined that the Capital Metro Light Rail Stage 1 project is not a controlled action and does not require assessment and approval under the EPBC Act as significant impacts are not likely on matters of national environmental significance.

3 Impact assessment

This section summarises issues identified in the scoping document that had to be assessed in the EIS.

3.1 Biodiversity

The project alignment and associated infrastructure has the potential to impact on remnant native vegetation communities and endangered species habitat. Threatened species and ecological communities which have been identified as potentially being affected include:

- Natural Temperate Grassland;
- Yellow Box/Red Gum Grassy Woodland;
- Golden Sun Moth;
- Perunga Grasshopper;
- Striped Legless Lizard;
- Ginninderra Peppercress; and
- other threatened species of plant.

It should be noted that much of the proposed alignment passes through highly modified landscapes dominated by introduced pasture grasses and planted native and introduced trees. Impacts on these areas are considered elsewhere in the EIS (and this report) for their landscape values.

The Australian Government Minister determined that the project was unlikely to have a significant impact on matters of national environmental significance including those noted above.

3.1.1 Potential impacts identified for biodiversity

Vegetation within the project area has generally already been disturbed as a result of urban development. As part of preparing the EIS, desktop studies and field surveys were undertaken. The purpose of the investigations was to identify threatened species, endangered ecological communities, and the conservation values of land in the project area.

Impacts to biodiversity include:

- Removal of 0.42 hectares of Yellow box-Blakely's Red Gun Grassy Woodland which also represents marginal foraging habitat for a variety of bird species, including threatened, migratory and common species.
- Removal of 10.49 hectares of cleared and disturbed land with scattered trees.
- Increased edge effects on the adjacent retained woodland of the Crace Grasslands Nature Reserve.

There is also the potential for a number of indirect impacts from the proposal to biodiversity, including wind-blown dust on vegetation, erosion and sediment accumulation from overland water flow, changes to local soil hydrological conditions due to altered surface water flows, spread of weeds from contaminated materials and equipment, potential spread of plant pathogens, damage to retained trees through accidental construction damage and noise and vibration.

Fauna death and injury may also occur during construction, particularly during vegetation clearing, and potentially during operation. For example, there is the potential for the mortality of a small number of individuals of Striped Legless Lizard during earthworks in disturbed grasslands with scattered trees. The location of the project within an existing road corridor assists in reducing this risk.

The project will not directly affect areas of high conservation significance.

3.1.2 Public comments

One representation received during the public consultation period identified impacts on biodiversity as a concern. The representation identified the potential impacts of new infrastructure on conservation areas and nature reserve, the removal of vegetation from street verges and median areas and the requirement to replace removed vegetation with suitable native plants to provide habitat.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.1.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and mitigation measures in the EIS to minimise the potential impacts to biodiversity and address concerns raised during the EIS process. These are detailed in the EIS and summarised in **Table 2** below.

Table 2: Avoidance and mitigation measures for biodiversity impacts

Proposed avoidance or mitigation measures	Stage of implementation
Develop a Biodiversity Management Plan as part of the Construction Environment Management Plan.	Prior to construction
Minimise clearing of native vegetation and fauna habitat in detailed design and construction planning	Project design
Retain native trees wherever possible	Project design
Pre-clearing protocols including checking for presence of flora and fauna and relocation of fauna that may be encountered during pre-clearing	Prior to any clearing
Installation of tile arrays along fences within the construction area to assist in the capture and relocation of Striped Legless Lizards during construction	Prior to and during works onsite

Establishing construction fencing and exclusion zones which are clearly demarcated as 'no go zones' to prevent unauthorised clearing and access to sensitive areas and also to prevent Striped Legless Lizards from moving beyond identified habitat areas	Prior to works onsite
Site inductions prior to construction to inform personnel of environmental management procedures, for example of weed control and erosion and sediment control measures	Prior to works onsite
Clearing protocols including avoiding mixing topsoil with debris and using a suitably qualified environmental scientist during habitat removal	During clearing
Weed management through weed removal and disposal without stockpiling, cleaning and wash down of equipment and appropriate importation of material to site	Throughout construction
Dust suppression works	Throughout construction
Surface water and sediment controls	Throughout construction
Revegetation of disturbed areas with robust native grass species appropriate to the type of vegetation community removed	After construction

The Construction and Operational Phase Environmental Sustainability Plans proposed for this project will set out the framework for continuing management, mitigation and monitoring programs for biodiversity impacts of the proposal and this will be a requirement of any subsequent development application.

3.1.4 Assessment of impacts and key findings

The Conservator of Flora and Fauna provided comments on the Draft EIS and the Revised EIS. The main issues raised by the Conservator on the Draft EIS were:

- The project has avoided direct impact on areas of high conservation value and the project does not interrupt the connection of key habitat areas.
- The impacts associated with the establishment and maintenance of bushfire Asset Protection Zones needs to be considered.
- The project is adjacent to areas of high conservation value, however the EIS commits to suitable management measures.
- A commitment to the control of invasive grasses during construction and operation should be included.
- Suitable trees should be planted in locations adjacent to grassland habitats to prevent adverse overshadowing.

The Conservator of Flora and Fauna provided the following comments on the Revised EIS:

- The issues previously raised have been satisfactorily addressed.
- Further clarification is required on the management of invasive grasses, however this is able to be satisfactorily addressed in the Biodiversity Management Plan and Vegetation Management Plan.
- Further suggestions relating to landscaping may be made at the DA stage.
- The scaling back of Asset Protection Zones and information on proposed management activities in these zones has addressed concerns.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of biodiversity impacts and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The risks to biodiversity as required by the Scoping Document and assessed in the EIS are set out in **Table 3** below.

Table 3: Risks to biodiversity as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Removal of vegetation communities	Almost certain	Major	Significant	**Medium**
Impact to threatened flora species	Unlikely	Moderate	Low - not potentially significant	
Impacts to threatened fauna species	Possible	Major	High	**Medium**
Clearing of potential habitat for migratory species	Possible	Moderate	Medium	**Low**

3.2 Heritage

Canberra has a long and rich history of use and custodianship by Australian Aboriginals, and since the 1820's by non-indigenous Australians. The proposal has the potential to impact on Indigenous and non-Indigenous heritage matters. Twenty six listed heritage items were identified in the EIS, along with three archaeological features and two nominations to the National Heritage List; '*Canberra – Central national Area and Inner Hills'* for the foundational elements of the Griffin plan and '*Canberra and Surrounding Areas'*. It is noted that these are nominations to the National Heritage list only.

3.2.1 Potential impacts identified for heritage

The proponent commissioned a heritage impact assessment by a suitably qualified person to support the EIS. The potential impacts of the proposal on heritage matters identified in the EIS include:

- Compatibility with the National Heritage values of Canberra and of Northbourne Avenue and City Hill. The authority notes that these places are not currently on the National Heritage list.
- Construction impacts on heritage items and/or the setting of heritage places along the alignment.
- Destruction of heritage items in potential archaeological deposit sites by construction activities.
- Changes to the landscape character of heritage places along the alignment.

With the exception of changes to the qualities of Northbourne Avenue, there is little probability of direct impacts of a permanent nature to heritage items. No heritage structures or Aboriginal cultural sites are proposed to be demolished or modified by the proposal.

The authority also notes that the Northbourne Avenue component of the project is located in a designated area and therefore is a matter for the National Capital Authority. While heritage impacts to Northbourne Avenue have been considered in the EIS documentation (to present a complete picture) they are outside the scope of this Assessment Report.

3.2.2 Public comments

Impacts to heritage matters were raised in five submissions received during the public consultation period for the Draft EIS. The matters raised in the submissions include the impacts of the proposal on the Melbourne and Sydney Buildings in the City, on City Hill, on tree removals on Northbourne Avenue and on the Northbourne housing precinct.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.2.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential impacts to heritage. These are summarised in **Table 4**

Table 4: Avoidance and mitigation measures associated with heritage

Proposed avoidance or mitigation measures	Stage of implementation
Location and design of light rail elements refined to avoid impacts on heritage items and views	Project design
Power substations to be low in profile, contemporary designs and to use high quality materials	Project design

Tree planting and landscaping along with funding for ongoing maintenance to reduce impact	Project design
Development of a heritage interpretation strategy to be implemented post construction	After construction
Construction compounds rationalised to minimise impacts on heritage items	Project design
Grouping/bundling of services and installation within existing corridors where possible to minimise new excavations required	Project design
Development of an unanticipated discovery protocol	Prior to commencing works
Heritage induction of all staff and contractors on potential archaeological issues and protocols	Prior to commencing works
Photographic recording of heritage items/places	Prior to commencing works
Landscape maintenance plan and maintenance funding	After construction
Construction hoardings to incorporate heritage interpretations	Throughout construction
Expert arborist advice used to establish buffers and work methods in vicinity of heritage listed trees (Swinden Street Downer, Haig Park)	Prior to commencing works
Monitoring of condition of heritage items throughout construction	Throughout construction
Development of an employment and training plan for the Aboriginal community in consultation with the Registered Aboriginal Organisations (RAOs) to provide opportunities to the Aboriginal community to work in the operational phases of the project	Prior to operation
Explore opportunities to incorporate inputs from the Aboriginal Community into LRV paint schemes and interior fabrics, as well as paving, stops and substations	Project design
Develop and implement a program of test pitting with the involvement of RAO's in locations of potential archaeological deposits	Prior to construction

A Heritage Management Plan is proposed to be developed to sit within the project's Construction and Operating Phase Environment and Sustainability Plans. The Heritage Management Plan will include the avoidance and mitigation measures identified in the EIS and this will be a requirement of any subsequent development application.

3.2.4 Assessment of impacts and key findings

The ACT Heritage Council provided comments on the Draft EIS and the Revised EIS. The main issues raised by the ACT Heritage Council on the Draft EIS were:

- The ACT Heritage Council supports the finding and recommendations of the *Heritage Impact Assessment.*
- Further detail is required on the historical and archaeological context for Aboriginal heritage, on the aims and methods of archaeological site inspections undertaken, on the outcomes of archaeological site inspections undertaken, on the assessment of archaeological potential for Gungahlin construction sites and mapping of archaeological site locations in relation to the project.
- Further information is required on the consultation with RAOs, and a request for ongoing consultation on works within Aboriginal cultural areas.
- The need for ongoing consultation and engagement with relevant heritage consultants and RAOs through detailed design and construction.
- There are further processes and approvals required under the *Heritage Act 2004*, these should be clearly identified.

The ACT Heritage Council provided the following comments on the Revised EIS:

- The ACT Heritage Council endorses the GML (2015) and Parsons Brinckerhoff Australia (2015) reports subject to conditions which are required to be complied with prior to construction.
- The advice of arborists is to be sought for the protection of trees in heritage areas during design and construction, significant impacts may require additional approvals.
- Detailed design of permanent infrastructure is to avoid impacts on views to City Hill, the ACT Heritage Council will review this at DA stage.
- Subsurface testing is required to be undertaken prior to construction at the Gungahlin construction compound and the stabling depot and maintenance facility site prior to construction.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of heritage impacts and proposed a range of mitigation and management measures to reduce these impacts as far as practicable. DA considerations at the back of this document reflect ACT Heritage Council comments on the Revised EIS.

The risks to heritage as required by the Scoping Document and assessed in the EIS are set out in **Table 5** below.

Table 5: Risks to heritage as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Impacts to heritage listed buildings or places	Unlikely	Major	Medium	**Low**
Impacts on landscape setting of heritage places	Likely	Moderate	High	**Low**
Impacts on the heritage values of Canberra the Planned National Capital and Northbourne Avenue	Likely	Moderate	High	**Beneficial***
Destruction of potential archaeological deposits and human remains.	Unlikely	Major	Medium	**Low**
Impacts on Aboriginal heritage places along the alignment.	Possible	Moderate	Medium	**Low**

**proponent identified beneficial impact on basis of long term improvement in Northbourne Avenue landscape quality from new tree plantings of appropriate species.*

3.3 Noise and vibration

The project will involve the construction and operation of a major transport project through the established districts of Gungahlin and North Canberra. With the construction and operation of the project there is the potential for noise and vibration to adversely affect the environment and community.

3.3.1 Potential impacts identified for noise and vibration

A *Noise and Vibration Impact Assessment* has been prepared by an appropriately qualified person to investigate the potential noise and vibration impacts of the project. The assessment identified the following potential impacts of the project:

- Noise impacts from construction plant, equipment, trucks and vehicles.
- Vibration from construction affecting human comfort and resulting in cosmetic damage to buildings.
- Noise impacts from the operation of the project, from LRV movements, maintenance and stabling activities at the depot and noise from project elements such as power supply substations.
- Vibration from LRV operations, including impacts on vibration sensitive equipment.

3.3.2 Public comments

Ten representations received during the public notification period of the Draft EIS identified concerns around the potential noise and vibration impacts of the project. The key issues raised were the disruption to businesses and residences by noise associated with construction, impacts from noise and wheel squeal during the operation of LRVs, noise from passengers at stops, noise impacts on the Canberra Racing Club operations and vibration impacts on sensitive equipment and historical objects.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.3.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential impacts of noise and vibration. These are summarised in **Table 6.**

Table 6: Avoidance and mitigation measures associated with noise and vibration

Proposed avoidance or mitigation measures	Stage of implementation
Undertake ongoing consultation with potential sensitive receivers to coordinate timing of vibration causing activities to avoid impacts	Project design
Specify LRVs with low auxiliary noise profiles	Project design
Minimise potential noise generation through track design and track bed features	Project design
Selection of appropriate track construction technology in vicinity of noise sensitive equipment	Project design
Design of depot refined to minimise track noise, plant noise and noise from vehicle movements and PA systems	Project design
Position substations and select equipment and finishing designs to minimise noise	Project design
Limit LRV ‘idling’ at Gungahlin terminus	Operation
Minimise noise through appropriate maintenance of LRV wheels and tracks	Operation
Scheduling of LRV maintenance activities at depot to avoid excessive noise generation outside of business hours	Operation
Limits on hours of work to avoid disruption in evenings and overnight, with the exception of night time works at key intersections	Throughout construction
Assessment, consultation and consideration of noise mitigation options for each ‘after hours’ construction activity	Throughout construction

Coordinating materials deliveries and waste collections from work sites and compounds during daytime hours	Throughout construction
Provision of noise mitigating hoardings/fences where necessary for worksites with extended work programs	Throughout construction
Scheduling of noisy works to occur during daytime hours wherever possible	Throughout construction
Minimise working consecutive nights in the same location	Throughout construction
Scheduling works adjacent to schools to occur outside of classroom hours	Throughout construction
Avoidance of operating multiple pieces of noisy equipment at the same time	Throughout construction
Locating and orienting noisy/vibration generating equipment as far as possible from receivers, and shutting down equipment when not in use	Throughout construction
Regular maintenance of plant and equipment to minimise unnecessary noise	Throughout construction
Arranging work sites to minimise reversing vehicle alarms and such that loading and unloading is carried out away from sensitive receivers	Throughout construction
Use of smaller vibration generating equipment where necessary and feasible	Throughout construction
Undertake monitoring use condition reports to avoid damage to buildings	Throughout construction

A Construction Noise and Vibration Management Plan (CNVMP) will be developed within the Environmental Management Plan proposed for this project. The Operating Phase Environment and Sustainability Plans will also include noise and vibration management and mitigation measures. These plans will be a requirement of any subsequent development application.

3.3.4 Assessment of Impacts and key findings

The Environment Protection Authority (EPA) provided comments on the Draft EIS and the Revised EIS. The main issues raised by the EPA on the Draft EIS were:

- The overview of the legislation and regulations which apply is generally accurate and correct.
- Some construction and maintenance activities of project infrastructure may be exempt from noise zone standards, however operational noise for project infrastructure will need to comply with appropriate standards.

The EPA provided the following comments on the Revised EIS:

- The EPA notes the proposed CEMP and OEMP to manage impacts of the project and will review the draft plans at DA stage and require that they are endorsed prior to construction.
- The EPA notes that additional engagement with stakeholders is recommended to manage noise and vibration.
- The EPA recommends that an independent environmental auditor is retained to monitor compliance with approved CEMP throughout construction.

EPA comments on the Revised EIS have been built into the DA considerations.

TAMS commented on the Draft EIS that noise from the project should not be considered in isolation of existing traffic noise, and that the Draft EIS was not clear on whether low frequency noise and wheel squeal had been considered. TAMS made no further comment on the Revised EIS.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of noise and vibration impacts and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The risks from noise and vibration as required by the Scoping Document and assessed in the EIS are set out in **Table 7** below.

Table 7: Risks of noise and vibration as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Noise impacts from construction plant, equipment, trucks and vehicles	Almost certain	Moderate	Very high	**High**
Vibration from construction affecting human comfort and resulting in cosmetic damage to buildings	Possible	Moderate	Medium	**Low**
Noise impacts from the operation of the project, from LRV movements, maintenance and stabling activities at the depot and noise from project elements such as power supply substations	Almost certain	Moderate	Very high	**Medium**

Vibration from LRV operations, including impacts on vibration sensitive equipment	Possible	Moderate/ Major	Medium – High	**Low**

3.4 Trees

The road median location of light rail tracks will impact on a number of planted trees along the route for Stage 1. In some locations, road works, widening and intersection works will impact on trees. The EIS has presented the 'worst case scenario' for impacts to trees. The number of trees to be removed may be reduced from the number presented in the EIS subject to a higher level of design resolution. Northbourne Avenue currently has offset plantings of multiple rows of *Eucalyptus elata*, which were planted in the mid 1980's.

It is noted that works approval along Northbourne Avenue will be administered by the National Capital Authority and is outside the scope of this Assessment Report although Capital Metro Agency has considered these impacts within their EIS documentation.

3.4.1 Potential impacts identified for planted trees

The Preliminary Environmental Assessment undertaken for the project identified the following risks to planted trees:

- Removal of trees along the alignment which contribute to the visual environment and the environment broadly.
- Impacts on regulated trees under the *Tree Protection Act.*

It is noted that approximately 175 trees are estimated to be removed within Territory land and that the remainder of trees to be removed are in designated areas and will form part of the works approval assessment by the National Capital Authority.

3.4.2 Public comments

During the public notification period for the Draft EIS, seven representations were received which raised concerns about the removal and replacement of planted trees. The main issues raised were impacts on the character of Northbourne Avenue and the selection of appropriate replacement species suited to Canberra conditions and the urban environment.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.4.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential impacts on planted trees. These are summarised in **Table 8.**

Table 8: Avoidance and mitigation measures associated with planted trees

Proposed avoidance or mitigation measures	Stage of implementation
Identification of registered (and provisionally registered) trees and install protection fencing	Prior to construction
Development of a tree replacement strategy for any protected trees in agreement with TAMS	Prior to construction
Identification of trees which do not impugn on project infrastructure or constructability to be retained. Plan to undertake pruning as necessary of retained trees to facilitate construction and operation	Detailed design
For trees to be retained – erect tree protection fencing and undertake necessary site preparation to minimise impacts, such as using pier footings for demountable buildings/plant and excluding vehicle movements and materials storage from root area	Throughout construction
Implement low impact construction techniques for project construction and services relocations where necessary and feasible	Detailed design
Where it is not possible to retain a tree – the project will replace removed trees in accordance with the tree replacement strategy	Detailed design

The Tree Replacement Strategy proposed for this project will set out how trees which are removed during construction will be replaced. It will specify the time for replacement, required ground preparation, planting and maintenance schedules. The tree replacement strategy is required to be endorsed by TAMS prior to construction and will be a condition of any subsequent development application.

3.4.4 Assessment of Impacts and key findings

TAMS provided comments on the Draft EIS that relate to planted trees:

- Appropriately sized replacement street trees should be selected to maximise growth performance and should consider ongoing maintenance requirements.
- It was noted that underground power supply to the LRVs would reduce the maintenance requirements for the project and provide a safer working environment.
- Further detail on tree species, spacing, planting techniques/infrastructure and maintenance is required to be provided for consideration at detailed design.

TAMS made no further comment on the Revised EIS.

The Conservator of Flora and Fauna noted in comments on the Draft EIS that the planted street trees are of low conservation value to threatened species.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of impacts to trees and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The risks to planted trees as required by the Scoping Document and assessed in the EIS are set out in **Table 9** below.

Table 9: Risks of planted trees as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Removal of trees along the alignment	Almost certain	Major	Significant	**Significant (short term)**
				Beneficial (long term)*
Impacts on significant trees as defined by the *Tree Protection Act.*	Unlikely	Major	Medium	**Very Low**

**proponent identified beneficial impact, on basis of long term improvement in Northbourne Avenue landscape quality from new tree plantings of appropriate species.*

3.5 Landscape and visual

The project will pass through different precincts along the route from Gungahlin to the City. It has the potential to impact upon the landscape quality and viewscapes with the removal of vegetation and the addition of new infrastructure to the landscape.

3.5.1 Potential impacts identified for landscape and visual

The proponent commissioned a *Landscape and Visual Assessment* for the EIS. The potential landscape and visual impacts identified in the EIS are:

- Visual impacts during construction from vegetation clearing, excavation and the use and movement of plant and equipment.
- The addition of light rail infrastructure to the landscape including rail track, poles, wires, stops, lighting, substations and LRVs.
- The addition of the depot and maintenance facility to the landscape.

3.5.2 Public comments

During the public notification of the Draft EIS, seven representations were received which raised concerns around the visual impacts from the project and impacts on the landscape. The main issues raised were the impacts of removing trees from Northbourne Avenue affecting the symbolic landscape nature of the approach to the City, and the landscape impacts of the proposed construction compound in the City and associated effects on

business. It is noted that works approval for Northbourne Avenue is the responsibility of the National Capital Authority and is outside the scope of this Assessment Report.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.5.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential visual impacts and impacts on the landscape. These are summarised in **Table 10.**

Table 10: Avoidance and mitigation measures associated with landscape and visual

Proposed avoidance or mitigation measures	Stage of implementation
Detailed design to refine the landscaping, external finishes and siting of substations to be better incorporated into the landscape	Detailed design
High quality construction hoardings will be installed and maintained regularly. Hoardings could incorporate imaging to integrate heritage or landscape settings	Throughout construction
Access to existing retail businesses to be maintained, or alternative access provided	Throughout construction
Materials and equipment will be stored at worksites and compounds in a way which reduces visual impacts	Throughout construction
Scheduling of works to avoid impacts on special events at EPIC and the racecourse	Throughout construction
Advanced ordering of median trees to ensure quality and consistency of size to be ready for implementation	Detailed design
High quality materials would be used in finished landscaping and routinely maintained to reduce impacts	Detailed design
Trees removed for construction would be replaced in accordance with a tree replacement strategy	Prior to construction
Above ground infrastructure such as support poles and wires could be collocated with traffic signals, street lighting and signposts to reduce visual clutter. Pole spacing would be kept consistent	Detailed design
Lighting associated with the project would be designed to limit spill into non-target areas and up-lighting would be capped by structures. Light colour would be designed to complement the adjacent area and public safety cameras would be selected to function without unnecessary lighting	Detailed design

The Construction Environmental Management Plan proposed for this project will include measures for the routine inspection and maintenance of construction hoardings and on the operation of work sites and construction compounds. The Construction Environment Management Plan will be a DA requirement for any development application.

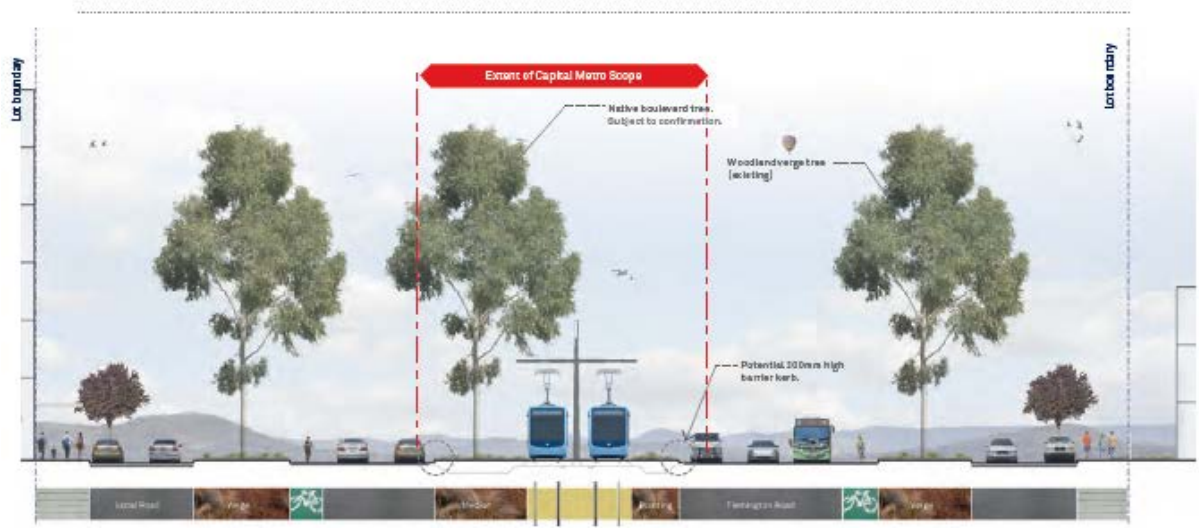


Figure 4: Expected Flemington Road Cross-section (source. Landscape Character & Visual Impact Assessment, Hassell 2015)

3.5.4 Assessment of impacts and key findings

TAMS provided comments on the Draft EIS that relate to landscape and visual impacts of the proposal:

- Appropriate landscaping should be included in the project to ensure an appropriate visual outcome, however consideration should be given to the ongoing maintenance requirements of selected landscaping.

TAMS made no further comment on the Revised EIS.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of landscape and visual impacts and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The visual and landscape impacts as required by the Scoping Document and assessed in the EIS are set out in **Table 11** below.

Table 11: Risks of landscape and visual impacts as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Visual impacts during construction from vegetation clearing, excavation and the use and movement of plant and equipment	Almost certain	Minor	High	**Medium**

The addition of light rail infrastructure to the landscape including; rail track, poles, wires, stops, lighting, substations and LRVs	Almost certain	Moderate	Significant	**Medium**
The addition of the depot and maintenance facility to the landscape	Almost certain	Minor	High	**Low**

3.6 Traffic and transport

Capital Metro Stage 1 will run down the central median of arterial roads in Northern Canberra. The tracks will cross a number of major roads at intersections and to facilitate safe traffic and pedestrian access will require some new traffic signals. With priority given to Light Rail operations new traffic signals and construction activities have the potential to impact on traffic and transport

3.6.1 Potential impacts identified for traffic and transport

A *Traffic and Transport Impact Assessment* was prepared for the EIS. It identified the following impacts associated with the project on traffic and transport:

- Reduced road network performance and carrying capacity and increased travel times due to construction vehicle movements and lane/road closures.
- Disruption to emergency services vehicle access due to construction activities.
- Reduction in parking limiting access to some businesses and residences.
- Reduction in road network performance due to light rail priority measures and from installation of additional signals.
- Disruption to pedestrian and cyclist facilities due to construction activities.
- Changes to access to some properties and businesses as a result of rationalising some road connections.
- Negative perceptions of public transport network performance due to interchanges between light rail and other modes.

3.6.2 Public comments

Fifty four representations received during the public notification period raised concerns relating to traffic and transport. The issues raised by the representations are summarised as follows:

- Positive health benefits are associated with public transport usage.
- Concern over shift in focus from, and changes to, existing bus services.

- Unfair access to public transport infrastructure under current and proposed scenarios across different districts of Canberra.
- Impacts from access and parking changes to businesses during construction.
- Impacts of closure of Swinden Street access to Northbourne Avenue service lane.
- Impacts of interchanges between different public transport modes.
- Lack of/too simplistic/biased comparison in the EIS of light rail with other public transport models and ride-sharing systems.
- Impacts on the road system and private vehicle travel times.
- Car park closures forcing people onto inefficient public transport.
- Impacts on the current bus networks in light rail catchment through reduced servicing and forced public transport mode shift.
- Poor municipal infrastructure in suburban areas preventing uptake of public transport.
- Lack of consideration/information of future light rail line impacts on significant heritage places.
- Support for investment in public transport.
- Lack of night time public/alternate transport option.
- Need for integration of the project with transport planning for whole of Canberra.
- Reduction in parking due to the City construction compound and particularly impacts on disabled persons and medical practitioners and noting a lack of alternative parking with capacity in the vicinity of the London Circuit, Melbourne Building and the Courts precinct.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS. The authority notes that parts of the project are in designated areas, including the London Circuit car park, and are subject to works approval by the National Capital Authority. While the EIS documentation has considered impacts associated with the entire proposal, works on designated land are outside the scope of this Assessment Report.

3.6.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential traffic and transport impacts. These are summarised in **Table 12.**

Table 12: Avoidance and mitigation measures associated with traffic and transport

Proposed avoidance or mitigation measures	Stage of implementation
Development and implementation of a Construction Transport Management Plan, with consultation from TAMS and ACTION	Detailed design
Implementation of a construction worker carpark at a location that limits impacts on other parking operations and using shuttle buses to move workers to construction sites	Throughout construction
Public awareness campaign of possible disruption, options and alternatives	Throughout construction
Disabled parking will be replaced if impacted by construction as close as possible to the original location	Throughout construction
A construction staging program will be developed to control the timing of works in key intersections. This program is to be developed in consultation with key stakeholders	Prior to construction
Intersection works in City locations (non-key intersections) would be scheduled to occur on weekends to reduce impacts on traffic	Throughout construction
Locally sourced materials will be used wherever feasible and practical to reduce interstate haulage	Detailed design and throughout construction
Detailed planning of special equipment deliveries (LRVs etc.) to reduce impacts on local communities	Detailed design
Commissioning and driver training will be undertaken during non-busy periods	Prior to operation
Refinement of intersection signals phasing to improve light rail and traffic efficiency	Operation
Refinements to bus networks and timetables to reduce impacts on public transport travel times and improve service in conjunction with Light Rail	Operation
Public awareness campaigns will be undertaken to increase understanding of new arrangements and interactions between cars, bicycles and pedestrians with light rail	Prior to operation
Parking restriction and changes to parking arrangements to discourage inappropriate parking by light rail passengers	Operation

A Construction Transport Management Plan (CTMP) will be developed to manage the impacts of the construction of the project on the transport network and parking. The CTMP will be a sub plan of the broader Construction Environmental Management Plan. The

proponent will also be required to work closely with TAMS in relation to road and traffic matters. These will be key DA requirements for any future development application/s.

3.6.4 Assessment of impacts and key findings

TAMS provided comments on the Draft EIS that relate to traffic and transport impacts of the proposal. Comments raised the following issues: provision of on-road cycling, combined noise impacts of project with existing traffic, traffic volume modelling and signals phasing.

TAMS made no further comment on the Revised EIS.

Exhibition Park made comment that overnight campers and staff of the park would benefit from the stop adjacent being a full time stop instead of an events only stop.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of traffic and transport impacts and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The impacts on traffic and transport as required by the Scoping Document and assessed in the EIS are set out in **Table 13** below.

Table 13: Risks of traffic and transport as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Reduced road network performance and carrying capacity and increased travel times during construction	Almost certain	Moderate	Very high	**High**
Disruption to emergency services vehicle access due to construction activities	Possible	Catastrophic	Very high	**Medium**
Reduction in parking limiting access to some businesses and residences	Almost certain	Moderate	Very high	**Medium**
Reduction in road network performance due to light rail priority measures and from installation of additional signals	Likely	Moderate	Very high	**Medium**
Disruption to pedestrian and cyclist facilities due to construction activities	Possible	Minor	Low - not potentially significant	*

Changes to access to some properties and businesses as a result of rationalising some road connections	Almost certain	Moderate	Very high	**Medium**
Negative perceptions of public transport network performance due to interchanges between light rail and other modes.	Possible	Moderate	High	**Low**

**A residual risk was not assessed in the EIS, the initial risk rating of low would not warrant specific measures. The planning and land authority considers that the proposed measures to be implemented through design, construction and prior to operation would mitigate impacts on pedestrians and cyclists during construction.*

3.7 Air quality and greenhouse gases

The operation of the proposed light rail network is likely to reduce airborne emissions as the electrically powered vehicles do not burn liquid fuels. However the construction of the proposal will use large quantities of liquid fuel and other material. The construction of the proposal has the potential to impact on air quality and greenhouse gas (GHG) levels through dust from excavation and emissions from plant and equipment and materials production and transport.

3.7.1 Potential impacts identified for air quality and greenhouse gases

The proponent commissioned two investigations for the EIS; an *Air Quality Impact Assessment* and a *Greenhouse Gas Emission Estimation*. The risks associated with air quality and greenhouse gases identified in the EIS are as follows:

- GHG emissions, dust and particulates from construction plant and equipment during construction, including impacts on sensitive receivers along the route.
- GHG emissions from construction contributing to climate change.
- Reduced air quality during operation from entrainment of pollutants by moving vehicles and pulverisation of particles by wheel/track interactions.

3.7.2 Public comments

Seven representations received during the public notification period raised concerns relating to air quality and GHG emissions. The issues raised by the representations are summarised as follows:

- Reduced air quality during operation.
- Dust impacts from construction activities, including on businesses adjacent to the alignment and construction compounds.
- Impacts of dust on air conditioning plant and maintenance of this equipment for buildings adjacent to the depot site.

- Impacts on amenity of outdoor areas for businesses adjacent to the depot site.
- Impacts on dust on sensitive historical objects at the National Archives.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.7.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential air quality and greenhouse gas impacts. These are summarised in **Table 14.**

Table 14: Avoidance and mitigation measures associated with air quality and greenhouse gas impacts

Proposed avoidance or mitigation measures	Stage of implementation
Maintenance of erosion and sediment control features to limit silt build-up	Throughout construction
Amending work undertaken on windy days to limit dust propagation	Throughout construction
Minimising materials and spoil stockpiles and employing appropriate management techniques including wetting, sealed delivery vehicles and storage tanks and fencing of stockpiled materials which could cause airborne dust	Throughout construction
Using appropriate work practices to limit dust generation from materials handing	Throughout construction
Undertake regular equipment maintenance to minimise potential for emissions	Throughout construction
Implement a 'no-idling' policy for all construction vehicles and plant to switch of engines when stationary	Throughout construction
Locating fixed equipment away from sensitive receivers to reduce impacts	Throughout construction
Use locally sourced materials to reduce fuel use and transport impacts	Throughout construction
Consider the use of biodiesel in place of regular diesel fuel. Use fuel additives if appropriate to optimise combustion and reduce emissions	Throughout construction
Use solar powered lights/message signs as appropriate	Throughout construction
Selection of lower embodied energy materials and substitutable materials and minimising materials waste	Detailed design and throughout construction
Energy efficiency measures for fixed construction components such as site offices, including solar panels and timer controlled lighting	Throughout construction

Replanting of removed trees as soon as practical to sequester carbon and improve air quality	Post construction
Selection of energy efficient LRVs and incorporation of technologies such as regenerative braking	Detailed design
Incorporation of solar panels in stops	Detailed design
Utilisation of green power for light rail operations to make up total as per ACT Government policy	Operation
Development and implementation of a Carbon and Energy Management Plan as part of Operational Environment Management Plan	Operation

3.7.4 Assessment of impacts and key findings

The EPA recommended in comments on the Revised EIS that an independent environmental auditor is retained to monitor compliance with the approved CEMP throughout construction. This has been specifically built into DA considerations.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of air quality and greenhouse gas impacts and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The impacts on air quality and greenhouse gasses as required by the Scoping Document and assessed in the EIS are set out in **Table 15** below.

Table 15: Risks of air quality impacts and greenhouse gas emissions as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
GHG emissions, dust and particulates from construction plant and equipment during construction. Including impacts on sensitive receivers along the route	Likely	Minor	Medium	**Low**
GHG emissions from construction contributing to climate change	Almost certain	Minor	High	**Low**
Reduced air quality during operation from entrainment of pollutants by moving vehicles and pulverisation of particles by wheel/track interactions.	Possible	Minor	Low - not potentially significant	*

**A residual risk was not assessed in the EIS, the initial risk rating of low would not warrant specific measures.*

3.8 Water and hydrology

There is known utilisation of groundwater at locations within the vicinity of the project. The construction of the project has the potential to impact on ground water and hydrology where excavations or de-watering are required near the water table.

3.8.1 Potential impacts identified for water and hydrology

For the EIS two studies have been undertaken; a *Surface Water Assessment* and a *Groundwater Assessment.* The risks associated with groundwater and hydrology are as follows:

- Impacts on groundwater from deep excavations or pollutant spills.
- Destruction of boreholes located within the construction footprint or drawdown of water from dewatering activities required during short-term for construction.
- Potential for flooding to impact on operations.
- Potential for project to exacerbate existing localised flooding during operation.
- Increased impermeable surfaces generating additional runoff and potentially carrying contaminants. Changes to surfaces generating additional surface flow velocities and runoff quantities and causing flooding.
- Potential for flooding to inundate track and stops and disrupt light rail operations.

3.8.2 Public comments

Two representations received during the public notification period of the Draft EIS raised issues relating to groundwater and flooding. The issues raised were that the proposal should not cause increased flooding risk to local businesses and that the project design should incorporate as much permeable surface as possible to limit runoff.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.8.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential groundwater and hydrology impacts. These are summarised in **Table 16.**

Table 16: Avoidance and mitigation measures associated with groundwater and hydrology impacts

Proposed avoidance or mitigation measures	Stage of implementation
Groundwater monitoring program at existing bores and monitoring wells for level and quality to establish baseline prior to construction. Investigate the usage status of registered bores	Prior to construction
Treatment of extracted groundwater (if required by testing) prior to discharge	Throughout construction

Implementation of erosion and sediment controls, and drainage and runoff management measures for construction sites. Revegetation of disturbed areas as soon as practicable after construction to limit erosion	Throughout construction
Development and implementation of procedures for the handling and use of hazardous materials and maintain spill kits is ready state	Prior to and throughout construction
Obtain appropriate licenses to take water for construction purposes	Prior to construction
Incorporate appropriate drainage measures and hazardous materials protocols at the depot facility to prevent contamination	Detailed design
Implement and maintain temporary surface water and creek diversions during construction in drainage lines	Throughout construction
Implement sediment and erosion controls during construction and ensure surface flows from disturbed areas are treated and dispersed to avoid erosions and flow concentration	Throughout construction
Diversion of surface drainage around disturbed areas wherever practical	Throughout construction
Incorporation of track drainage system to handle design rainfall recurrence. Captured stormwater to be fed into existing municipal stormwater infrastructure where appropriate	Detailed design
Where existing network capacity is not sufficient for addition of light rail runoff, provision of additional storage in oversized pipes or elsewhere in stormwater system	Detailed design
Design of stormwater drainage systems to protect endangered ecological communities from runoff	Detailed design
Implementation of measures to avoid impacts on the operation of and infrastructure associated with the Inner North Reticulation Network	Throughout construction
Design and construct new bridges to match existing channel flow characteristics	Detailed design
Develop a flood emergency management plan for construction and include provisions for flood management. Where desirable raise tracks above 1% AEP flood level to mitigate impacts on continuity of services	Detailed design
Provide additional flood storage or drainage infrastructure as appropriate where storage is removed by project or associated road works	Detailed design

Undertake further assessment of stormwater systems around the alignment in Dickson and if feasible implement measures to improve drainage to limit flooding	Detailed design
Consideration of incorporating active and passive water sensitive urban design (WSUD) measures in median. Incorporation of active WSUD measures before discharge to drainage network (where space is not available in median)	Detailed design
Incorporation of water efficient landscaping and fixtures throughout project and WSUD measures at stops and depot to limit impacts to stormwater system	Detailed design

The Construction and Operating Phase Environment and Sustainability Plans proposed for this project will incorporate measures for the continuing management, mitigation and monitoring programs for the relevant impacts of the proposal.

3.8.4 Assessment of impacts and key findings

The EPA noted in comments on the Draft EIS and the Revised EIS that appropriate licences would be required to use surface and groundwater for construction purposes (Including water from sediment control ponds).

The authority considers that Capital Metro Agency has undertaken a detailed assessment of hydrological impacts and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The impacts on groundwater and hydrology as required by the Scoping Document and assessed in the EIS are set out in **Table 17** below.

Table 17: Risks to groundwater and hydrology as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Impacts on groundwater from deep excavations or pollutant spills	Unlikely	Moderate	Low - not potentially significant	*
Destruction of boreholes located within the construction footprint or drawdown of water from dewatering activities required during short-term for construction	Possible	Moderate	Medium	**Very low**
Potential for flooding to impact on operations	Possible	Moderate	Medium	**Low**

Potential for project to exacerbate existing localised flooding during operation	Possible	Moderate	Medium	**Low**
Increased impermeable surfaces generating additional runoff and potentially carrying contaminants. Changes to surfaces generating additional surface flow velocities and runoff quantities and causing flooding	Likely	Moderate	High	**Medium**
Potential for flooding to inundate track and stops and disrupt light rail operations	Likely	Minor	Medium	**Low**

**A residual risk was not assessed in the EIS, the initial risk rating of low would not warrant specific measures. Mitigation measures have been identified to manage risks associated with pollutant spills.*

3.9 Contamination and soils

The project and depot will be constructed in areas which have been used for various purposes over the last century. In this time the land may have been contaminated by past activities. The construction of the project has the potential to interact with contaminated soils and groundwater.

3.9.1 Potential impacts identified for contamination and soils

The proponent has commissioned *Phase 1 and Phase 2 Environmental Site Assessments* to establish whether or not contamination is present. The key risks associated with contamination and soils identified in the EIS as follows:

- Vegetation removal causing erosion and sedimentation.
- Potential to encounter unsuitable geotechnical conditions for construction of project.
- Potential to encounter contaminated land from past uses.
- Contamination of groundwater due to chemical spills during construction.
- Mobilisation of existing contamination (known or unknown) in the environment.

3.9.2 Public comments

No issues relating to contamination and soils were identified in comments made by the public.

3.9.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential impacts to contamination and soils. These are summarised in **Table 18.**

Table 18: Avoidance and mitigation measures associated with contamination and soils impacts

Proposed avoidance or mitigation measures	Stage of implementation
An Erosion and Sediment Control Plan is to be developed prior to construction and implemented for the duration construction activities and until disturbed areas are stabilised. Erosion and sediment control measures will be inspected and maintained on a regular basis	Prior to construction
Minimisation of exposed soils during construction and revegetation of exposed soils at the completion of works at each location	Throughout construction
Providing for surface water diversions around construction sites to minimise site water volumes	Throughout construction
Stockpiled materials are to be stored in covered bunded areas and managed to avoid dust and erosion impacts	Throughout construction
Works would be halted in wet conditions where impacts to soils are likely to occur	Throughout construction
Landscape design and finishes will limit the potential for erosion. Retaining walls will be constructed where necessary to retain soils	Detailed design
A Contamination Management Plan has been prepared, it is required to be endorsed by an independent auditor and adhered to throughout construction	Throughout construction

The Erosion and Sediment Control Plan and Contamination Management Plan will form part of the Construction Environmental Management Plan proposed for this project.

3.9.4 Assessment of impacts and key findings

The EPA provided the following comments on the EIS:

- The EPA recommends that an independent environmental auditor is retained to monitor compliance with approved CEMP throughout construction.
- The EPA must review and endorse the independent auditor's statement into the *Environmental Site Assessment* prior to construction.

These have been built into the DA considerations.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of impacts associated with contamination and soils and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The impacts on contamination and soils as required by the Scoping Document and assessed in the EIS are set out in **Table 19** below.

Table 19: Risks to soils and geology as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Vegetation removal causing erosion and sedimentation	Likely	Minor	Medium	**Very low**
Potential to encounter unsuitable geotechnical conditions for construction of project	Likely	Moderate	High	**Low**
Potential to encounter contaminated land from past uses	Almost certain	Moderate	Very high	**Low**
Contamination of groundwater due to chemical spills during construction	Possible	Moderate	Medium	**Low**
Environmental impacts associated with the disposal of groundwater during operation of the project	Possible	Moderate	Medium	**Low**
Mobilisation of existing contamination (known or unknown) in the environment	Possible	Moderate	Medium	**Low**

3.10 Social and economic

The construction of the project will be the result of a large capital expenditure by the ACT Government. According to the EIS, the project is expected to result in a range of economic benefits to the community which counterbalance the capital expenditure. As well as financial cost and benefits to the Government and community, there is the potential for the project to have impacts on social aspects of the community.

3.10.1 Potential social and economic impacts

The proponent commissioned a *Socioeconomic Impact Assessment* for the EIS. The risks associated with social and economic impacts identified in the scoping document and EIS are as follows:

- Impacts to local businesses from construction and operation of the proposal and restriction in access to premises.
- Removal of existing roadside memorials within road reserves and attached to trees to be removed to facilitate construction.
- Impacts on community during construction from matters such as noise, dust and visual impacts and contaminated lands/unexpected finds.
- Perceived barrier between communities split by the proposal.

3.10.2 Public comments

Sixteen representations received during the public notification period identified concerns relating to the social and economic impacts of the project. The issues raised in the representations are summarised below:

- Sharing of cost of infrastructure across the whole community, whilst service is only provided to a limited area.
- Concern over a lack of consultation regarding the project.
- Impacts on amenity and tourism from construction and site compounds in central Canberra.
- The EIS does not adequately consider social and economic impacts on other areas of the ACT.
- Concern that job creation figures skew the cost/benefit assessments as relatively few jobs will be created over the full operational timeframe of the project.
- Impacts of the project absorbing funding which could be used for other critical City infrastructure.
- Economic impacts on businesses from the removal of carparking in the City for a construction compound and financial impacts on customers at alternative parking facilities.
- Concerns over prudential use of government money after expenditure on carpark upgrades if sites are to be used for construction compound for duration of project construction.
- Cost impacts of lost time for private motor vehicles spending longer in traffic as a result of the project.

- Questioning of the appropriateness of the project on the basis that a whole of City light rail network would be cost prohibitive and that an alternative system would better integrate with the rest of the City at a more affordable cost.
- Costs to businesses from maintenance activities required due to project impacts.
- Concern over business impacts if taxes are imposed to subsidise the project, especially if applied only to project catchment.
- Need for communication strategies to share the health benefits associated with public transport usage.
- Suggestions for extension of the project to other locations/terminus or prioritising other routes to serve additional communities.
- Expressing the need for additional ongoing consultation with affected residents and businesses.
- Concern over the length of the EIS and its accessibility to the community and volunteer community organisations.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.10.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential social and economic impacts. These are summarised in **Table 20.**

Table 20: Avoidance and mitigation measures associated with social and economic impacts

Proposed avoidance or mitigation measures	Stage of implementation
Refinement of design to limit impacts on residences and businesses from access changes and construction compounds	Detailed design
Implementation of a business and landowner engagement plan to communicate and manage construction impacts	Prior to construction
Incorporation of safe and well signposted crossing points for the light rail lines and construction sites to limit severance of community	Detailed design and throughout construction
Engagement with National Rail Safety Regulator on construction and operational plans for the project	Detailed design and operation
Implement ongoing communication strategies with the community on construction activities and hazards. Maintain an easy to use website of construction activities	Throughout construction

Establishment and maintenance of a complaints process for affected parties. Maintaining a register of complaints received	Throughout construction and operation
Engagement with affected parties on the removal of memorials and cultural heritage items and establishing protocols for relocation or replacement at suitable times and location	Prior to construction
Implementation of measures as outlined elsewhere in the EIS to minimise impacts of dust, noise, disruption and pollution	Detailed design, construction and operation
Design of LRVs, tracks, roads and stops to maximise rail, road and pedestrian safety	Detailed design and operation
Conduct community education campaigns on appropriate safety measures when sharing the road and open space with LRVs	Prior to operation
Incorporation of public safety measures such as emergency buttons and video surveillance at light rail stops and on LRVs. Incorporation of crime prevention features in stop and LRV design. Regular reviews of safety procedures	Detailed design and operation
Undertake appropriate maintenance to ensure a safe and comfortable environment and operation of the project	Operation
Provision of temporary directional signage and business information where existing material is obstructed during construction	Throughout construction

The Construction and Operating Phase Environment and Sustainability Plans proposed for this project set out a framework for continuing management, mitigation and monitoring programs for the relevant social and economic impacts of the proposal.

3.10.4 Assessment of impacts and key findings

The authority considers that Capital Metro Agency has undertaken a detailed assessment of social and economic impacts associated with the project and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The social and economic impacts as required by the Scoping Document and assessed in the EIS are set out in **Table 21** below.

Table 21: Social and Economic risks as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Impacts to local businesses from construction and operation of the proposal and restriction in access to premises	Possible	Minor	Low - not potentially significant	*
Removal of existing roadside memorials within road reserves and attached to trees to be removed to facilitate construction	Almost certain	Minor	Very high	**High**
Impacts on community during construction from matters such as noise, dust and visual impacts	Likely	Moderate	High	**Medium**
Perceived barrier between communities split by the proposal	Possible	Moderate	High	**Low**

**A residual risk was not assessed in the EIS, the initial risk rating of low would not warrant specific measures. Mitigation measures have been identified to manage risks associated with impacts to local businesses including the provision of temporary signage, ongoing communication and engagement, limiting dust, noise and pollution and maintaining as much public carparking as possible*.

3.11 Utilities and services

The project is located within the built-up area of Canberra and has the potential to impact on a range of existing utilities and services. The construction of the project may require the relocation or upgrade of some services and cause disruption to supply.

3.11.1 Potential impacts identified for utilities and services

The proponent considered the impacts on utilities and services during the preparation of the EIS. The risks associated with utilities and services identified in the scoping document and EIS are as follows:

- Disruption to asset owner access to services and utilities.
- Damage to services and utilities during construction (including safety risks).
- Electrolysis corrosion risks caused by potential stray leakage currents from the rails into surrounding earth causing cause electrolysis corrosion of nearby buried metalwork.

The authority notes that works approval on designated land, within Northbourne Avenue, is a matter for the National Capital Authority. While the EIS documentation assesses impacts from the whole project, impacts along Northbourne Avenue associated with utilities and services are outside the scope of this Assessment Report.

3.11.2 Public comments

Five representations received during the public notification of the Draft EIS raised concerns relating to utilities and services. The issues raised are summarised as follows:

- Disruption of supply impacting on businesses and provision of compensation for unacceptable disruption.
- Relocation of major infrastructure such as gas main s and potential safety impacts on adjacent properties.
- Need for effective communication of disruption to service supply to affected properties.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.11.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential impacts on utilities and services. These are summarised in **Table 22.**

Table 22: Avoidance and mitigation measures associated with utility and services impacts

Proposed avoidance or mitigation measures	Stage of implementation
Development and implementation of a Utility Management Plan. The plan to include a list of services, investigations, design, approval, construction, testing and handover requirements and measures to be implemented in the case of encountering an unknown service	Detailed design and construction
Consultation with utilities services providers on potential relocations as required	Detailed design
Review of project design where conflict with utility services is identified to explore alternative design solutions	Detailed design
Incorporation of energy efficiency measures to reduce impacts on utility services	Operation
Implementation of design, prevention, maintenance and ongoing testing programs to minimise risk of electrolysis corrosions	Detailed design, construction and operation

The Utilities Management Plan proposed for this project sets out the framework for continuing management, mitigation and monitoring programs for the impacts of the proposal. This will be part of the broader Construction Environment Management Plan and is a key DA consideration.

3.11.4 Assessment of impacts and key findings

The Utilities Technical Regulator of the ACT identified the requirement for appropriate protection for utility services from electro-chemical corrosion caused by the project.

Telstra noted the potential for impacts on its assets and recommended further detailed investigation to determine the appropriate solution. Telstra noted the need for service to not be disrupted by the project construction.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of impacts on utilities and services and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The impacts on utilities and services as required by the Scoping Document and assessed in the EIS are set out in **Table 23** below.

Table 23: Risks utilities and services as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Disruption of supply impacting on businesses and provision of compensation for unacceptable disruption	Possible	Major	High	**Medium**
Relocation of major infrastructure such as gas mains and potential safety impacts on adjacent properties	Possible	Major	High	**Medium**
Need for effective communication of disruption to service supply to affected properties	Possible	Major	High	**Low**

3.12 Waste, energy and resources

Large quantities of materials will be consumed and waste generated by the construction of the project. In addition, the operation of the project may draw substantial amounts of electricity from the existing network. The consumption of materials and energy and the generation of waste have the potential to impact on the community and environment.

3.12.1 Potential impacts identified for waste, energy and resources

The EIS considered the impacts of the proposal on waste, energy and resources. The risks identified in the scoping document and EIS are as follows:

- Increased waste from infrastructure construction.
- Hazards from the disposal of construction waste potentially including contaminated/hazardous materials.
- Increased resource and materials demands for construction, reducing availability to the local community.
- Increased energy consumption from the manufacture of building materials and infrastructure.
- Increased energy consumption for the operation of the network.

3.12.2 Public comments

No issues relating to resources, energy and waste were raised by the community during the public notification period.

3.12.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential impacts on utilities and services. These are summarised in **Table 24.**

Table 24: Avoidance and mitigation measures associated with utility and services impacts

Proposed avoidance or mitigation measures	Stage of implementation
Construction activities will investigate opportunities, and where appropriate implement measures, to reuse or recycle construction and demolition materials	Detailed design and construction
A waste hierarchy will be implemented to inform the selection of materials and processes with priority of resource use as follows: avoidance -minimisation-reuse/recycling-disposal	Detailed design and construction
Implementation of best practice waste management measures on construction sites, such as recycling. Providing training to staff on reuse and recycling	Throughout construction
Refining designs to minimise resource use where possible	Detailed design
Treating waste water in accordance with applicable standards. Using appropriately licensed contractors to dispose of hazardous materials	Throughout construction
Maintaining site cleanliness and disposing of waste in accordance with approved plans and policies	Throughout construction

Setting performance targets for waste re-use and generation and monitoring performance against targets	Throughout construction
Sourcing local materials where possible to reduce resource consumption from transport of materials	Detailed design and construction
Managing stockpiles in accordance with best practice and plans of management. Storing hazardous materials in accordance with appropriate standards	Throughout construction
Provision of waste bins for passengers for disposal of general wastes	Operation
Providing recycling and re-use facilities at depots for use of staff and making arrangements for the recycling of materials from maintenance activities and track works	Operation
Storage and use of hazardous materials is to be in accordance with best practice or appropriate standards. Spill kits and clean-up plans are to be developed and kept in readiness	Operation

A Waste Management Plan will be developed as part of the Construction and Operating Phase Environment and Sustainability Plans proposed for this project sets out the framework for the management of relevant impacts relating to waste, resources and energy. These are key DA considerations.

3.12.4 Assessment of Impacts and key findings

The authority considers that Capital Metro Agency has assessed impacts to waste, energy and resources from the proposal and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The impacts on energy, waste and resources as required by the Scoping Document and assessed in the EIS are set out in **Table 25** below.

Table 25: Risks for energy, waste and resources as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Increased waste from infrastructure construction	Almost certain	Minor	High	**Low**
Hazards from the disposal of construction waste potentially including contaminated/hazardous materials	Almost certain	Minor	High	**Low**

Increased resource and materials demands for construction, reducing availability to the local community	Likely	Minor	Medium	**Low**
Increased energy consumption from the manufacture of building materials and infrastructure*	Almost certain	Minor	High	**Low**
Increased energy consumption for the operation of the network.	Almost certain	Moderate	Very high	**Low**

**The risk relating to the increase in energy consumption during the operation of the project is expected to be managed through the construction of traction power substations at several locations along the alignment. Consultation with the ACT electricity distributor has not identified any shortcomings in the electrical supply capacity that would affect the project or the community.*

3.13 Land use

The project will change the use of land along the alignment and in the depot location in some cases. The use of the land for light rail may in some cases limit the opportunity for some alternative uses in the future. However, in other locations the use of the land is incidental or ancillary to facilitate the light rail and will be able to be integrated into future land uses.

3.13.1 Potential impacts identified for waste, energy and resources

The EIS investigated the potential impacts associated with changes to land use. The risks identified in the scoping document and EIS are as follows:

- Impacts on public property including footpaths and other open spaces.
- Impacts on amenity and value of properties for short term during construction.
- Loss of public open space to project infrastructure and associated social impacts.
- Acquisition of private land for the project.

3.13.2 Public comments

Six representations received during public notification identified issues relating to land use. The issues that were raised are summarised as follows:

- Reduction in land value in locations not serviced by light rail due to comparative lack of benefits (whilst sharing costs).
- Slower growth in property values in areas not benefitted by light rail.

- Change of use of carpark in the City to a construction compound. It is noted that the carpark location on London Circuit is on designated land and is outside the scope of this Assessment Report and planning approvals by the planning and land authority.
- Changes to land use for the Northbourne Housing Precinct as facilitated by and supporting the project.
- Impacts on access to private properties.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.13.3 Avoidance and mitigation measures

The EIS commits to a range of measures to reduce impacts on surrounding land during construction including measures to limit noise, dust, vibration, lighting, and access among other impacts. The scope of the project is limited to Stage 1 of the Light Rail network. Future stages and public transport planning in other districts are outlined in *Transport for Canberra.*

3.13.4 Assessment of impacts and key findings

The authority considers that Capital Metro Agency has undertaken a detailed assessment of land use impacts associated with the proposal and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The impacts on land use as required by the Scoping Document and assessed in the EIS are set out in **Table 26** below.

Table 26: Risks land use as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Impacts on public property including footpaths and other open spaces	Likely	Minor	Medium	**Low**
Impacts on amenity and value of properties for short term during construction	Likely	Minor	Medium	**Low**
Acquisition of private land for the project	Almost certain	Minor	High	**Medium**

3.14 Climate change

Climate change has the potential to change the severity and frequency of risks related to the construction and operation of the project. Increases in the frequency of extreme events such as storms and heat waves are predicted under current climate change levels and are likely to increase further as anthropogenic effects deepen.

3.14.1 Potential impacts identified in relation to climate change

The proponent commissioned a *Climate Change Impact* Assessment for the project. The risks associated with climate change identified in the scoping document and EIS are as follows:

- Predicted increase in frequency, severity and duration of extreme temperature anomalies (Days exceeding 35°C).
- Predicted increased frequency and severity of extreme wind events.

Increases in temperature anomalies could cause track buckling and danger to LRV operations. Overhead wires will sag more in higher temperatures and have the potential to become caught on LRVs, other infrastructure or to interact with vegetation. The potential for and impacts of bushfires also increases in correlation with temperature. Higher temperatures would also impact on the ability of LRVs to maintain comfortable conditions and increase load on air conditioning units.

3.14.2 Public comments

No issues relating to the impacts of climate change on the public or community were raised by the community during the public notification period.

3.14.3 Avoidance and mitigation measures

A range of measures to reduce the project's contribution to climate change are included in the construction and operational plans including: use of local and recycled materials, using lower energy materials (such as fly-ash concrete), solar power in compounds and the depot, and the through the replacement of vegetation removed with new plants.

Public transport projects such as Capital Metro Stage 1, which will service a busy route, produce lower emissions and land use impacts than the equivalent private motor vehicles. This contributes to mitigating global scale risks associated with climate change.

The project implements a range of design and management measures to reduce the risk posed to the project under climate change scenarios. These have been outlined in other sections of this report and in the EIS documentation.

The Construction and Operating Phase Environment and Sustainability Plans proposed for this project sets out the framework for continuing management, mitigation and monitoring programs for the relevant risks to the proposal. These plans are key DA considerations.

3.14.4 Assessment of impacts and key findings

The authority considers that Capital Metro Agency has assessed climate change impacts from the proposal and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The impacts of climate change as required by the Scoping Document and assessed in the EIS are set out in **Table 27** below.

Table 27: Risks associated with climate change as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Predicted increase in frequency, severity and duration of extreme temperature anomalies (Days exceeding 35°C)	Possible	Major	High	**Medium**
Predicted increased frequency and severity of extreme wind events.	Possible	Major	High	**Medium**

3.15 Hazard and risk

There are a number of potential risks and hazards to the project and caused by the project.

3.15.1 Potential impacts identified for hazards and risk

The risks associated with hazards and risk identified in the scoping document and EIS are as follows:

- Injury or fatality due to undertaking construction works in close proximity to sensitive receivers (e.g. schools), major arterial/regional roads and highly pedestrianised areas.
- Potential impacts of Electric and Magnetic Fields resulting from the operation of the light rail, including potential impact to sensitive equipment along the alignment.
- Injury or fatality due to collisions between LRVs and pedestrians within highly pedestrianised areas.
- Injury or fatality due to collisions between road and LRVs at signalised crossings and locations where road traffic would be maintained adjacent to the Project.

3.15.2 Public comments

Six representations received during the public notification of the project raised issues relating to the risks and hazards associated with the project. The issues raised are summarised as follows:

- Additional risk to pedestrians due to median location of project requiring additional roads crossings to reach stops.
- Safety risks associated with relocation of major infrastructure, potentially closer to homes and businesses.
- Increase in localised flooding risk to homes and businesses from increased impermeability and from changed drainage patterns.

- Safety of proposed designs/operations to pedestrians and cyclists and the potential for conflicts with LRVs.
- Public safety during construction.
- Risks to horses and jockeys at Thoroughbred Park as a result of construction activities.

The issues raised during public notification were considered by the proponent and a response provided in the Revised EIS.

3.15.3 Avoidance and mitigation measures

The proponent has committed to a number of avoidance and/or mitigation measures in the EIS to minimise the potential impacts of hazards and risks. These are summarised in **Table 28.**

Table 28: Avoidance and mitigation measures associated with hazards and risks

Proposed avoidance or mitigation measures	Stage of implementation
Implementation of best practice construction management techniques in accordance with the Construction Environment Management Plan and its sub plans	Prior to and during construction
Road safety and awareness campaigns for the community to reduce the likelihood of collisions with LRVs	Prior to and during operation
Targeted consultation with operators of sensitive electronic equipment and implementation of feasible mitigation measures as required. Conducting maintenance of infrastructure as required	Detailed design and operation
Implementation of Operating Phase Environment and Sustainability Plan and associated sub plans as identified in the EIS and this report	Operation
Development of operating procedures and compliance with Office of the National Rail Safety Regulator for the safe operation of the project	Detailed design and operation
Cooperation between proponent and ACT Policing on crime and risk prevention measures	Operation

The Construction and Operating Phase Environment and Sustainability Plans proposed for this project sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the proposal. These plans are key DA considerations.

3.15.4 Assessment of impacts and key findings

TAMS noted that underground power supply to LRV's would reduce the risk to workers associated with frequent tree and overhead power supply maintenance activities.

The authority considers that Capital Metro Agency has assessed risks and hazards from the proposal and proposed a range of mitigation and management measures to reduce these impacts as far as practicable.

The impacts of risks and hazards as required by the Scoping Document and assessed in the EIS are set out in **Table 29** below.

Table 29: Risks and hazards as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Injury or fatality due to undertaking construction works in close proximity to sensitive receivers (e.g. schools), major arterial/regional roads and highly pedestrianised areas	Possible	Catastrophic	Very High	**Medium**
Potential impacts of Electric and Magnetic Fields resulting from the operation of the light rail, including potential impact to sensitive equipment along the alignment	Possible	Moderate	Medium	**Low**
Injury or fatality due to collisions between LRVs and pedestrians within highly pedestrianised areas	Possible	Catastrophic	Very High	**Medium**
Injury or fatality due to collisions between road and LRVs at signalised crossings and locations where road traffic would be maintained adjacent to the Project.	Possible	Catastrophic	Very High	**Medium**

3.16 Bushfire

The project has the potential to be impacted by bushfires. The project also has the potential to cause bushfire impacts on other areas through construction and operational activities.

3.16.1 Potential impacts identified for bushfire

Parts of the project area are located within a Bushfire Prone Area and therefore appropriate consideration for bushfire protection measures is required. In particular, the depot is proposed to be located on bushfire prone land. Capital Metro Agency has also considered the potential of land more generally to carry a bushfire toward or away from the project. There are a number of potential ignition sources from the project during construction and operation that have been considered in the EIS documentation.

3.16.2 Public comments

No representations raised concerns around bushfire.

3.16.3 Avoidance and mitigation measures

The proponent has committed to a number of mitigation measures in the EIS to minimise the potential bushfire impacts. These are summarised in **Table 30.**

Table 30: Mitigation measures for bushfire

Proposed mitigation measures	Stage of implementation
Site induction for contractors	Prior to construction
Maintain equipment properly	During project works
Meet all legislative requirements, including construction requirements for buildings in a bushfire prone area	Various
Develop an Emergency Management Plan	Prior to construction
Maintain asset protection zones where required by ACT Emergency Services Agency	Prior to works onsite
Trim trees and vegetation appropriately	Various
Hot works prohibited on days when a catastrophic fire danger has been declared	Throughout construction
Put in place appropriate protocols where hot works are required	Throughout construction
All vehicles and mobile plant will be fitted with fire extinguishers	Throughout construction
Regularly water retained vegetation during bushfire season	Throughout construction
Ensure appropriate site security	Throughout construction and operation
Landscaping at the stabling depot and maintenance facility would be designed in accordance with *Planning for Bushfire Protection Guidelines*	Prior to operation

The Construction and Operating Phase Environment and Sustainability Plans proposed for this project sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the proposal. These plans are key DA considerations.

3.16.4 Assessment of impacts and key findings

It is considered that the residual bushfire risks, taking into consideration the proposed mitigation measures, are low.

The Emergency Services Agency made a number of comments on the Draft EIS that were addressed in the Revised EIS. Following a meeting with the ESA and the Conservator, Capital Metro Agency made a number of changes to asset protection zones which are required within some areas of the project.

The authority considers that Capital Metro Agency has undertaken a detailed assessment of bushfire related impacts a range of mitigation and management measures have been proposed to reduce these impacts as far as practicable.

The impacts of risks and hazards as required by the Scoping Document and assessed in the EIS are set out in **Table 31** below.

Table 31: Risks to bushfire as defined in the EIS

Potential impact	Likelihood	Consequence	Risk	Residual risk
Potential impact of bushfires from areas adjacent to the alignment impacting on the operation of the Project.	Unlikely	Minor	Very low - not potentially significant	**Very low**

3.17 Environmental Management Plan

A Construction Environment Management Plan (CEMP) and Operational Phase Environment and Sustainability Plan (OPESP) will be developed and will set out the framework for continuing management programs for the relevant impacts of the proposal during construction and operation. These plans will also include provision for independent environmental auditing.

The CEMP would be endorsed by an independent certifier prior to the commencement of construction. An annual environmental compliance report will be prepared for approval by the independent certifier demonstrating that the project has complied with the CEMP.

The CEMP will include:

- mitigation measures to reduce impacts as far as possible;
- all relevant requirements and commitments in planning approval conditions;
- applicable legislative requirements;
- surveillance, monitoring, auditing and corrective actions;

- roles and responsibilities; and
- incorporate a complaints management system.

The CEMP will include a number of sub-plans including:

- Noise and vibration management plan;
- Dust and air quality management plan;
- Traffic management plan;
- Soil and water management plan;
- Hazardous materials management plan;
- Emergency management plan;
- Biodiversity management plan;
- Heritage management plan;
- Vegetation management plan;
- Spoil management plan;
- Utilities management plan;
- Contamination management plan;
- Water management plan
- Waste and recycling management plan; and
- Construction emergency response plan.

An Operating Phase Environment and Sustainability Plan (OPESP) will also be developed to outline measures and processes for the effective implementation of any ongoing environmental requirements during the operation of the project. This plan will also include a number of the sub plans mentioned above to ensure impacts are managed during the operational stage of the project as well as during the construction phase.

A CEMP and an OPESP are key DA considerations for any future DA/DA's.

4 DA Considerations

With consideration of the proponents draft and Revised EIS, the authority recommends a number of considerations that should be built into any future development approval for the project to avoid and mitigate adverse environmental impacts as outlined in **Table 32**.

Any development application related to the completed EIS will include consideration of the DA considerations.

The planning and land authority recommends regular and ongoing contact with key entities and agencies during all phases of the project, such as the EPA.

Table 32: DA considerations for the Capital Metro Light Rail Stage 1 project

No.	Condition contents	Endorsement/approval	Stage which approval required	Draft condition of approval
1	Construction Environment Management Plan	Various	Prior to construction, each relevant sub plan must be in place and endorsed prior to commencement of any works to which that sub plan relates. *For example, prior to any disruptions to traffic a Traffic Management Plan must be approved in writing by Territory and Municipal Services.*	The proponent must prepare a Construction Environment Management Plan that is endorsed by an independent certifier. The Construction Environment Management Plan must include the commitments made in the EIS, the Tree Replacement Strategy and a number of sub management plans that are endorsed by relevant authorities including but not limited to: • Noise and vibration management plan • Dust and air quality management plan • Traffic management plan • Soil and water management plan • Hazardous materials management plan • Biodiversity management plan • Vegetation management plan • Heritage management plan including unexpected finds protocol • Spoil management plan • Contamination management plan • Utilities Management Plan

				• Waste and recycling management plan • Construction emergency response plan • Water management plan which includes measures for erosion and sediment control where relevant and also ensures adequate drainage and runoff management for the proposed stabling depot and maintenance facility. This plan must recognise the requirement for licence approval of any proposal to source non-potable surface water for construction purposes and the requirement to obtain Waterway Works Licences for any work that involves work in a waterway (which includes any bridges built over water). The Construction Environment management Plan should build in measures for an independent consultant to monitor and audit construction works and report on these works regularly to key stakeholders, including the EPA.
2	Erosion and sediment control	EPA	Prior to and during construction	The design of erosion and sediment controls would be carried out in accordance with the Environment Protection Guidelines for Construction and Land Development in the ACT.
3	Site audit statement	EPA	Prior to commencement of construction works	Prior to the commencement of construction works the Environment Protection Authority must review and endorse in writing the auditor's site audit statement and report into the adequacy of the assessment and proposed management of contamination issues along the proposed route.

4	Business and landowner engagement	EPD	Prior to and during construction	Minimise impacts to private properties as much as possible. Develop and implement a business landowner and engagement management plan to be implemented during construction of the project.
5	Crime prevention through environmental design	EPD	During detailed design	Ensure that adequate crime prevention through environmental design measures are incorporated into the light rail design.
6	Heritage considerations	ACT Heritage Council	Prior to construction in relevant areas	The following must be met prior to construction in relevant areas: • Arborist advice is sought for the protection of trees during the construction phase located within the 'Trees of the former CS & IR Experiment Station' and 'Haig Park' heritage areas. This advice is to be provided for advice and review by the ACT Heritage Council prior to the commencement of works in both these areas. Significant impact to identified heritage values within these areas may require the approval of a Statement of Heritage Effect under Section 61H of the *Heritage Act 2004* prior to the commencement of works. • Permanent project infrastructure is to be designed to avoid any substantial impacts on the views to City Hill from Northbourne Avenue. Further information on project infrastructure is to be provided for Council review and advice prior to the commencement of works in this area.

				• Further archaeological investigation (subsurface testing) is required within the Gungahlin construction compound and the stabling depot and maintenance facility site, prior to the commencement of works in these areas. Prior to such investigation, Excavation Permit approval under Section 61F of the *Heritage Act 2004* is to be obtained. Should archaeological investigation identify that Aboriginal places or objects would be impacted by proposed development, Statement of Heritage Effect approval is to be obtained prior to the commencement of works. • Further information will be required to inform and support the assessment of the Gungahlin construction site (Block 1, Section 230, Gungahlin) as a potential archaeological deposit, given the predictive archaeological model presented in GLM (2015) and the prior assessment of this area by Biosis and RAO's (in 2012) as being of low archaeological potential. This information should be provided to the Council in the Excavation Permit application to be prepared in accordance with Section 61E of the *Heritage Act 2004.* • The 'Unexpected Finds Protocols' presented in GML (2015) and Parsons and Brinkerhoff Australia (2015) are to be amended to include Council notifications in accordance with Section 51 of the *Heritage Act 2004,* and where project impacts to additional heritage places or objects are identified, approval is to be sought from the Council in accordance with Section 76 of the *Heritage Act 2004* prior

				to the commencement of works.
7	Greywater treatment	Department of Health EPD	Prior to construction of relevant structures	If a greywater treatment system or rainwater tanks are proposed the system/s must comply with the *Public Health Act 1997* and with the *rainwater Tanks Guidelines 2010.* Treated greywater plumbing and irrigation systems or any rainwater tank taps must be clearly and appropriately labelled.
8	Tree Replacement Strategy	TAMS	Prior to construction	A tree replacement strategy is to be agreed with TAMS and reflect landscape plan approvals from the DA. The Strategy will outline; the timing for replacements, species selection, size of stock, planting technique and ground preparation, maintenance, and replacement in the event of damage or death of a tree.
9	Operating Phase Environment and Sustainability Plan	Various	Prior to operation	The proponent must prepare an Operating Phase Environment and Sustainability Plan prior to operation of the proposal. The Operational Environment Management Plan must include the commitments made in the EIS, and a number of sub management plans that are endorsed by relevant authorities including but not limited to: • Noise and vibration management plan, including noise mitigation measures to ensure that substations at all locations will meet noise goals • Carbon and Energy Management Plan • Water Management Plan • Waste and Recycling Management Plan

				• Vegetation Management Plan • Heritage Management Plan • Landscape Maintenance Plan
10	Community Education Program	TAMS	Prior to operation	A program is to be developed and implemented to educate the community on changed traffic arrangements and safe interactions with LRVs.
11	Community complaints and information register	EPD	Detailed design through operation	The Proponent is to implement a complaints and feedback service for the community. Contact information is to readily available at construction compounds and on construction hoardings. A register of complaints made by the public and incidents causing harm to the environment during construction is to be maintained by the Proponent. Responses to issues raised are to be recorded. A summary report is to be provided to EPD on a regular basis from the DA decision.

5 Other ACT considerations

5.1 Ecological Sustainable Development Principles

The following ecological sustainable development principles have been considered in the EIS documentation. It is considered that economic, environmental, social and equitable considerations are contained within the EIS documentation and inform decision making through the implementation of the following principles:

- *The precautionary principle*

The proponent has considered the precautionary principle in the preparation of its EIS. The planning and land authority has also considered the precautionary principle in preparing this assessment report.

The precautionary principle can generally be summarised as where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In this case it is reasonable to contend from the EIS that there are no threats of serious or irreversible environmental damage arising from the project. Accordingly, the precautionary principle is not enlivened in the first place.

However it is considered that the EIS presents a thorough assessment of impacts with supporting studies and that a precautionary approach has been taken wherever relevant in relation to project impacts. This is reflected in the assessment of the worst case scenario for a number of project impacts.

- *The principle of inter-generational equity*

The proposal has given consideration to the health, productivity and diversity of the environment for the benefit of future generations. The proposal will have a positive effect on carbon emissions and provide improved access and modes of travel for future generations.

- *The conservation of biological diversity and ecological integrity*

The proposal has considered the conservation of biological diversity and ecological integrity through a detailed assessment of environmental impacts and application of avoidance and mitigation measures. Advice was also received from the Conservator for Flora and Fauna and has been considered within this Assessment Report.

- *Appropriate valuation and pricing of environmental resources*

As noted above environmental issues have been considered in detail in the EIS documentation and the project will have a positive impact on the carbon footprint.

5.2 Statement of Strategic Directions

The statement of strategic directions recognises that the ACT must be planned as both the setting for the National Capital and as a self-governing community in its own right. The

statement also has a focus on principles for sustainable development relating to environmental, economic and social sustainability as well as spatial planning and urban design principles.

Some of the key principles in the statement of strategic directions include integrated land use and transport planning, Canberra's role as the national capital, ease of getting around the City, vibrant centres, economic investment and growth, the needs of people with disabilities, promoting commercial and retail activity, high density development near major centres that are well served by public transport and development to encourage the use of public transport.

The EIS documentation is considered to be consistent with the statement of strategic directions in the Territory Plan. Relevant principles have been considered both specifically in the EIS documentation and more broadly throughout the EIS.

6 Recommendation

Having regard to the documentation and information provided, the authority has assessed the Capital Metro Light Rail Stage 1 draft and Revised EIS as meeting the requirements of Chapter 8 of the PD Act.

It is the authority's assessment that the draft and Revised EIS has provided sufficient information to the ACT Government and the community to allow an informed evaluation of potential environmental impacts which could be attributed to the Capital Metro Light Rail Stage 1 proposal.

Capital Metro Agency has proposed a range of avoidance, mitigation and management measures to reduce potential environmental impacts arising from construction and operational activities associated with the project. It is considered that any potential adverse impacts can be adequately addressed by implementing these measures and the development application considerations specified in this report.

The influence of construction activity associated with the Capital Metro Light Rail Stage 1 project, and the subsequent environmental performance attributable to its ongoing operation, will be monitored by a variety of public agencies and an independent auditor.

The authority's recommendation is that the Minister need take no action in relation to the EIS. The Minister may however, decide to present the EIS to the Legislative Assembly. This action does not affect an EIS being complete in accordance with section 209 of the PD Act.