



Australian Government
National Capital Authority



CONSULTATION REPORT

Works Approval No 20277

LIGHT RAIL – STAGE 1
(Federal Highway and Northbourne Avenue)

April 2016

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Introduction

Under the *Australian Capital Territory (Planning and Land Management) Act 1988*, the National Capital Authority (NCA) prepares and administers the National Capital Plan (the Plan) to ensure Canberra and the Territory are planned and developed in accordance with their national significance.

The Plan sets out the broad planning framework for the Australian Capital Territory (ACT). Areas designated as having special characteristics of the National Capital are subject to detailed planning policies and guidelines.

Any buildings or structures, demolition, landscaping or excavation works in Designated Areas require the approval of the NCA. The NCA considers such proposals in the context of the relevant provisions of the Plan.

On 10 February 2016 the NCA received a Works Approval application from the Capital Metro Agency (CMA) for proposed works associated with the construction of a light rail network along the Federal Highway/Northbourne Avenue corridor between Flemington Road and Alinga Street. The application also includes proposed work on Block 13 Section 63 City for a temporary site compound. CMA is seeking approval for a range of works as part of Works Approval application (WA20277) including:

- » Demolition/removal of all existing infrastructure within the Northbourne Avenue and Federal Highway medians (the medians)
 - » Earthworks
 - » Removal of trees and other soft landscaping within the medians.
 - » Removal of trees within the Federal Highway /Northbourne Avenue verges, north of Antill Street.
 - » Installation of approximately 5.4 kilometres of embedded rail tracks and concrete trackform within the medians.
 - » Installation of soft landscaping including trees within the medians and verges
 - » Construction of new road pavement and road intersections.
 - » Temporary site compound on Block 13 Section 63 City.
- » Demolition of infrastructure within the Federal Highway and Northbourne Avenue road reserves, north of Antill Street

The following works will be the subject of separate applications:

- » architectural and furnishing detail of the stops and any other associated infrastructure
- » overhead wires and poles infrastructure
- » mid-block crossings within the Northbourne Avenue median and the associated landscaping, south of Antill Street
- » lighting
- » signage
- » drainage
- » utilities and services
- » new and relocated traffic signals
- » traffic control devices
- » tactile ground surface indicators
- » relocated bus shelter infrastructure
- » works associated with construction and environmental management this includes temporary hoarding, fencing, sediment and erosion control works and signage
- » details of new pedestrian and cycle paths north of Antill Street
- » works associated with temporary traffic management.
- » any other works not listed above but fall within the definition of works as described in the *ACT (Planning and Land Management) Act 1988*.

The location of the subject site is at Attachment A.

The current application (WA20277) was the subject of community consultation. A public information session was held on 1 March 2016. Approximately 40 people attended the information session which was held at the Theo Notaras Cultural Centre. A presentation was made by the Chief Planner, Andrew Smith, and attendees were invited to ask questions. A range of questions were asked about the need for light rail, the removal of existing trees and establishment of new trees, impacts on traffic and existing intersections, and the integration of the rail network with the existing bus service.

The following report details the public consultation process undertaken by the NCA relating to this application.

Public Consultation Requirements

1.1 National Capital Plan

Under the Plan, the requirements for public consultation apply, but are not limited to, certain residential developments, telecommunications facilities (that are not considered low impact) and amending or issuing an instrument under the Plan (including Development Control Plans).


1.2 Commitment to Community Engagement

The NCA's 'Commitment to Community Engagement' details how the NCA conducts consultation. The purpose is to achieve a greater level of consistency and transparency in the NCA's decision making process. The Commitment to Community Engagement describes:

- » the minimum requirements for consultation
- » the timeframes for amendments to the Plan
- » what is involved in preparing a new Development Control Plan
- » the process for amending or issuing an instrument under the Plan
- » the process by which WA applications, which are released for public consultation, will be assessed.

Part 2 - Consultation of the NCA's 'Commitment to Community Engagement' describes the consultation process for WA applications. The NCA will make an assessment of whether a proposal is consistent with the National Capital Plan and if it requires public consultation. An assessment is made in relation to adverse impacts on:

- » public space and community amenity
- » environment, heritage or landscape values
- » amenity of the locality in terms of materials, finishes, scale, massing, design and quality
- » consistency with an existing Heritage Management Plan.



When an application for works is lodged and consultation is required, consultation with the community and stakeholders will be undertaken by the applicant, the NCA or both. Where consultation is undertaken by the applicant, the NCA may choose to stipulate specific requirements that the applicant is required to implement.

The NCA may set aside the requirement to undertake full public consultation where:

- » previous consultation has been undertaken on the proposal
- » minor amendments to previously approved works are required
- » proposals are given exemption, as outlined in Part 2.3 of the 'Commitment to Community Engagement'
- » the NCA determines no stakeholders will be affected.

Public consultation was undertaken on the application as the proposal was considered to have a potential impact on public space and community amenity, environment, heritage and landscape values, amenity of the locality in terms of materials, finishes, scale, design and quality.

Summary of Public Consultation

2.1 The public consultation process

Public consultation was undertaken by the NCA in the following manner:

- » the NCA wrote to adjoining lessees advising of the consultation process and invited comments
- » on Wednesday 17 February and Saturday 20 February 2016, the NCA published a public notice in The Canberra Times detailing the proposed works and inviting submissions to be made to the NCA in relation to the proposal ([Attachment B](#))
- » between 18 February and 18 March 2016, the NCA published details of the proposal on the NCA's website
- » between 18 February and 18 March 2016, the NCA placed A1 size signs along Federal Highway and Northbourne Avenue
- » on Tuesday 1 March 2016, the NCA held a public information session
- » the NCA referred the application to ACT Government entities including; Emergency Services, Heritage Council, Environment Protection Authority, and Conservator of Flora and Fauna Liaison, ACT Policing, Environment and Planning Directorate & the Territory and Municipal Services Directorate.

Sixteen (16) written submissions were received by the NCA. An assessment of the issues raised in the submissions and an NCA response is contained in the Consultation Report ([Attachment C](#)).

The NCA also received advice from the following ACT Government entities:

- » ACT Emergency Services Agency
- » ACT Policing
- » Conservator for Flora and Fauna
- » Environment Planning Directorate
- » Environment Protection Authority
- » ACT Heritage Council
- » Territory and Municipal Services Directorate

Subject to the Authority's agreement, the Consultation Report will be published on the NCA's website for public access.

2.2 Submissions Received, Comments and Response

The NCA received a total of sixteen submissions on the proposal within the public consultation period. Fifteen submissions raised issues or objections in relation to proposal. One submission was received in support of the proposal. Emails of acknowledgment were sent to all submitters advising them that their submissions would be taken into consideration before a decision is made on the application. A late submission was received from Yowani Country Club who indicated their in principle support for the light rail network.

Key issues raised in the submissions of objection were:

- » that the proposal does not demonstrate design excellence
- » that the use of the median for light rail is not supported and that light rail on the kerbside should be considered
- » the removal of trees
- » the perception of an inappropriate planning process for the whole of the proposed light rail project
- » the impacts from construction
- » the cost of the proposed works
- » consideration of other transport options eg buses, driverless cars
- » perceived inconsistency with policies and principles of the National Capital Plan

- » impact from the changes to the Northbourne Avenue service road
- » impacts on road intersections
- » changes to access arrangements for the Lyneham Sports Precinct
- » an increase in traffic congestion.

Key issues raised in the submissions of support were:

- » General support for a light rail system as public transport system.

In addition to the formal submissions received, nine people provided comments on the NCA's website. Five people clearly indicated their support for light rail, while two people indicated that they did not support the proposal. The general comments of an additional two people did not clearly specify their position on the proposal.

Those in support of the proposal are of the view that Canberra needs light rail and that it will create a far more liveable city. One person in support raised concerns about the overhead wiring and whether it was required. Those not in support of the proposal were concerned about the cost and lack of electoral support.

A response about overhead wiring is addressed in the Consultation Report at [Attachment C](#). The cost and lack of electoral support are not matters for consideration by the NCA.

Conclusion


The NCA's consultation process was carried out in accordance with the Plan and the NCA's 'Commitment to Community Engagement (February 2015)'.

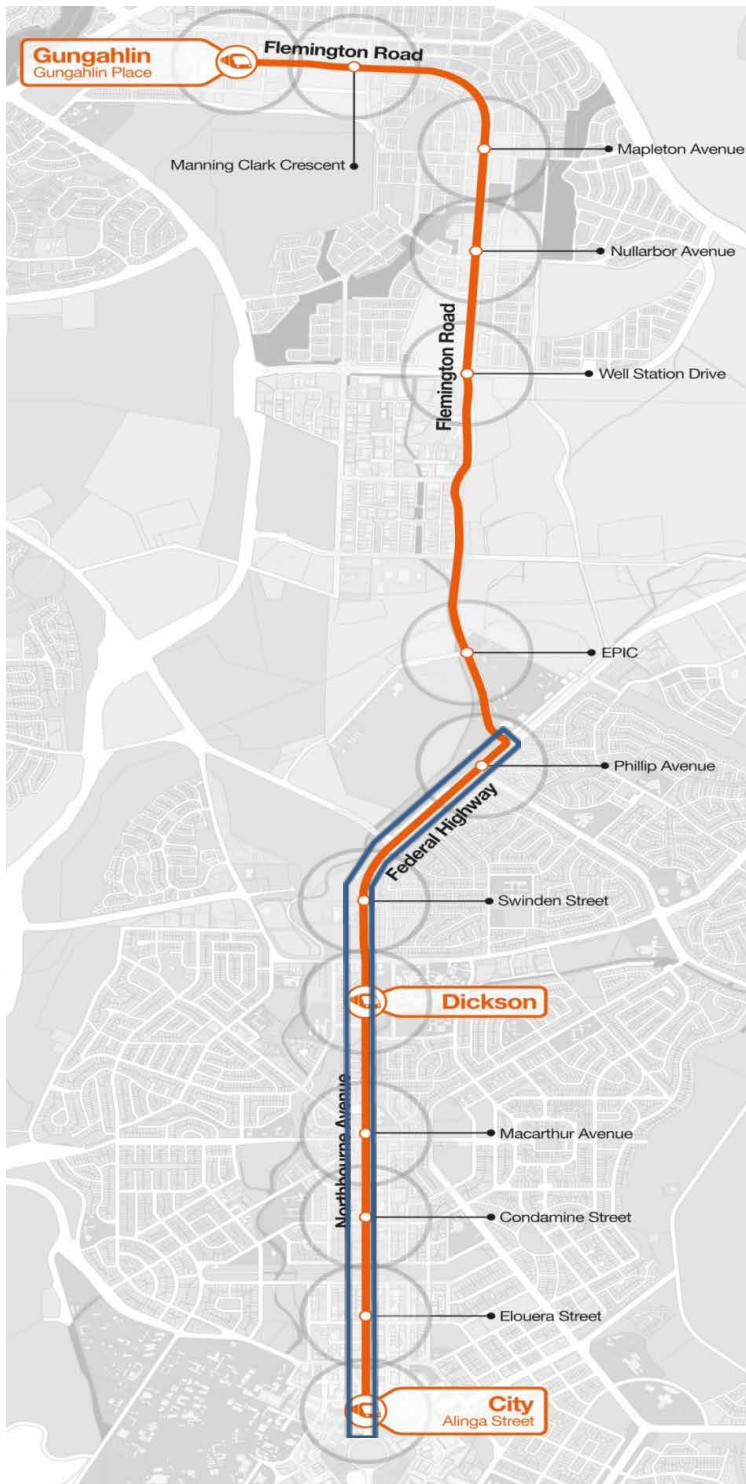
The NCA has assessed issues raised by submitters and has taken these issues into account as part of the assessment process.

The NCA considers that the proposal is not inconsistent with the provisions of the National Capital Plan. The Delegate intends to approve the works with the requirement that further Works Approval applications are submitted including detailed drawings for the station stops and associated infrastructure, drainage, electrical conduits, overhead wiring infrastructure, lighting, signage and temporary works associated with construction, such as construction environment management plans and temporary traffic management.

Attachment A

Location of the Light Rail route

Key:  - Area of light rail route within the Designated Area



Attachment B

The Canberra Times Public Notice



Australian Government
National Capital Authority

WORKS APPROVAL

OPEN FOR PUBLIC CONSULTATION

Federal Highway and Northbourne Avenue
(between Alinga Street and Flemington Road) &
Block 13 Section 63 City

Capital Metro Agency: Stage One – Light Rail Network

A Works Approval (WA) application has been submitted to the National Capital Authority (NCA) by the Capital Metro Agency. This application relates to proposed works along the Federal Highway and Northbourne Avenue corridors, between Alinga Street and Flemington Road, and construction compound on Block 13 Section 63 City.

Works under consideration include but are not limited to light rail tracks, hard and soft landscaping (including the tree removal and replacement program) and road/site works.

The plans and supporting documentation for this WA application can be viewed at the NCA's website.

A public information session will be held by the NCA on this application:

Date: Tuesday, 1 March 2016

Time: 6.00 pm

Where: Theo Notaras Multicultural Centre, 2nd Floor, North Building, 180 London Circuit, Canberra City

RSVP: lightrail@natcap.gov.au or (02) 6271 2888

The NCA welcomes community feedback on this application from Thursday, 18 February until COB, Friday, 18 March 2016.

Submissions can be made on the NCA's website, via email to lightrail@natcap.gov.au or GPO Box 373, Canberra ACT 2601.

Please contact the NCA for further information on (02) 6271 2888.

www.nationalcapital.gov.au

Attachment C

Summary of submissions and NCA Response

The National Capital Authority (NCA) undertakes an open and transparent works approval application process. As part of this process the NCA prepares a Consultation Report for publication on the NCA website, which includes a summary of each submission, along with the name of each person making the submission. Names of submitters have been omitted where a submitter requested confidentiality.

Submission	Issue	NCA response
1 – Ben Esguerra		
	The submitter expressed his support for the project.	Noted. The National Capital Plan identifies Northbourne Avenue as a multi-use boulevard providing a corridor for public transport.
2 – Bryn Challis		
	<p>The submitter raised issues regarding the location of substation TPS6 which is located near Macarthur House, Lyneham and is proposed to be located partly into the verge of Northbourne Avenue. The submitter identified a number of impacts as a result of locating the substation in the proposed location. These included the impact on the existing footpath, the street trees, disruption to the formal geometry of the corridor and it being visually obtrusive located close to the road with no room for screen planting.</p> <p>The submitter noted that there appeared no good reason for the protrusion into the verge and suggested that it be located further back into the MacArthur House carpark. The submitted further noted that such a substantial building should be set back 10 metres from the boundary, like every other building along Northbourne Ave.</p>	<p>The applicant has amended the plan to remove Substation TPS6 from the location as shown on Drawing No. 10-700-RD-1262 which was available for viewing during the public notification period.</p> <p>The substation will be located outside the Designated Area.</p>
3. Penleigh Boyd		
	<p>The submitter objected to the proposed light rail for a number of reasons. The submission was detailed and included images (Attachment D).</p> <p>In summary the submitter raised the following issues:</p> <ul style="list-style-type: none">» that Canberra demonstrate, to the nation and the world, excellence in design and that Stage 1 Light Rail Network did not demonstrate this required excellence.	<p>As required by the <i>Australian Capital Territory (Planning and Land Management) Act 1988</i>, the object of the National Capital Plan (the Plan) is to ensure that Canberra and the Australian Capital Territory are planned and developed in accordance with their national significance.</p> <p>Given the complexity and scale of the light rail project, the works required to be assessed by the NCA will be done through a series of Works Approval applications however the proposition of a light rail system along the Federal Highway and Northbourne Avenue corridor has been considered as part of this first works approval application (WA20277).</p> <p>At the strategic level, the Plan's General Policy Plan – Metropolitan Canberra (Figure 1) provides for a Inter-Town Public Transport System from the City to Gungahlin with a route along Northbourne Avenue, Federal Highway and Flemington Road. The proposal is consistent with the General Policy Plan.</p>

Submission	Issue	NCA response
	<p>» the light rail network in the Spanish city of Bilbao is an example of a normal “world standard” for good practical urban design. The current Works Approval documentation promises neither.</p>	<p>The application has also been assessed as consistent with the general policies (derived from The Griffin Legacy Propositions) which form a basis for planning and urban design decisions for the Central National Area, its landscape setting and approaches. The proposal reinforces the main avenues by: realising Northbourne Avenue as a multi-use boulevard providing a corridor for public transport; preventing the Central National Area from being overwhelmed by through traffic and; providing a public transport system that reduces car dependency.</p> <p>The Griffin Plan proposed a model streetcar city. Griffin’s network of Main Avenues is direct and efficient, providing lines for ‘rapid transport’ (Griffin’s term). The Griffin Legacy published in 2004 states that <i>‘Canberra was designed by Griffin as a city of boulevards – Main Avenues. The avenues, at sixty metres wide (two to three times wider than typical main streets in other Australian cities) are generous for a number of reasons: they are designed to cater to the inevitable growth of traffic associated with mature cities; they have a grandeur contributing to a prestigious architectural setting; they carry up to two lanes of arterial traffic in each direction and tram lines which, with growth, can be converted to an underground metro system; they contain space for major tree plantings (as many as eight rows) for ornamental effect as ‘parkways’, and for ventilation, climate and dust amelioration’.</i></p> <p>The Griffin drawing <i>‘Canberra – Typical Highways, 1917’</i> indicates Griffin’s intent for the central median on highways and avenues to be used for park and tramway.</p> <p>Detailed Conditions of Planning, Design and Development for Main Avenues and Approach Routes are set out in Section 2.2 of Chapter 2 of the Plan. This section provides that road pavements, medians, footpaths and verges are to be developed to consistently high standards. This section also provides that the Main Avenues and Approach Routes are to be developed and maintained as high quality landscaped corridors.</p> <p>An Urban Design Handbook was developed by CMA in consultation with the NCA to clearly articulate expectations with regard to the design outcomes within the corridor. The handbook recognises that the light rail traverses places, landscapes, streets and precincts of national, territory and local significance and the design outcomes have responded to these appropriately.</p> <p>The distinct landscape characters of the Federal Highway and Northbourne Avenue have been recognised in the proposal. Northbourne Avenue will retain its character as a tree lined boulevard whilst the Federal Highway will retain its bush like qualities.</p> <p>The NCA has continued to work with the applicant to further refine the landscape detail and reinforce the landscape experience along these two sections of roads. The existing character of the Federal Highway is defined by a random mix of native and exotic species. Plans have been amended to include a significant number of additional native trees within the verges.</p>

Eucalyptus Manniferas are proposed to be planted in a couple of locations within the median north of Antill Street where the median width allows for trees. This inclusion will provide an appropriate introduction of the species choice for the tree lined median of Northbourne Avenue, south of Antill Street.

The understorey landscape for Northbourne Avenue will be an urban meadow of native planting made up of bands and layering of wildflowers. The landscaping will provide a natural barrier to prevent pedestrians/cyclist crossing the track at non-designated locations.

Mid-block crossings for pedestrians and cyclists have been provided along Northbourne Avenue. The applicant has proposed a soft landscaping design solution and this is considered to be a high quality design outcome. Further refinement of the design of the mid blocks is required by the NCA, and these details will be provided in a separate Works Approval application.

Materials such as exposed aggregate concrete (Benchmark: Australian War Memorial) and granite pavers are proposed to be used for pedestrian pavements. These are considered to be high quality and durable materials.

An embedded track will be used for the entire length of rail track along the Federal Highway and Northbourne Avenue and the track is set within an in-situ exposed aggregate concrete pavement (buff colour).

Further approval will be required for the overhead wiring and associated infrastructure, architectural detail of the station stops and furnishings. High quality design outcomes in line with the principles and policies of the Plan will be required.

The NCA notes the submitter's comments about the Bilbao light rail. It is also noted that the design of the Bilbao light rail included a grass treatment between the tracks. The NCA understands that a number of trackform treatments, including grassed tracks, were considered by Capital Metro Agency in developing a reference design and the project requirements. The reference design highlighted that an integrated landscape design solution for the median is required, considering the tree planting, trackform, understorey planting and paving.

CMA's project requirements did not prescribe a particular trackform and landscape design solution and instead specify performance requirements that the design solution would need to meet. This has allowed Canberra Metro, as the preferred bidder, to develop the design that has been provided as part of the works to be assessed by the NCA.

The National Capital Plan recognises the unique characteristics of the main approach into Canberra which is different to other cities around the world. Accordingly the design response provided has responded to the opportunities that the wide median of Northbourne Avenue provides to create a high quality landscape befitting of the Capital whilst balancing requirements for ongoing maintenance.

Submission	Issue	NCA response
	<p>The submitter objects to the proposal to run the light rail on Northbourne Avenue's median strip.</p> <p>The submitter provides some suggestions of how to overcome the objection. These are stated below:</p> <ul style="list-style-type: none"> » a better concept, more suited to Canberra's existing stage of urban growth, is to run the light rail on the road. This option does not seem to have been explored. The submitter outlines his view of the advantages of kerbside track position. » running the light rail on the road is apparently proposed for future light rail links between Civic and Russell. An on-road light rail track location is thus acceptable in principle to the light rail network proponents. 	<p>The NCA is required to assess a Works Approval application for consistency with the National Capital Plan (the Plan). CMA has made an application for a light rail system within the median. The proposal is not inconsistent with the National Capital Plan. The Works Approval process does not provide for the NCA to consider other options.</p> <p>The applicant has advised that as part of the design process, the alignment of the tracks within the corridor was investigated to identify the best option. This built on previous studies and consultations held in 2012 that looked at both kerbside and median alignments. The project team looked at the pros and cons of locating the tracks in the median (centre of the road) or on either side of the road or within the road lanes. Through this investigation, the median alignment was proposed as the preferred alignment as it:</p> <ul style="list-style-type: none"> » aligns with the Griffin plans for Canberra which allowed wide medians for rail transport » retains the current traffic capacity and creates the least disruption to traffic » has less direct impact on access for businesses, facilities and residents on either side of the road » removes the need to widen intersections that are already taking up a significant area (such as the intersection of Antill Street and Northbourne Avenue in Dickson) » supports the ability to provide prioritisation for light rail services without significant changes to current traffic light operation. <p>In addition when light rail operates in traffic lanes it can complicate the turning movements at each intersection and create a higher level of uncontrolled traffic and rail interaction. There is already a wide median for the majority of the corridor, which provides significant construction and operational benefits.</p> <p>The current works under construction on Constitution Avenue include a dedicated bus lane and should light rail proceed this lane will be removed and the light rail track will be located adjacent to the median. Due to the differing road geometry and urban setting, different design solutions are considered appropriate in different settings.</p>

Submission	Issue	NCA response
	<p>The submitter notes that the Works Approval documentation indicates that more than five hundred healthy trees on Northbourne Avenue are proposed to be removed and is of the view that the NCA is the custodian of these trees and can insist on the protection of trees in the nationally significant areas which it controls. The submitter further comments that the NCA needs to insist on a better design solution.</p>	<p>Since planting commenced on Northbourne Avenue in 1921 the plantings have undergone substantial changes and the avenue has experienced a regular renewal of its landscaping. The current plantings are the third set used to provide a sense of progression and arrival along the route.</p> <p>The relative health of existing trees is detailed in a Tree Assessment presented as part of the Works Approval documentation. The ACT Government has undertaken a number of assessments in recent years that demonstrate a general decline in the health of the existing <i>Eucalyptus elata</i> within the median. The ACT Government will be required to replace the existing median planting regardless of implementing light rail. The NCA has recently approved the removal of 42 trees within the Northbourne Avenue for safety reasons.</p> <p>Direct impact to existing median trees is unavoidable due to the construction requirements of the project, balanced with minimum road design requirements (e.g. operational lane configurations and widths) in conjunction with allowances for service relocations, and minimising safety risks associated with the operation of light rail such as provision of adequate clearances for Light Rail Vehicles, overhead wires and other infrastructure.</p> <p>The landscape solution is to replace the <i>Eucalyptus elata</i> with <i>Eucalyptus mannifera</i> in two staggered rows on either side of the trackform. The trees will be planted at a height of approximately 4 metres and although there is no definitive timeframe for when the planted manniferas will reach maturity, it is generally understood that Eucalyptus can grow at a rate of between 1 to 2.5metres each year given the right conditions. On this basis, and recognising that <i>Eucalyptus mannifera</i> is considered mature at heights of between 10-20m, it is expected that the planted trees will be approaching maturity within 10 to 15 years from establishment.</p> <p>The NCA recognises that the landscape character of Northbourne Avenue will change in the short to medium term as the trees are removed and replaced. The NCA also recognises it was part of Griffin’s plan that the medians be use for the provision of public transport (tram), and this proposal builds on this planning principle whilst creating an opportunity for the ACT Government to renew trees which are already in decline.</p> <p>Canberra Metro has proposed a strategy whereby fewer trees are removed during the initial construction stages without significantly impacting construction activities. This will minimise the visual impact of tree removal during construction.</p> <p>Canberra Metro proposes to undertake construction activities in four stages which will allow existing trees to remain in place. The construction period between the last tree removal and the re-instatement of the trees is currently anticipated to be a maximum of just over three months.</p>

Submission	Issue	NCA response
	<p>The submitter recommends that the NCA should request an independent comparative study of the two options: median strip location versus on-road location. The NCA should not make any decision on The Stage 1 Light Rail Network Works Approval documentation until receipt and assessment of this independent comparative study.</p>	<p>The NCA is required to assess a Works Approval application for consistency with the Plan. CMA has made an application for a light rail system within the median. The Works Approval process does not provide for the NCA to request a comparative study as requested.</p> <p>However the applicant has advised that a comparative study has already been undertaken. Through this process a median alignment was found to be preferable as it required fewer modifications to intersections, would reduce access issues to business, residential and commercial uses on the corridor during construction and will cost less than other options. A median alignment will make use of centralised stop and system infrastructure which will be more cost effective than duplicating stops and shelters on either side of the road.</p>

4. Ted Streatfield

The submitter has made a submission on behalf of the Capital Executive Apartment and objects to the proposed application on the following grounds:

The proposal is disjointed due to being separated from the Development Application (DA) required for the works on other than designated land.

The proposal seeks approval for part of a modification to Masson Street diagonally across from 1-18 Braddon. This along with a host of other modifications is part within designated land controlled by the National Capital Authority (NCA) and part within the Territory Plan controlled by ACTEPD. This creates a situation where one approval gives precedence over the other and as the EPD DA decision has been made there is undue pressure on the NCA to match the decision despite any difficulties with the design or concept. Now that the DA is approved for works that abut the designated land the NCA will be obliged to approve those works regardless of any adverse considerations.

We object to the fact that the works approval on Northbourne Avenue has not been sought at the same time as the DA on Territory Land. This incongruence places pressure on another authority to approve the same works as a given rather than as a properly assessed outcome. Also the NCA has the more important role in ensuring that the development is the best possible outcome for Northbourne Avenue and the city of Canberra.

Objection noted however the NCA can not control when applications are made to either itself or the Environment and Planning Directorate (EPD). The NCA recognises that the proposed light rail proposal presented a unique situation where sections of the same development were located in areas managed by both planning authorities.

The existing legislative framework for the NCA and the ACT Government also allows each planning authority to consider proposals at different levels of design development. The NCA requires considerable more design development to have occurred before a Works Approval application can be lodged. There is no legislative provisions that require applications that sit over the two planning jurisdictions areas to be lodged concurrently.

The NCA considers each Works Approval application on its merits and whilst it was consulted about the Development Applications, it does not allow the decisions of the ACT Government to prejudice its decision making processes.

Submission	Issue	NCA response
	<p>My clients consider that the cost and inconvenience created by the installation of light rail will not create sufficient benefit to the community or the businesses affected by the construction works along Northbourne Avenue particularly to the CEA and to the Haig Restaurant.</p>	<p>The cost and benefit of a development proposal the subject of a Works Approval Application is not a matter required to be assessed by the NCA.</p>
	<p>The construction will disrupt traffic for a significant period of time and there is severe lack of concise information about how businesses will be directly affected. The planning report states at Page 79 that there are proposed mitigation measures for construction activities that will maintain access or provide alternative access to residential and commercial properties and pedestrian movement. The dot points under section 3.2 of the planning report are motherhood statements without any substance of how they will be implemented or how they will directly affect active businesses. There is no information relating to the expected consequences of that traffic and pedestrian disruption on nearby businesses.</p>	<p>The NCA will require Canberra Metro to prepare a Construction Environmental Management Plan (CEMP) and this will be subject to a separate Works Approval application. The CEMP will be required to address the management of a range of issues including but not limited to dust, air, traffic, waste and recycling, contamination, heritage and spoilt.</p> <p>The NCA will be assessing what mitigation measures are included to notify residents of timing of upcoming construction and ensure that adequate business signage is retained.</p> <p>Construction is intended to be staged to minimise disruption to residents, businesses and existing transport operations. Some construction work may be required outside of normal construction hours such as work across major intersections, utility diversion works or works that can occur without exceeding night-time noise. The NCA will consider the construction staging in more detail at the time the Works Approval application is lodged.</p> <p>The NCA acknowledges that there will be a level of inconvenience to businesses during the construction of light rail. The NCA will be working with CMA and Canberra Metro to develop a management plan that incorporates measures to mitigate likely impacts.</p> <p>Given the linear nature of the light rail project, it is expected that the duration of the noisiest activities at most locations will be relatively short.</p>

Submission	Issue	NCA response
	<p>My clients are of the opinion that during construction patrons will avoid the Northbourne Avenue area in order to avoid the traffic congestion, dust, noise and loss of amenity that will occur and business will be significantly reduced without any provision for adequate compensation. We advocate that the effects should be reviewed and allowances made to make sure that businesses can survive the economic effects of the light rail project. Not just during construction but also after completion to ensure that light rail does not leave currently viable businesses at a disadvantage to other businesses at hub points to the extent where there is significant bias towards some businesses to the detriment of others.</p> <p>Analysis of the effects on specific businesses along Northbourne is required to accurately gauge the economic impact of the light rail project and to determine if there is a better/fairer configuration for the layout of stops and hubs. For some businesses the construction and completion of the light rail project may cause a significant downturn in business and we believe that the onus is on the ACT Government to ensure that lost income from the detrimental impact of the light rail should be compensated through a scheme set up before approval is given to the works application.</p>	<p>Compensation is not a matter for assessment by the NCA through the Works Approval process.</p>
	<p>The light rail project is an expensive major transport infrastructure project that may be subject to a very short lifespan. No consideration has been given within the works application to the revolution coming in cheap driverless transport that will leave expensive public transport options unviable in the future. We may be pouring many millions of dollars into an outmoded transport system that will not be compatible with future personal/public transport requirements. It is our expectation that driverless on call transport will do to buses and light rail what highway trucks have done to the national railway system.</p>	<p>This is a broader policy issue that is beyond the scope of the Works Approval application under consideration. The ACT Government has made a commitment to the delivery of Stage 1 light rail based on current transport strategies which include consideration of alternate transport options and technologies.</p>

Submission	Issue	NCA response
	<p>The majority of people in Canberra already generally dislike and do not commonly use the buses and do not appreciate being jostled or held to times within public transport systems. With the expected rise of driverless and synchronized vehicle traffic, bus systems and light rail will very likely not be able to compete and we may have to remove the light rail network in the near future to make way for more smaller inexpensive and lower maintenance driverless vehicles so that they can gain priority access through Northbourne Avenue. The inclusion of light rail on Northbourne Avenue will further retard the uptake of this technology to the detriment of the remainder of the city.</p>	<p>This is a broader policy issue that is beyond the scope of the Works Approval application under consideration.</p>
	<p>We request that a comparative review be undertaken of the future expected use of this type of driverless transport compared to the light rail project into the future. There appears no reason why people would use an outmoded, less convenient, more impersonal, less comfortable and more expensive light rail transport when they can simply call up a cheap driverless car that will take them to their destination at their choice of time & place. We may have a future where less people own cars but use them more as a dial up service industry will explode onto the market as soon as driverless vehicles are permitted on our national roads. This may have the effect of destroying the benefits of the current light rail project and requiring its removal in a short period of time to allow more smaller independent synchronized public transport vehicles to use the space. The current proposal for rails on the ground is short sighted and does not allow for any future use of the road space to allow for a possible future of increased small driverless vehicles moving all over the city and sharing the main routes.</p>	<p>The Capital Metro Agency has submitted an application for Works Approval for a light rail network. The NCA is required to assess the proposed works for consistency against the relevant principles and policies of the National Capital Plan.</p>

Submission	Issue	NCA response
	<p>National Capital Plan - The following are relevant applicable extracts from the National Capital Plan (NCP) (Italics added for emphasis):</p> <p>2. Main Avenues and Approach Routes</p> <p>Main Avenues</p> <ul style="list-style-type: none"> • Northbourne Avenue <p>2.2 Designated Area ‘Main Avenues and Approach Routes’</p> <p>The objective for planning and development is to establish and enhance the identity of the approaches to the Central National Area as roads of national significance and, where relevant, as frontage roads for buildings which enhance the National Capital function <i>and as corridors for a possible future inter-town public transport system.</i></p> <p>This will be achieved by ensuring that works within the reservations are carried out to the highest standards, by maintaining and enhancing landscaping, and <i>by facilitating the flow of traffic as far as may be possible</i> in consistency with this principle.</p> <p>Detailed Conditions of Planning, Design and Development</p> <p>3. Traffic is to be managed to ensure the continued effective function of the Main Avenues and Approach Routes. The Main Avenues will provide access to fronting buildings where practicable, and <i>where traffic safety and flows are not adversely affected.</i></p> <p>We recommend that a complete report on this area of concern should be commissioned and evaluated prior to approval of the light rail system to ensure that the correct and most cost effective transport strategy is promoted.</p>	<p>The Capital Metro Agency has submitted an application for Works Approval for a light rail network. The NCA is required to assess the proposed works for consistency against the relevant principles and policies of the National Capital Plan.</p> <p>A number of studies have been undertaken to consider alternative options to light rail and an analysis was included within the Environmental Impact Statement (EIS) which was prepared.</p> <p>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.</p> <p>In summary, the findings were:</p> <ul style="list-style-type: none"> » 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. <p>The proposed work is not inconsistent with the National Capital Plan.</p>

Submission	Issue	NCA response
	<p>6. Transport</p> <p>6.1 Background</p> <p>The National Capital Plan is required to set out general principles and policies to be implemented throughout the Territory, for planning national and arterial road systems. The interaction between land use activities and transport is important. The disposition and size of the centres for major employment and other uses places different demands and stresses on the transport system and the physical fabric of the City. The hierarchical system of roads, developed successfully in the new towns of Canberra, <i>provides a high standard of safety and service to all road users.</i></p> <p>The overall transport system comprises the road network, car parking facilities and public transport. The efficiency of the road system depends, not only on the physical provision of infrastructure, but also on the operational policies adopted for the use and control of facilities including public transport. Efficient operation of the national and arterial road systems also requires that an effective public transport and priority system be established. It is important that the provision of public transport and the implementation of related policies by the ACT Government keeps pace with residential, commercial and industrial development needs. These policies should aim to minimise the consumption of energy and to enhance the physical environment of the Territory.</p> <p>6.2 Principle for Transport</p> <p>Transport planning and provision will:</p> <ul style="list-style-type: none"> » reserve a route for the development of a public transport service to link major employment nodes. As far as practicable the service will be segregated from other transport systems and will operate with priority of right-of-way » incorporate nationally recognised practices and standards consistent with the role and function of each road, or additional standards set out for the Designated Areas of this Plan. 	<p>This is a broader policy issue that is beyond the scope of the Works Approval application under consideration. The ACT Government has made a commitment to the delivery of Stage 1 light rail based on current transport strategies which include consideration of alternate transport options and technologies.</p>

Submission	Issue	NCA response
	<p>6.3 Policies and Standards for Transport</p> <p>1. The National and Arterial Roads System will:</p> <ul style="list-style-type: none"> » <i>generally not provide frontage access to development except where such access will meet appropriate design standards and road safety needs</i> » <i>generally intersect with the local road network through distributor roads.</i> <p>2. <i>A corridor between Civic, the town centres and major employment nodes, suitable for priority or segregated right-of-way for use by public transport services will be reserved against a possible future need to develop a system of inter town and express routes suitable for buses or other technologies as appropriate.</i></p> <p>3. <i>Transport strategies should promote the convenience and efficiency of public transport use.</i></p> <p>The approval of the current light rail proposal would be inconsistent with the above Principals Policies and Standards at Section 2.0 of the NCP. Failure to take account of emerging new technologies and their impact on the public transport system is anathema to a high functioning city. Using up the only space within Northbourne Avenue suitable for accommodating or allowing for future transport functionality is inconsistent with the objective stated at 2.2 above. The loss of any future possible traffic flow enhancements because of the light rail project without consideration of its effect on future transport trends such as increased traffic from driverless vehicles fails to fully address the objective of maintaining traffic flow whilst allowing for future public transport needs. The light rail project will severely impede any future increase in traffic flow which is inconsistent with the above objective and the above detailed conditions of design and planning.</p>	<p>See comment on page 22.</p>

Submission	Issue	NCA response
	<p>Inconsistent with NCP policy for Transport - As noted at 6.1 Background to transport; there should be a high standard of safety and service to all road users. This should also allow for future expansion and improving technologies. It is important that the provision of public transport and the implementation of related policies by the ACT Government keeps pace with residential, commercial and industrial development needs. This proposal has not demonstrated keeping pace with expected future changes to public transport use which will be in the form of an expanding driverless social phenomenon that is likely to make unviable all other forms of public transport.</p> <p>As noted at 6.2 Principle for transport; considering the fast expansion and adoption of driverless vehicle technology that is expected the current proposal fails to investigate and make allowance for the need for further driverless only fast lanes within the road network as it spills onto Northbourne Avenue. The city could end up with a major congestion problem as the light rail takes up any available additional space on Northbourne. If public transport further loses ground over driverless vehicle networks then an underutilised asset will become a liability requiring removal. The longevity of the system has not been appropriately demonstrated to show that it will exceed the expectation from the take up of driverless vehicles.</p>	<p>See comment on page 22.</p>

Submission	Issue	NCA response
	<p>Conclusion</p> <p>The proposal appears ill-considered against the NCP in regard to future sustainability against the expected uptake of driverless vehicle technology and transport systems. The proposal is inconsistent with promoting sound business principals because of the inadequate level of information regarding how the works will be carried out and inadequate information regarding the evaluation of the consequences to nearby businesses.</p> <p>The current proposal is unacceptable to my clients in its current form and it appears inconsistent with the objectives of the NCP to promote a sustainable and high functioning future transport network and for these reasons we believe that the WA application should not be approved.</p>	<p>See responses to Submission 4 above.</p>
<p>5. Northbourne Lodge, Blue and White Lodge, Canberra Lodge and Miranda Lodge</p> <p>Paula Simcocks and Dien Nguyen (owners of Northbourne Lodge), Mary Constantine and Michael Papas (owners of Blue and White Lodge and Canberran Lodge) and Tom Wutao (owner of Miranda Lodge)</p>		
	<p>The submitters are the business owners of the Bed and Breakfast Lodges operating on the service road along Northbourne Ave between Swinden St and Antill St, Downer and have raised the following concerns:</p>	
	<p>1. The proposed blockage of the service road entrance at Swinden St, Downer would make access to our Lodges extremely difficult and would drastically reduce the number of guests using our B&B services. It would be impossible for our B&B to operate profitably. Consequently, this would lead to the closure of our businesses that have been operating for 49 years.</p>	<p>1. The applicant has responded to the concerns by amending the plans to allow a left turn in and left turn out from the Northbourne Avenue service road (south).</p> <p>2. The current entrance to the service road from Antill Street meets road safety requirements for access of service vehicles however the applicant has amended plans to widen the access the improve ease for larger vehicles.</p>

Submission	Issue	NCA response
	<p>2. The proposal to use a narrow entrance at the end of the service road on Antill St is unviable. It is both impractical and dangerous, being located at a sharp narrow corner which is the intersection of 2 extremely busy roads: Northbourne Ave and Antill St. Laundry and food supplies trucks, buses bringing sporting teams and tourists, removalists, ambulances, fire engines and cars have great difficulty turning into it. Regular blockage of the drain and the slope of the land flood the roadway during heavy rains making it impassable.</p> <p>3. The proposed exit of traffic opposite No. 524 Northbourne Ave does not allow for entrance to the properties. It does not allow for the large number of vehicles exiting No. 524 or the turning circle of larger vehicles. The location of an entry/ exit point opposite the B&Bs compounds the traffic noise problem making it harder for the business to operate.</p> <p>4. Closure of the entrance into the service road from Swinden St also makes it harder to see the signage locating our business properties.</p> <p>The viability of businesses along the corridor of the light rail is essential to provide more commuters to use this mode of transport. Our Lodges provide alternative accommodation to large hotels as we can cater to groups with special requirements. Our Lodges have been providing a valuable service for 49 years.</p> <p>During construction of the project, the dust and noise over two/three years will make it extremely hard for us to operate our B&Bs. In a period of economic downturn, we will not only lose prospective clients but will also lose regular clients as access to our B&Bs will be so difficult and complicated. With the proposed closure of the Swinden St entrance, we unanimously agreed that it would be unviable to continue to operate our business at all in the future.</p>	<p>3. The plans have been amended to include an entry and exit point onto Northbourne Avenue. Northbourne Avenue service road is for local traffic only and traffic numbers should be relatively low. It is understood that the service road is currently used for rat-running. CMA have committed to monitoring this situation after the changes to the roads have been made to determine if the problem still remains. It is expected that the change to the entry will reduce rat-running.</p> <p>4. The NCA will require Canberra Metro to prepare a Construction Environmental Management Plan (CEMP) and this will be subject to a separate Works Approval application. The CEMP will be required to address the management of a range of issues during construction including but not limited to dust, noise air, traffic, waste and recycling, contamination, heritage and spoilt. The NCA will be assessing what mitigation measures are included to notify residents of timing of upcoming construction and ensure that adequate business signage is retained.</p> <p>Construction is intended to be staged to minimise disruption to residents, businesses and existing transport operations. Some construction work may be required outside of normal construction hours such as work across major intersections, utility diversion works or works that can occur without exceeding night-time noise.</p>

Submission	Issue	NCA response
	<p>The submitters have requested the following changes:</p> <ol style="list-style-type: none"> 1. The service road entrance at Swinden St is kept open with controlled regulation of the traffic lights at the junction of Swinden St and Northbourne Ave. 2. The traffic along the service road is made one way from Swinden St to Antill St. 3. Speed humps are put in place on the service road to slow the high flow of traffic, allowing for pedestrians and cyclists and preventing motorists using it as an extra lane on Northbourne Ave. 4. Parking regulations are maintained. 5. Improved landscaping for noise reduction on Northbourne Ave along with signage on the nature strip for businesses existing along the service road. 6. Noise reduction landscaping to be continued from Swinden St to Antil St along Northbourne Ave without any further exit or entry point as the Swinden St entrance remains open. 7. Service road exit at Antil St is widened, improved and maintained to ensure that the road remains open in all types of weather. 8. Compensation is provided for our businesses by suspending commercial rates during the period of construction and signage is placed on the nature strip to help clients access existing businesses. 9. Businesses are updated on a regular basis with the construction process so that we can plan ahead. Future projections are necessary for us for we may have to compensate guests if they book six months in advance and cannot get a good night's sleep while construction work is in progress. We may need to reorganise bank loans and sell. We may need to close completely during the most disruptive periods or completely reorganise our business. 10. A meeting is made with the NCA and the Lodge owners at a later date as not all the owners are able to attend the meeting on 1st March 2016 due to prior travel arrangements. The submitters request that they remain informed if the entrance to the service road from Swinden St can remain open so that we can remain open. 	<ol style="list-style-type: none"> 1. The current agreed design option will retain the closure of the service road to Swinden Street but will address local business concerns through the provision of both entrance and exit points to the service road from Northbourne Avenue, as well as enhanced access from Antill Street. It is considered that this design option will retain and improve access for service and emergency vehicles and ensure ease of access for B & B clients. The plans have been amended to reflect these changes. 2. The proposed design changes will not result in the service road being made one way. 3. As above, access to the service road will be further south than the current entrance from Swinden Street and therefore should reduce the desirability of "rat running" however the applicant has advised that the situation will continue to be monitored. 4. There is no intention to change existing parking regulations in this area, through the submitted Works Approval application or proposed works. 5. Design review has resulted in increased retention of existing trees and improved landscaping in this area. Vegetation is shown to have minimal noise mitigation benefits. Amended plans have been submitted to the NCA 6. As with previous comments, the design has been revised based on business owners comments and provides an option that meets road safety requirements and addresses the concerns raised. Also see point 5. above 7. The service road access/egress from Antill Street will have widened access and improved road geometry, in response to these concerns. 8. The NCA will require Canberra Metro to prepare a Construction Environmental Management Plan (CEMP) and this will be subject to a separate Works Approval application. The CEMP will be required to address the management of a range of issues during construction including but not limited to dust, noise air, traffic, waste and recycling, contamination, heritage and spoilt. The NCA will be assessing what mitigation measures are included to notify residents of timing of upcoming construction and ensure that adequate business signage is retained. 9. The applicant has advised that prior to the commencement of works a business landowner and engagement management strategy will be developed. This will ensure that businesses are informed of the project and methods to proactively support businesses through the construction phase to minimise disruptions. 10. The NCA made contact with the lodge owners to outline the proposed design changes as described above.

Submission	Issue	NCA response
6. Blue and White Canberra Lodges	<p>We wish to submit the following comments relating to the above.</p> <p>On 24th February 2016 a meeting was organised by Dean Hamana and Tracey Atkinson from Capital Metro to inform the Bed & Breakfast Establishments of traffic changes.</p> <p>We were given a plan of the traffic changes along the service road without a Legend, which was not properly explained.</p> <p>Our comments are as follows:</p> <ol style="list-style-type: none"> 1. Closing off the service road from Swinden Street is disaster, as our customers access and depart our properties from this point and we will lose our trade. 2. Our Laundry, Product Suppliers, Garbage Disposals all drive heavy duty vehicles and according to the plan will have to access our properties from Antill Street which will be impossible as it is far too narrow an opening for them to manoeuvre. 3. If there is an emergency for Ambulance or Fire Attendance again it will be impossible for them to gain access. This will cause loss of life and properties. 4. We are unable to access our properties with the closure of the service road from Swinden Street as we do not live on our premises, we live nearby and will be unable to prepare breakfast on time for our Guests in the mornings. If there is an emergency after hours we have the same problem. 5. The Slip Road proposed at the front of 524 Northbourne Avenue, Downer will cause a congested pathway onto Northbourne Avenue creating a hindrance rather than a solution. <p>In conclusion we wish to state the following, The Blue and White and Canberra Lodges are a Family Run Business which opened in 1966, in that time we have developed a loyal customer base, if the service road is closed at Swinden Street we lose our Regular and Future Clients and close our doors.</p>	See response for Submission 5.

Submission	Issue	NCA response
7. John Painter	<p>Thank you for providing the opportunity to comment on what I see as the apparent futility of the backward looking installation of a light rail service. It would seem that research into this project and its effect on the long established city areas has been inadequate resulting in inaccurate recommendations.</p> <p>Technology has shown us the possibilities and flexibility of electric buses, which, free of pollution, could use power from the nation's developing renewable energy resources. For a national capital already well on the way to realising its goal of 80% power from natural resources, how good it would be to use this resource in a forward thinking innovative way. This proposal replicates an eighteenth/nineteenth century tram line structure which will cause much disruption to little avail.</p>	<p>The applicant has advised that the light rail will be required to source a minimum of 10 per cent of the light rail system's electricity usage from renewable energy sources such as solar or wind. Combined with the ACT Government achieving its target of 90% renewable energy by 2020, by which time stage 1 light rail will be up and running, will enable the project to be effectively 100% renewable energy powered. Further, the project requirements specify that measures must be included for abatement of carbon emissions associated with construction and operation of light rail.</p> <p>Light rail systems continue to be introduced and extended in cities worldwide, including in Australian cities such as Adelaide, Sydney and the Gold Coast, evidencing the currency of this transport option.</p>
	<p>It has long been noted that bus services in Canberra run at an unacceptable level of loss while attempting to service the many separate village and satellite shopping areas throughout the Northern suburbs. It is apparent that the light rail would offer little access to these suburban areas so it must be assumed that buses would still be needed to service them. If not, Canberra citizens would need to become even more reliant on their cars.</p>	<p>Buses will continue to service suburban areas, outside the main public transit corridors with the provision of local bus services. Integration between transport modes is vital to the success of light rail. Modern transport systems integrate all modes of transport and the proposed light rail network will be part of an integrated public transport system with buses and encourage individuals to park and ride, walk or cycle to transport stations.</p>
	<p>The prospect of simultaneously knocking down all the beautiful trees in Northbourne Avenue leading to the city centre would, of itself, already mark the planned Light Rail, as being of questionable value. This important entrance to the Nation's capital, which charmingly offers shelter from searing sun and adds beauty to the lengthy approach to the heart of our city, would become a derelict site - trees that would normally have been replaced in an orderly fashion would now be demolished. Residents would await the return of lost shade and beauty for several years while tolerating the building noise of this about-to-be outmoded project. National and international visitors would, no doubt, be puzzled at such environmental vandalism in a territory that professes to be concerned with the environment.</p>	<p>See response to Submission 3.</p>

Submission	Issue	NCA response
	<p>Why should citizens of the entire Territory pay for inadequate infrastructure planning when Gungahlin was first on the drawing board, which will detrimentally impact on ratepayers for decades to come?</p> <p>Why put this city back several decades by spending ratepayers' money installing a service that will provide even less flexible and financially viable transport than already exists? Are we really to believe statistics suggesting property value increases along the route will justify such expenditure?</p>	<p>Decisions on how the ACT Government spend ratepayer's money is not a matter for consideration by the NCA as part of the assessment of a Works Approval application.</p>
	<p>It was heartening to read that there was no plan to commence the light rail construction prior to the forthcoming election (hopefully including the non-destruction of the trees) and I call upon both sides of politics to put a stop to this light rail proposal before causing any further wasting of further major expenditure. Who can we trust?</p>	<p>Comments noted. No response required.</p>
<p>8. Steven White</p>		
	<p>The removal of the outside median rows of trees appears to be predicated on the provision of utility service ducts, but no reason is apparent as to why the ducts cannot lay closer to the tracks. It may well suit the constructors' ease to just clear everything away rather than have troublesome trees and roots to deal with. The removal of trees close to the tracks is acceptable but not those outside.</p> <p>Arguments that arborists have determined the existing trees should be replaced are a spurious distraction, in that plenty of other plant authorities have publicly stated that the current trees are fine and their proposed replacements unsuitable. Similar arguments for a complete landscape change conveniently overlook the fact that it will take a decade at least to achieve the mature plantings that we currently enjoy. Once they are gone, the nation's capital will all be poorer for it.</p>	<p>Direct impact to existing median trees is unavoidable due to the construction requirements of the project, balanced with minimum road design requirements (e.g. operational lane configurations and widths), in conjunction with allowances for service relocations and minimising safety risks associated with the operation of light rail such as provision of adequate clearances for LRVs, overhead wires and other infrastructure.</p> <p>The current <i>Eucalyptus elata</i> planted in the Northbourne Avenue median are endemic to escarpment forests with high rainfall and humidity, therefore their growth and maintenance in Canberra has been supported by the irrigation of verges. When irrigation was turned off during the last ACT drought, these trees responded badly. Wind throw and branch drop has been an ongoing characteristic of these trees in the median, and the extent of tree loss is evidenced by the gaps in the planting pattern within the median. An arborist assessment undertaken in 2014 has been provided with the application, this provides a history of arboriculture reports relevant to the development of light rail in this corridor.</p> <p>Further information on previous assessment is also provided in Appendix A of the Urban Design Enhanced Definition Design Report http://www.capitalmetro.act.gov.au/data/assets/pdf_file/0009/741465/Capital-Metro-Urban-Enhanced-Definition-Design-Appendix-B_Part10.pdf</p>

Submission	Issue	NCA response
	<p>A further matter is the lengthy construction period of disruption outlined in the Initial Construction Management Plan which unfortunately, drawing on past immediate experience, is likely to blow out. Refer to the current upgrade for Constitution Avenue, over a mere 2.5 kilometres, which began in 2012 but shows no sign of reaching its completion this year. Should the proposed tram extension to Russell proceed, then roadworks will continue along Constitution Avenue for an indefinite period.</p> <p>A reminder of the details is pertinent, given the similarity of due process, viz: upgrade works were to be completed in three stages, with service relocation works from May 2013; stage 1 construction from February 2014 and stage 2 construction from April thereafter. So does the NCA really believe the construction plan for Northbourne Avenue will ever be met? If noise and other standards are to be realised, construction will drag on and on and an eyesore fester to the detriment of our Capital.</p>	<p>The current application is only for works along Federal Highway and Northbourne Avenue. The ACT Government has indicated that it is not proceeding with light rail along Constitution Avenue at this time. Meeting the construction timeframes is a matter for the applicant to manage.</p>

9. Kent Fitch

The submitter provided a detail submission (46 pages) which is provided at [Attachment E](#).

In summary the submitter objects to the proposed application because the proposed project fails to meet the policies of the National Capital Plan, the objectives of the ACT Territory Plan and of the ACT Government's transport policy. The submitter has provided an assessment against the stated justifications for the project, the objectives for the project and the National Capital Plan.

It is noted that the submitter has provided an assessment against the stated justifications for the project and the objectives for the project. The applicant has provided this information as part of the Planning Report. This information provides background about the project however is not relevant to the assessment of the Works Approval Application. The NCA is required to assess the application against the relevant policies and principle of the National Capital Plan.

5.2 Policies for Transport

Policy: "Transport strategies should promote the convenience and efficiency of public transport use."

Although CMA claim "Policy met", the analysis in sections A and B above based on Capital Metro's documents clearly demonstrates that the impact on transport, both public and private, will be strongly negative. That is, the proposed project provides poorer transport outcomes than the current ACTION bus services at both Capital Metro's 2021 and 2031 projections comparing the "base" (do nothing) and "project" (build the tram) case.

A Traffic Assessment Report was prepared by Parson Brinckerhoff as part of the Environmental Impact Statement.

The report concludes that the introduction of light rail would present an improved outcome for public transport and active transport users while impacting general traffic mostly along the Federal Highway section but that these could be mitigated. Traffic modelling of the 'base' and 'with project' scenarios found that increased delay related impacts to general traffic, occurred primarily at the following locations:

- » at those intersections previously operated as priority control and which are not to be signaled (eg Swinden Street)
- » intersections where the light rail alignment and a major traffic movement cross each other.

Submission	Issue	NCA response
	<p>In particular, Capital Metro’s modelling shows that in both 2021 and 2031:</p> <ul style="list-style-type: none"> » traffic volumes and traffic congestion will worsen if the tram is built » average traffic speeds will be slower if the tram is built » more intersections will be operating at or above capacity if the tram is built » Comparing current ACTION bus services against the proposed tram services shows: » the tram provides a less frequent service » the tram carries fewer passengers and bikes in total in the AM peak period » the tram carries less than half the number of seated passengers in the AM peak period » the tram requires more mode changes, longer journeys to stops and will result in much longer overall travel times for public transport passengers <p>As such, Capital Metro’s claim that the project meets the NCP Transport Policy is contradicted by the evidence from their own Environmental Impact Statement, Development Applications and Works Application.</p>	<p>A number of mitigation measures were recommended in the traffic assessment report. The applicant has committed to a number of avoidance and/or mitigation measures to minimise the potential traffic and transport impacts. The applicant has advised that further refinements of intersection signal phasing will be undertaken to improve light rail and traffic efficiency.</p> <p>The NCA also makes the following general comments in response:</p> <ul style="list-style-type: none"> » Research has found that people will walk further to use light rail (up to 1km compared to 400m for bus services – Burke and Brown, 2007). » The current proposed tram frequency is 1 every 5 minutes which will improve capacity beyond that articulated in the submitted analysis. » Modern transport systems integrate all modes of transport and the proposed light rail network will seek to establish buses as feeder services into light rail (and heavy rail) operations and encourage individuals to park and ride, walk or cycle to transport stations. It is not anticipated that mode change required through the introduction of light rail will result in a lower quality service than that provided by the current ACTION buses. <p>The proposed works are not inconsistent with the National Capital Plan.</p>

Submission	Issue	NCA response
	<p>9.2 Policies for Infrastructure</p> <p>Policy (12.3.c) : The planning and provision of electricity and telecommunications facilities should be undertaken in a manner which takes all reasonable steps to minimise the visual effects of transmission lines, substations and telecommunications facilities on the natural and built environments of the National Capital. Detailed policies for the installation of telecommunications facilities are set out at 12.4.</p> <p>CMA's response to this policy is:</p> <p>"Not applicable to the Project. This component of the Project does not involve any electricity or telecommunications facilities."</p> <p>However, the project does indeed involve extensive "electricity facilities", namely overhead electric cabling along the route and numerous substations to supply power to this cabling, and associated tram control and signalling infrastructure.</p> <p>Section 12 of the National Capital Plan addresses infrastructure but does not specifically address electricity power cabling, such as the tram is proposing to use in the designated areas along Northbourne Av and Federal Highway. However, the NCA has already stated that overhead cabling is not acceptable in other designated areas such as Constitution Avenue, as it would contravene the specific policy "vi" in section 12.4.2 of the NCP"</p> <p><i>"Cable Rollout – Approval within Designated Areas for overhead cable rollout will only be given where overhead services already exist and where the National Capital Authority is of the opinion that the proposed cable will not impact adversely on the locality."</i></p> <p>This policy is very clear: overhead cable rollout is only acceptable in those locations where is already exists, AND where it does exist, only when the NCA is of the opinion further rollout will not create an additional adverse impact.</p>	<p>The applicant's response to this policy for the purposes of this Works Approval application is correct. The infrastructure associated with the overhead lines and poles will be the subject of a separate Works Approval application. Furthermore Section 12.4.2 (vi) is not relevant to the proposed light rail project. It relates to cable roll out associated with telecommunication facilities only.</p>

Submission	Issue	NCA response
	<p>Because the designated areas in the centre of Northbourne Av and Federal Highway do not have existing overhead cable, the proposed tram cable should not be approved according to this section 12.4.2.vi of the National Capital Plan.</p>	<p>Capital Metro cannot avoid this problem by claiming that this section is contained under the telecommunications section of the NCP, because overhead cable creates the same "visual pollution" regardless of whether it is carrying electricity or telecommunications.</p>
	<p>Both types of cabling requires poles for support, and indeed the need for electrical isolation and for mitigating the dangers of fallen cables requires poles supporting electrical cables need to be more resistant to damage and hence sturdier, more numerous and more imposing.</p>	<p>Imagine ACTEWAGL submitted a works proposal to run overhead power lines down the centre of Northbourne Av and Federal Highway: what would be the expected response of the community and the National Capital Authority?</p>
	<p>Capital Metro's claim that the NCP's policies on infrastructure and cable rollout are not applicable to the project are contradicted by the intention in the NCP that overhead cables not be allowed in designated areas, and the NCA's previous determination that they will not be allowed along Constitution Avenue.</p>	<p>If the project had provided an improvement (rather than a deterioration) to Canberra's transport, it may have been worthwhile considering approval of the project subject to the same conditions that the NCA has already stipulated along Constitution Av: wire-free running.</p>

Submission	Issue	NCA response
	<p>3.4 Main Avenues and approach routes</p> <p>Policy 2.2 ii. The Main Avenues and Approach Routes will be developed and maintained as high quality landscaped corridors...</p> <p>Policy 2.5 Landscape Experience</p> <ul style="list-style-type: none"> » to ensure Canberra’s unique setting within the natural landscape is reflected in the sensitive design and landscape treatment for the highway which reinforces the perception of the National Capital; and » to recognise the significance of views to the surrounding hills and ensure engineering structures respect the landform and landscape patterns <p>The proposed tram is a major industrial infrastructure, requiring an imposing industrial landscape of tracks, poles, overhead cabling, additional signalling and signs, safety barriers/fences and extensive road signage and markings.</p> <p>Proponents of such projects typically go to great lengths to down-play the strongly negative visual impact such infrastructure are associated with, and particularly during the project approval stage. Whilst often jarring in an already heavily urbanised setting, the visual impact along the currently beautiful centres of the avenues providing the main approach route to Canberra will be particularly damaging.</p> <p>Many artist impressions of the Capital Metro have been circulated which deliberately down-play the visual impact: cabling is omitted, or barely visible, poles are rarely seen, accompanying necessary barriers, signage and road markings are somehow absent.</p> <p>Comparing artists impressions of the Gold Coast light rail with reality is a reminder of how misleading this publicity can be. “Artistic license” is one thing, misrepresentation is another. The submitter provides examples in the form of images and these can be viewed in Attachment D.</p>	<p>See response to Submission 3.</p> <p>The NCA does not approve artistic impressions but rather detailed drawings so it can undertake an assessment of the proposal including any visual impacts. The proposed works will have to be constructed in accordance with the approved drawings.</p>

Submission	Issue	NCA response
10. David Dickson	<p>The proposal to remove all trees from the median strip of Northbourne Avenue is a desecration of the principal vehicular entry to Burley Griffin's unique "Bush Capital".</p> <p>Moreover this proposal flies in the face of the Federal Government's current policy of "20 million trees planted by 2020". This programme has cost taxpayers \$35.56 millions to plant 11 million trees up to the end of 2015.</p> <p>Replanting Northbourne Avenue with "Brittle gum" would only make a mockery of the Federal Government's present national programme - during the decades it takes to replace the present Avenue of mature trees.</p> <p>"Brittle gum" has earned a reputation for shedding limbs - which will be an increasing risk to the overhead lines of the Gungahlin tram</p> <p>This absurdity will only be emphasized as the Gungahlin tram (Section 1a) is transformed into the Russell cable-car (Section 1b) proposed for Constitution Avenue lined by English plane and Pinoaks.</p> <p>How a professional design authority can recommend two such visually different, and technically expensive standards beggars belief.</p> <p>If indeed the NCA considers itself as the "trustee of the National Capital" it should endorse an alternative to the "scorched earth" policy proposed by the ACT for Northbourne Avenue by applying the Peretto principle.</p> <p>That is by removing 20% of the trees on the Western half of the median strip it would retain afternoon Summer shade for commuters.</p> <p>Likewise by retaining 20% of the trees on the Eastern half it would open up the median strip to the morning Winter sun. This would not only save half the trees, but add to the comfort of morning and evening commuters year round.</p> <p>Griffin's vision for Canberra and his travails with public works bureaucrats are well documented, here's hoping the NCA does not add another chapter.</p>	<p>Earlier analysis of the potential to retain the outer row of trees concluded that the extent of excavations and disturbance within the root zone would unacceptably impact these trees. The declining health of the trees within the median requires the ACT Government to replace these trees in the near future regardless of light rail. There will be more trees replanted as part of the project than the number to be removed.</p> <p>The replacement tree species for Northbourne Ave <i>Eucalyptus mannifera</i> was determined in consultation with key stakeholders including the NCA and supported by expert advice from arborists, landscape and urban design experts. Advice is that the <i>Eucalyptus mannifera</i> is no more prone to limb drop than other eucalypt species.</p> <p>Differing urban contexts require distinct design and landscaping responses. The proposed landscape approach supports the progressive formalisation of landscape design from the Federal Highway through to Civic. At this stage the ACT Government is not progressing the light rail through to Russell.</p> <p>Direct impact to existing median trees is unavoidable due to the construction requirements of the project, balanced with minimum road design requirements (e.g. operational lane configurations and widths), in conjunction with allowances for service relocations and minimising safety risks associated with the operation of light rail such as provision of adequate clearances for LRVs, overhead wires and other infrastructure.</p> <p>See also response to Submission 3.</p>

Submission	Issue	NCA response
11. David (no surname supplied)	<p>The development application as presented does no more than implement the tram lines into the existing landscape, and does not adequately take into account and address the existing traffic problems along the route.</p> <p>As part of an integrated transport network, this project should include improving all aspects of this key transport corridor and gateway to Canberra, including addressing current weaknesses in road infrastructure, making improvements to walking and cycling infrastructure. This plan does not do any of this, and as a result, will make this corridor more dangerous. This application should not be approved without the following issues being addressed:</p>	<p>The light rail system has been designed to integrate into the existing transport network. The system forms part of the overall transport plan for Canberra and is aligned with planned upgrades of other transport modes in the future. Traffic analysis at each intersection has been undertaken to understand the needs for a safe and efficient interface between the light rail and other road users. This analysis has led to some changes in intersection layouts, phasing patterns, signal timing and movement allocations, based on present and longer term traffic modelling.</p> <p>The applicant has advised that the road design and capacity is based on traffic modelling at intersections and designed in accordance with Territory standards. Some levels of congestion in the peak period will result in congestion and queuing at intersections. The design is to allow for safe operation of traffic but cannot prevent or manage poor driver behaviour.</p>
	<p>The right hand turning lane from the Federal Highway (southbound) onto the Barton Highway should be extended (or duplicated) as a large number of vehicles (particularly trucks and semi-trailers) use this to head towards Melbourne. This turn lane often causes delays because it is not sufficiently long enough to meet demand and large trucks are often not quick enough to make turns and run red lights in this location.</p>	<p>The applicant has advised that the phasing for the Federal Highway / Barton Highway intersection has been adjusted. The phasing allows southbound through traffic and southbound right turning movements to occur simultaneously. This arrangement removes potential for stationary right turning traffic to queue into through lane whilst through traffic is moving.</p>
	<p>Northbourne Avenue between Antill Street should be three lanes in each direction to cater for the traffic volumes entering and leaving Canberra (large number of vehicles exit/enter at Barton Highway). This will not change with light rail the traffic is mostly tourist, interstate and heavy vehicle traffic.</p>	<p>The applicant has advised that the upgrade of the road is not currently under consideration. It may be included in future capital works programs if considered to be an issue once operational.</p>
	<p>If a new access road is to be provided to Yowani, this should have a dedicated left turn lane heading north on Northbourne Ave. The presence of pedestrian crossing without a turning lane will delay traffic heading north and cause rear-end accidents due to the high volume of traffic turning left at the Barton Hwy.</p>	<p>Access to the Yowani Country Club is provided at the signalised intersection opposite Swinden Street. Left turning vehicles filtered with the north/south pedestrian movements will generally occur at the start of the phase. As vehicles will be stationary / slow moving during the start of the phase the risks and severity of rear end collisions is reduced.</p>
	<p>The right turn lane from Northbourne Avenue (southbound) onto Antill St (towards Belconnen) is not long enough. It is shorter than it is currently, which is already too short to sufficiently meet peak demand (as evidenced by the tyre marks/dirt patch from people mounting the median strip). This lane should be made longer than it is currently, not shorter.</p>	<p>Reference is understood as Northbourne Avenue right turn into Mouat Street. The length of this turn lane is not being reduced. The length that is provided has been considered as part of the Traffic assessment.</p>

Submission	Issue	NCA response
	<p>The plans do not sufficiently detail cycling (bike paths) improvements. As Northbourne Avenue is currently the most dangerous roadway for cyclists, the rail plans in this development application should not be approved until details of improvements (i.e. off-road or segregated cycle paths) are developed to provide safer conditions for cyclists.</p>	<p>The project ensures that on road cyclist facilities are maintained or provided for the length of the corridor. Upgrades to the off road cycle network outside of the light rail corridor does not form part of this project.</p>
	<p>The bus stops marked on the road in the current plans between Antill Street and Barry Dr should be removed as they should not be required with light rail in place. If bus stops are required, dedicated bus bays should be implemented. The current arrangements are extremely dangerous for cyclists and drivers swerving into the middle lane to avoid buses.</p>	<p>Existing bus stops are to be retained but the number and routing of services is expected to change as a result of developing and implementing an integrated public transport network. A reduction in the number of buses stopping at bus stops will reduce conflict for cyclists and other road users.</p>
	<p>The width of traffic lanes on Northbourne Ave from Antill St into the City should be improved to meet current Australian design standards. The currently very thin lanes (and as marked in the plans) are dangerous for all road users and cause accidents because they do not meet these standards.</p>	<p>Upgrading lane widths on Northbourne Avenue does not form part of the light rail project. The applicant has advised that there is no indication that the current lane widths (3.2m – 3.4m) do not operate effectively.</p>
	<p>The right hand turn from Northbourne Ave (northbound) onto Antill St towards Dickson should be made longer to meet demand for turning traffic it does not currently meet.</p>	<p>The length within the design has been assessed within the traffic assessment.</p>
	<p>A dedicated left turn slip lane has been removed from Northbourne Ave onto Cooyong Street (southbound). This should be reinstated or a dedicated left turn lane implemented as this will result in danger for pedestrians crossing and increase rear-end accidents.</p>	<p>This slip lane has been removed to allow pedestrians to cross the road in a single movement. Given the high number of pedestrians in this location the splitter island is too small to provide space for pedestrians waiting to cross at the lights. Left turning vehicles filtered with the north/south pedestrian movements will generally occur at the start of the phase. As vehicles will be stationary / slow moving during the start of the phase the risks and severity of rear end collisions is reduced.</p>
	<p>The right turn lane from Northbourne Ave onto Cooyong Street (northbound) needs to be made longer. This lane currently causes delays, accidents and queuing across intersection (of Bunda/Rudd St) as demand exceeds the length.</p>	<p>Phasing and timing for this intersection has been adjusted to reduce the potential for traffic queuing past the turn bay.</p>
	<p>The left turn sliplane from Barry Drive onto Northbourne Avenue has been removed. There is no logical reason for this lane to be removed. It assists greatly with alleviating traffic on Barry Drive at Northbourne Ave as traffic can turn onto Northbourne Ave and this lane should be retained.</p>	<p>This slip lane has been removed to allow pedestrians to cross the road in a single movement. Given the high number of pedestrians in this location the splitter island is too small to provide space for pedestrians waiting to cross at the lights. Left turning vehicles filtered with the north/south pedestrian movements will generally occur at the start of the phase. As vehicles will be stationary / slow moving during the start of the phase the risks and severity of rear end collisions is reduced.</p>

Submission	Issue	NCA response
	The right hand turn from Northbourne Ave (northbound) onto Rudd St has been removed. This turn is regularly used and there is no logical reason for it to be removed. The interstate coaches use this turn to access the Jolimont Bus terminal without needing to use the dangerous Moore/Rudd Street intersection. It also provides legal access to carparks at the ANU off Marcus Clarke Street without drivers breaking the law of the "no right turn" signs. A dedicated turn lane should be added to allow this turn.	The right turn has been removed to ensure operational efficiency of the intersection. There is no evidence to suggest that the general community will deliberately disobey a regulatory sign through a major intersection. Engagement with stakeholders such as the Coach services at the Jolimont bus station is ongoing and their concerns / comments are also being considered in detail.
	The traffic arrangements on Bunda St west onto Rudd St should be fixed. Allowing both lanes from Bunda St to go straight to Rudd will alleviate the delays from cars waiting to turn left for pedestrians crossing Northbourne Ave.	Rudd Street westbound currently has a single lane. Provision of a second lane would require additional road widening that would impact properties and / or existing cyclist provisions.
	A left turn lane from Northbourne Ave (Northbound) onto Rudd St should be added for safety and alleviate congestion. This will reduce rear-end accidents and provide more safety for pedestrians. A large amount of traffic turns left here for Jolimont and Novotel guests, competing with the pedestrian crossing.	Left turning vehicles filtered with the north/south pedestrian movements will generally occur at the start of the phase. As vehicles will be stationary / slow moving during the start of the phase the risks and severity of rear end collisions is reduced.

12. John L. Smith

The submitter provided a submission titled 'A Model of Phase Loss Due to Tram Priority at an Intersection'. The submission included diagrams and has been provided at [Attachment F](#).

The submitter comments that the design has little if any scope to expand its capacity or improve its service quality to respond to future growth. This is because it has the fundamental limitation of not having the right of way grade separated from road traffic, and completely open to pedestrians. In this respect the design is premised on having trams given priority over road traffic at every intersection. It is clear (see Appendix A) that this will have serious impact on road traffic congestion for marginal improvement in journey time.

The submitter comments that the design documents presented to the NCA show scope for increasing the platform length for tram stops by approximately 25%. This limited scope for expansion of capacity is a fundamental design flaw. Without grade separation, significantly increasing the number of modules on a light rail train is highly problematic and would not be an option for the future.

A traffic assessment has been undertaken across the network. This assessment considers intersection phasing and timing, level of priority for Light Rail, and predicted traffic growth. Micro simulation traffic modelling has been undertaken to demonstrate the traffic movements and impacts over the whole network.

The submission contains the following specific points (together with an analytical assessment of signal phasing with the introduction of light rail).

1. A bus way would be a quicker alternative to light rail.
2. Light rail will cause high levels of traffic congestions.
3. Service speed would reduce as Canberra grows.

In response to the above items.

1. A dedicated busway running along the same alignment as the light rail would encounter similar constraints regarding travel times as the light rail. The capacity of a bus is less than the light rail vehicle therefore more services would be required to provide similar capacity. With higher service frequency to accommodate the same number of passengers, providing a similar level of priority at intersections would cause delay to other traffic above and beyond that of light rail. In reality the level of priority for busses would likely need to be reduced.

Submission	Issue	NCA response
	<p>The submitter further comments that because journey distance is the most significant factor affecting transport preferences in Canberra, it is paramount that any transport design yields and maintains fast services into the future. The design submitted to you is for slow services that will only get slower as Canberra grows.</p> <p>The submitter advised that in the context of Infrastructure Australia, it has already been shown that bus-ways represent a cost effective means of improving Canberra's transport and that there is a project on the Infrastructure Australia Priority List, February 2016, to develop two bus-ways in Canberra.</p> <p>The submitters ask why is there an application to develop light rail before the NCA if the ACT government has a major investment in bus ways in mind? Bus ways can deliver fast services. It would be a gross failure of your responsibility in assessing the application to ignore the new technologies that are becoming available and the way that they would merge with current investment in bus-ways.</p>	<p>2. Provision of light rail does remove a certain amount of green time from the signal cycle when called. The assessment provided in the representation does demonstrate a theoretical impact on phasing due to the provision of light rail. The assessment however does not provide context to the specific variables at any of the intersections along the alignment i.e traffic numbers, pedestrian movements, existing capacity, future capacity, timing efficiencies etc. The network modelling undertaken as part of the project provides evidence to the operation of each intersection given the predicated traffic growth and LRV operations.</p> <p>3. The service speed has been assessed in consideration of future demand and future growth.</p>

13. Netball ACT		
	<p>In response to the plans submitted by Canberra Metro for the development of the light rail along Northbourne Ave, Netball ACT submits the following comments regarding the General Arrangement, Traffic Intersection and Signal Phasing Plan, sheet 52 Northbourne Ave and Swinden St.</p> <p>The plans indicate a change to the traffic flow in and out of Southwell Park allowing only north bound traffic to enter and exit the precinct. A second entrance to the precinct will be opened, through a signal controlled intersection on Swinden Street into both Yowani Country Club and Southwell Park. In doing so, it is proposed that the current gravel car park between the existing netball courts and Northbourne Ave be sealed and used as a throughway for south bound traffic entering and exiting the precinct. While Netball ACT appreciates the rationale behind these plans, we have concerns that the use of this car park as a throughway for traffic will jeopardise the safety of the members utilising the netball courts.</p>	<p>The current proposed changes in traffic arrangements will alter movements in the Southwell Park precinct. Southbound movements from the precinct will need to occur from the signalised intersection at Swinden Street, or through the exit onto Mouat Street which allows traffic to then turn right onto Northbourne Avenue southbound.</p> <p>The proposed traffic arrangements are being investigated further to see if there are alternate options that will alleviate these concerns and there is an ongoing dialogue with Netball ACT to resolve this matter.</p>

Submission	Issue	NCA response
	<p>The current gravel carpark is utilised by Canberra Netball Association as a major entry point into their facilities. With approximately 1,700 members consisting of mainly young children, this carpark is a hive of activity with kids running, throwing balls and congregating in the carpark prior to and immediately after games. Turning this carpark into a throughway for southbound traffic entering and exiting Southwell Park would increase the risk of a child or other member of the public being hit by a car utilising the carpark as a means to access other facilities in the precinct or to avoid traffic build up on Mouat Street.</p> <p>Netball ACT would like consideration be given to an alternative entrance to the one being proposed. Understanding the limitation to this, at very least we would expect a robust traffic management plan to be implemented which includes measures to reduce traffic speed for those utilising this entrance to access Southwell Park.</p>	

14. Roger Shelton		
	<p>Thank you for putting this to public consultation and for the very well conducted information meeting (which I attended).</p> <p>Firstly some comments about the application documentation.</p>	<p>Comments noted.</p>
	<p>The documentation and attachments provided was massive and, to my mind, very over-comprehensive in some aspects and way beyond reasonable time capacity to go through thoroughly. It seemed to me the resources expended on preparing this application was excessive and can only add to the whole cost. As an example, was it really necessary to itemise every tree? Surely a statically meaningful sampling should have been sufficient. If the itemisation of each tree seemed necessary to protect against vexatious appeals/ litigation then things have indeed reached a sorry state.</p>	<p>The documentation was prepared in accordance with requirements for an application for Works Approval.</p>
	<p>Another example is where the documentation quotes numerous planning clauses with the remark 'not applicable'. On the other hand the cross section drawings are representative only and this is how it all should have been.</p>	<p>The documentation was prepared in accordance with requirements for an application for Works Approval.</p>

Submission	Issue	NCA response
	<p>The documentation makes numerous references to other documents, standards, and the like, some of which are indicated as possibly 'commercial in confidence' and others would not be easily accessible or only at a subscription/purchase cost. Whilst this did not impede me, as a general principle, any referenced document in a document put out to public consultation should also be equally and easily available.</p>	<p>Noted however it is not a requirement of the NCA to require an applicant to make publicly availability documentation such as AUSTRROADS standards and other Australian Standards.</p>
	<p>There is some padding (see comment below re phrases/words) which could have been summarised to advantage.</p>	<p>See responses below.</p>
	<p>Secondly concerning the information meeting.</p> <p>I, personally, was somewhat unaware until then, that the process related to, and was limited to, how the works dovetailed with the Authority's established plans and criteria, thus it became an inappropriate venue to pursue engineering/design technicalities not relevant to that.</p>	<p>Comments noted. Light rail has a shorter stopping distance than heavy rail. Operating light rail speed is regulated to consider safe stopping distances.</p> <p>The National Capital Plan does not prohibit overhead electricity lines however it does include a policy which requires the planning and provision of electricity facilities to take all reasonable steps to minimize the visual effect of lines and substations. The lines and poles are not subject of this application and a further Works Approval application will need to be submitted to the NCA.</p>
	<p>Two questions at the meeting caught my attention.</p> <p>1. A questioner asked about the Government indemnifying victims of accidents involving the light rail. I wondered what was driving this? It subsequently occurred to me that there is a vast road safety emphasis on level crossing dangers due to trains needing 100s, if not 1000s, of metres to stop. So it is easy to see that some members of the public think light rail vehicles would also need long stopping distances (a while back a letter in the Times claimed this very hazard), whereas, if fitted with magnetic track brakes, they can actually outperform the stopping capability of any bus or other road vehicle.</p> <p>2. Another question concerned the proscribing of overhead 'power' lines in the planning scheme, thus precluding the overhead power wire for the light rail. Obviously this proscribing related to ordinary pole and wire distribution to premises. But perhaps the questioner had a very technical point - it would depend on the precise wording and context in the planning scheme.</p>	

Submission	Issue	NCA response
	<p>The documents (Materials and Finishes) show that the surface finish of the actual track zone is ordinary concrete. This may not be the best option. Some artists' impressions and also some overseas sites (I believe) have used grass as a surface treatment with only the actual rail tops exposed, aesthetic improvement being the objective. A partial approach to this could involve artificial grass. A lesser outcome could involve coloured concrete. The aesthetics of the track zone surface finish might usefully be further considered.</p>	<p>The current proposed track form has been considered as part of an overarching design treatment, which includes multi-level landscaping to incorporate the light rail infrastructure into the surrounding landscape, street network and main avenue/ approach route setting.</p>
	<p>Another look at the need for the Magistrates area car park in the middle of the City and beyond the end of the stage 1 works seems appropriate. Perhaps one of the demolition sites of flats along Northbourne Ave could be a better choice for stage 1 works. (The Magistrate site could, however be more appropriate to facilitate the mooted extension to Russell.)</p>	<p>The applicant advised that as part of project development, a broad range of compound sites had been considered and a compound at the Magistrates Court car park was considered to best meet the criteria for a compound at the city end of the project. The size of the compound proposed has been reduced to minimise the impact.</p>
	<p>Stray current collection (5.4 Initial Construction Management Plan) is an important aspect to avoid ongoing electrical pollution. It is noted that the cabling (or ducting therefore) is not specifically shown in the typical cross sections. (Possibly this, in fact will be incorporated in the actual track bed structure and not require separate locating.)</p>	<p>The electrical cabling and conduits will be the subject of a separate Works Approval application. The applicant has advised that the stray current assessment and protection are aspects of the project's utilities design and management.</p>
	<p>Noise control mentions various mitigation efforts. It is suggested that reversing alarms are the major intrusive factor in civil construction sites and where multiple vehicles are involved, the resulting plethora of noise becomes just background and of little safety usefulness. Thus minimisation of this aspect would be a major benefit. It is suggested that this be looked into with the involvement of work safety authorities.</p>	<p>Suggestion noted. The applicant will be required to prepare a Construction Environmental Management Plan which will include a Noise Management Plan.</p>
	<p>There are many vague, undefinable, unenforceable, and wish thinking phrases/ words in parts of the documentation. For examples see 5.2, Part C, Planning Report for phrases/words such as 'minimise', 'where feasible and practical', 'great as possible', 'where possible' and so forth. All very nice but of little real value and really only describing normal good work practice and aspiration.</p>	<p>The Construction Environmental Management Plan has yet to finalised. The CEMP will need to be endorsed by an independent environmental consultant and submitted to, and approved by the NCA prior to the commencement of any work.</p>

Submission	Issue	NCA response
	<p>The overhead contact wire structure, though not specifically part of this WA application, is relevant. It has been pointed out in the 'comments' and other media that fully electric buses are in development with a small fleet already in London and a coach prototype demoed Melbourne to Sydney on one charge. The rapid development of this technology (equally applicable to light rail vehicles) may render the provision of an overhead power contact wire obsolete by the time the track installation is complete. It is suggested that this aspect needs to be kept under close review.</p>	<p>Comment noted.</p>
	<p>The other disruptive factors frequently mentioned are 'Uber' and autonomous vehicles. My view is that neither are likely to have an early impact and that when autonomous operation of road vehicles finally occurs, it will only, at best, cause a temporary lull in congestion. Again, light rail would be easier to operate autonomously than a road vehicle due to the directional constraint of the track (there are already autonomous well proven light rail systems overseas and the Sydney mono-rail was supposed to be - a well developed technology). It is suggested therefore, that this aspect is irrelevant.</p>	<p>Comment noted.</p>
<p>15. Alice Xyrakis</p>		
	<p>I am a resident the Northbourne Ave service road and have been since 1965, I have studied the road changes in conjunction with the plan for the proposed light rail. I am concerned about the access to Swinden Street from the service road being closed. I travel from Ainslie or Dickson shops to my home regularly, the only way through (since direct access from Antil street was blocked) is from Antill street right into Pigot street and then left into Blakett street, left into Swinden street, left Into Northbourne Ave service road. With the closure of access from Swinden Street there seems to be no access to my street anywhere!!</p> <p>I would like to be informed of further road changes which will be put into place for access to my home.</p>	<p>The applicant has responded to the concerns by amending the plans to allow a left turn in and left turn out from the Northbourne Avenue service road (south of Swinden Street) which will allow access to the submitter's property located on the Northbourne Avenue service road.</p> <p>The applicant has responded to the concerns by amending the plans to allow a left turn in and left turn out from the Northbourne Avenue service road (south).</p>

Submission	Issue	NCA response
16. Max Kwiatkowski	<p>I am opposed to the proposal lodged by Capital Metro for the transformation of Northbourne Avenue to allow for the construction of a light rail line from Civic to Gungahlin.</p> <p>Like many Canberrans - and visitors to Canberra - I enjoy the current character of Northbourne Avenue, with its urban forest median. It makes for a great entryway into Canberra, a lush green, tree-lined space in the heart of the city. There are few roads quite like it in Australia. While certainly there are ways Northbourne Ave and the cityscape surrounding it can be improved, I fear that the construction of light rail, as currently proposed, will change the Northbourne corridor for the worse, and significantly compromise a nationally significant landscape.</p> <p>The submitter's key issues are noted below.</p>	<p>Comments noted.</p>
	<p>Construction of light rail in the Northbourne Avenue median will require the clearfelling of the urban forest, comprised of lush, mature eucalypts. The result in the short to medium term will be an unacceptable scorched-earth landscape more akin to something out of the western suburbs of Sydney.</p>	<p>See Response to Submission 3.</p>
	<p>Once construction is complete it is proposed that 4m tall brittle gums are planted in rows either side of the light rail line. First of all, this is an unsuitable species for the median as it is prone to limb drop. The trees won't co-exist well with light rail infrastructure if they're allowed to.</p> <p>Once construction is complete it is proposed that 4m tall brittle gums are planted in rows either side of the light rail line. First of all, this is an unsuitable species for the median as it is prone to limb drop. The trees won't co-exist well with light rail infrastructure if they're allowed to overhang it. Secondly, it will be over a decade before the trees grow to a reasonable size and in the meantime the landscape will be diminished. Thirdly, experts advise against planting eucalypts at such a large size as such they are not only much more expensive but have a poor record of establishing well. For this reason eucalypts are usually planted at <1.5m. Planting 4m tall specimens will lead to poor growth and a high rate of mortality. Replacing trees that die will further inflate cost and lead to a substandard treescape.</p>	<p>The proposed tree species <i>Eucalyptus mannifera</i> has been selected based on extensive advice and analysis.</p> <p>The existing <i>Eucalyptus elata</i> (River Peppermint) trees are not indigenous to the area and are typically found in moist valleys in coastal ranges of NSW. The current planting of <i>Eucalyptus elata</i> have been found to be susceptible to wind throw and branch drop and are reliant on ongoing irrigation. An alternate tree species previously proposed <i>Eucalyptus rossii</i> (Scribbly Gum) was found to be less than ideal for the soil conditions within the Northbourne Avenue corridor.</p> <p>Planting a larger tree size does increase the maintenance requirement during the establishment period to support growth, which is within the project scope. The maintenance responsibility and risk of tree failure is held by Canberra Metro. Tree growth will be managed to provide a suitable form and to provide adequate clearance of light rail infrastructure.</p>

Submission	Issue	NCA response
	<p>Light rail will involve the construction of hideous power poles and line. This will clutter a previously treed landscape with poles and wires, taking away from its current character. I think this is unacceptable in this day and age of wireless and battery technology. If Canberra is to adapt mass transit – there are far more modern, less visually intrusive technologies out there which are more suited to Canberra.</p>	<p>The details of the overhead lines and poles will be the subject of a separate Works Approval application to the NCA. The NCA will require the associated light rail infrastructure including overhead lines to be integrated with lighting and other infrastructure to minimise visual intrusion. Combined with the proposed landscape treatment the light rail infrastructure will provide an integrated design solution.</p>
	<p>If light rail is to benefit Canberra as a whole, rather than just an exclusive niche area, light rail will have to be rolled fairly quickly to other parts of the city. However, other builds will be problematic and costly – how will light rail cross the lake, how will the wires it requires interact with the leafy landscapes of the Parliamentary Triangle, and so on? There are good reasons for thinking future lines may never eventuate – which leads to equity issues. Investment in bus technology and bus rapid transit networks – which are not only more flexible but cheaper – or wireless mass transit systems would avoid these pitfalls.</p>	<p>The Light Rail Network Plan released for community consultation at the end of 2015 provides an outline for a light rail network that encompasses Canberra more widely and provides a framework for the future network to be rolled out. At this stage the proposed Russell extension has not been confirmed to go ahead, however it is expected that in instances where the light rail network interacts with the National Triangle/Parliamentary Zone and Central National Areas that the design treatment will respect the national importance of these areas.</p>
	<p>According to the ACT Government's own projections, Northbourne light rail is set to increase vehicular congestion compared to a Business As Usual (BAU) Scenario. This is because light rail will give traffic light priority to light rail vehicles, disadvantaging road traffic. Also, a light rail scenario will lead to more development in the corridor than the BAU, further increasing congestion and travel times.</p>	<p>Potential delays to private motor vehicle journey times and at intersections were considered through the Environment Impact Statement process, as an impact associated with the proposal. This impact has been mitigated to the greatest extent possible. It is expected that there will be an increase in daily round trip travel times for private motor vehicles under the proposal of less than 10% of the expected travel times without the proposal in 2021. (See Parsons Brinkerhoff Australia, Capital Metro Traffic and Transport Impact Report 12 June 2015, Table 4.4, pg 39). This is considered to be an acceptable impact on the road network efficiency for the increase in public transport capacity of the proposal and the need for the light rail to have a priority run.</p>
	<p>A light rail alignment in the median will make access difficult for many, including the elderly, the disabled and children. Changing from bus to light rail modes could be problematic and a disincentive to public transport use if it involves crossing a busy Northbourne at grade.</p>	<p>The light rail project is designed to be 100% accessible including access to the platform. The NCA will require that an Access and Mobility Plan, prepared by an independent expert, to confirm that relevant standards are met and access is compliant. Ongoing consideration and planning for integration between different transport modes is occurring as part of the ACT Governments transport strategies.</p>

Attachment D Submission of Penleigh Boyd

NCA - Stage 1 Light Rail Network - Works Approval documentation – Comment p.1

NATIONAL CAPITAL AUTHORITY
STAGE 1 LIGHT RAIL NETWORK
WORKS APPROVAL
PUBLIC CONSULTATION

WRITTEN SUBMISSION

This written submission objects to the proposed work described on the Works Approval documentation for **Stage 1 Light Rail Network**.

Nature of Objection:

Canberra should demonstrate, to the nation and the world, excellence in design. It is in the National Capital Authority's charter to demand high quality urban design for our capital. The Stage 1 Light Rail Network does not demonstrate this required excellence. Bilbao, for example (image below), shows a level of excellence in the urban design of its light rail system which Canberra should meet or excel. The current Works Approval documentation promises neither.



Bilbao light rail

NCA Public Consultation Comment

February 2016 – submission author: Penleigh Boyd

CONSULTATION REPORT

NCA - Stage 1 Light Rail Network - Works Approval documentation – Comment p.2

The Spanish example, Bilbao's light rail network, is not cited here as an example of extravagant perfection. This example simply shows a normal "world standard" for good practical urban design. Concealed power lines would be a design improvement but, being realistic and working to a budget, Bilbao has handled that aspect well. Note the planting between the tracks which reduces stormwater run-off and does not form a heat-sink when sun drenched. The design of the current Stage 1 Light Rail Network Works Approval falls short in comparison and is not of adequate standard for our national capital. Remember too that Bilbao is effectively the "Geelong" of Spain. The design standard of its light rail network should not outdo Australia's capital city. However, such peripheral details are secondary to Canberra Light Rail's poor design concept. It is the poor concept - running the light rail on Northbourne Avenue's median strip - which is the subject of this objection.

How to overcome the objection:

High quality urban design begins with the conceptual thinking behind the proposal.

A poor concept, no matter how well or diligently constructed, will always result in a poor quality design outcome. At the very outset, the Stage 1 Light Rail Network Works Approval demonstrates inadequate urban design thinking.

There is no need to elaborate on the importance of Northbourne Avenue, as the gateway to Canberra, and the **dramatic sense of arrival** which it creates. For the Works Approval documentation to promote the destruction of this magnificent tree lined entry, proposing the removal of over five hundred healthy trees still with decades of life left in them, puts the concept of a "Bush Capital" to shame. It cannot be allowed to happen.

A better concept, more suited to Canberra's existing stage of urban growth, is to run the light rail on the road. This option does not seem to have been explored, yet.

A kerbside track position, on the existing road alignments, provides numerous advantages:

1. Existing trees on the Northbourne Avenue median zone are preserved
2. More logical kerbside entry to trams is provided
3. Safer access to trams for tram users (no need for pedestrian access to median zone)
4. Less likelihood of overhead power outages from falling tree limbs
5. Existing traffic signal systems can be retained
6. Cheaper and more efficient construction and operating costs
7. Quicker to build and therefore less disruptive to everyone

Note: The Works Approval documentation indicates that more than five hundred healthy trees on Northbourne Avenue, which are proposed to be removed as part of the submitted design, fall within the National Capital Authority's boundary. Accordingly, the NCA is the custodian of these trees. Whilst the NCA may not be the instigator of detail in the proposal, the NCA can insist on the protection of trees in the nationally significant areas which it controls. The ACT Government, as promoter of the current light rail design, should not be dictating their preferences to the National Capital Authority. The NCA must set high standards as they are charged with looking after the national capital, for all Australians.

NCA Public Consultation Comment

February 2016 – submission author: Penleigh Boyd

For the National Capital Authority to approve the destruction of these five hundred trees, it would make the NCA equally culpable in the proposed degradation of Canberra. The National Capital Authority needs to insist on a better design solution.

Note: Running the light rail on the road is apparently proposed for future light rail links between Civic and Russell. An on-road light rail track location is thus acceptable in principle to the light rail network proponents. As an aside, the NCA are to be congratulated for vetoing overhead power lines for the proposed future Civic-Russell link.

Recommendation:

As part of the Stage 1 Light Rail Network Works Approval assessment, the National Capital Authority should request an independent comparative study of the two options: Median strip location **Versus** On-road location.

At a minimum the study should compare the following key aspects of each approach:

1. Quantity of existing trees lost
2. Safety for light rail users
3. Effect on vehicular traffic travel times
4. Anticipated duration for the construction phase
5. Disruption of the construction phase
6. Costs of each option

The National Capital Authority should not make any decision on The Stage 1 Light Rail Network Works Approval documentation until receipt and assessment of this independent comparative study.

The proposed destruction of Northbourne Avenue’s existing trees, and the degradation of the sense of arrival into Canberra, is not a matter to be taken lightly. The National Capital Authority, as the custodian of the national areas of Canberra, must demand a better outcome than that currently proposed.

Thank you for providing a Public Consultation phase as part of your approvals assessment process. We do appreciate the opportunity to provide the above comments for your consideration.

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A. Assessment against the stated justifications for the project

B. Assessment against the stated objectives for the project

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Appendix A - The stage 2 extension

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Summary

The Capital Metro Works Approval Application to the National Capital Authority describes a proposed project that fails to meet the policies of the National Capital Plan, the objectives of the ACT Territory Plan and of the ACT Government's transport policy and even its own stated justifications and objectives. These failures are systemic to the design of the project and they are comprehensive. It fails environmentally, economically, socially and as a transport solution. Hence, the project is not "fit for purpose" as a transport solution for the national capital and so the Capital Metro Light Rail Works Approval Application should be rejected.

Section A - Assessment against the stated justifications for the project

The "NCA Works Approval Planning Report, Stage 1 – Gungahlin to Civic" section 1.2.1 "Project Justification" states:

"The ACT Government has identified Canberra's need for accessible, **high capacity** and **high quality** transport to increase the public transport mode share and reduce car dependence ...

The Capital Metro Project (the Project) is being developed to accommodate the predicted increase in Canberra's CBD and northern suburbs population over the next 20 years. This expected population growth means alternative transport modes will be needed over this time to reduce demand pressure on the existing transport network (i.e. road and bus) and improve transport network capacity, efficiency and reliability.

The goal to **improve transport is consistent with the Transport for Canberra** — Transport for a Sustainable City 2012–2031 Policy (Transport for Canberra) which aims to create a transport system that puts people first and links new development to investment in public transport.

Improvements to Canberra's transport network will ultimately assist in generating a number of economic and social benefits. Without improvements such as light rail, future development along the Project corridor would cause **further decline in traffic speeds, increased travel times** and therefore inhibit access to employment, community facilities, social and recreational activities."

A1. Assessment of the project against the "high capacity" criteria

An oft-stated aim of the project is to improve the public transport capacity along the route to encourage commuters out of their cars and onto public transport, thereby reducing congestion. One of the main periods of congestion is the AM peak.

Gungahlin and North Canberra are served by an extensive, high capacity and high quality bus network. Currently during the weekday AM peak hour between 7:00am and 8:00am, 30 buses leave Gungahlin Town Centre and travel to Civic on three different routes (service numbers 56, 57 and 58 and the 2xx express services).

The total passenger capacity on these services between 7:00am and 8:00am is 2130, of whom 1365 are seated. The bike carrying capacity on these services will soon be 60 (with 98% of buses to have bike carrying capacity by mid 2016).

By comparison, in 2019, in the same weekday AM peak hour between 7:00am and 8:00am, the project proposes to run 10 trams at 6 minute intervals. The total passenger capacity on these services will be at most 2070, of whom 660 are seated. The bike carrying capacity on these services will be 40.

Comparison of ACTION and Project absolute capacity, weekday peak hour, Gungahlin to Civic

	ACTION 2016	Tram 2019	Tram service/capacity decrease
Services per hour from Gungahlin Town Centre	30	10	67%
Passenger Capacity	2130	2070	3%
Seated capacity	1365	660	52%
Bike capacity	60	40	33%

[Note: the same analysis holds regardless of whether the AM peak hour is defined as leaving Gungahlin between 7:30am and 8:30am, or indeed for any period leaving within the 7:00am to 8:30am peak period.]

As can be seen, the proposed service delivers poorer service frequency, passenger capacity (and particularly seated capacity) and bike capacity.

The proposal's capacity is even worse on a per-capita basis given the increase in population forecast for Gungahlin from approximately 61,000 now to 72,900 in 2021, according to the ACT Government's "BACKGROUND PAPER 9: Population growth and demographic change, October 2011".

Comparison of ACTION and Project capacity per 1000 head of Gungahlin population, weekday peak hour, Gungahlin to Civic

	ACTION 2016	Tram 2021	Tram service/capacity decrease
Services per hour from Gungahlin Town Centre	0.49	0.14	71%
Passenger Capacity	34.9	28.4	19%
Seated capacity	22.4	9.05	60%
Bike capacity	0.98	0.55	44%

Hence, 2 years after the project is scheduled to start operating, the project will deliver much less per-head capacity than the current ACTION bus system.

One approach to this problem may be to increase tram service frequency from every 6 minutes to every 4 minutes. This increases per-1000-head passenger capacity to 34.1, still slightly below that of the current ACTION services, although per-1000-head seated capacity is increased to only 10.9, still less than half that of current ACTION services, and hence still falls short on capacity. However, such a change requires purchasing and operating 50% more trams than currently proposed. Most significantly, it will result in a

tram passing through each intersection in either direction on average every 2 minutes, resulting in the disruption of most traffic signal cycles on all 24 intersections and tram crossings by tram priority. Capital Metro have not released traffic modelling based on a 4 minute service headway, but the impact of already modelled tram-induced congestion conducted on a less frequent service will be greatly exacerbated by more frequent traffic phase interruptions.

In summary, by providing lower total passenger capacity, many fewer passenger seats and reduced service frequency, the project fails to meet its own “high capacity” criteria. The reduced passenger capacity of the tram will not allow the tram to service even the current public transport mode-share by 2021, and will encourage commuters to instead increase use of private cars.

A2. Assessment of the project against the “high quality” criteria

Many of the current ACTION bus services originate in Gungahlin suburbs “beyond” the Town Centre, and some travel through the suburbs of Throsby, Harrison, Franklin (and also Mitchell), collecting passengers at conveniently located bus stops close to their homes. Many services continue past Civic, to Russell, Barton, Kingston and Fyshwick, with the convenient outcome that many commuters never need to change bus.

In contrast, the proposed tram will travel on a single fixed route from Gungahlin Town Centre to Civic. Passengers not travelling from and to locations on that route first need to travel to a stop along the route which will frequently require catching a “feeder bus”, then walking from the bus stop to the tram stop, then waiting for a tram, then departing the tram in Civic, then walking to their bus stop, then waiting for the bus to their destination and boarding it.

For this majority of passengers that will require these transfers, a great deal of inconvenience and wasted time is added to their journey. For people with limited mobility, what was once one bus boarding and exit will typically become two bus boardings and exits, two additional walks and a tram boarding and exit.

The requirement to “change modes” is a well-recognised disincentive to the use of public transport, yet changing modes is what the tram will force on many would-be commuters.

There will be no passengers for whom travel to and from the tram stops will be quicker and more convenient than their current bus equivalent and for most, the tram will offer a much less convenient service and much longer total journey times.

Even along the tram route, the tram stops are placed much further apart than the current bus stops, an added inconvenience for all travellers, and particularly so for those with limited mobility, and for all during inclement weather.

Once aboard the tram, fewer than 32% of capacity passengers can be seated, compared to 64% currently on ACTION buses. When combined with the lower total capacity of the tram, this means most of the passengers currently seated on the bus will not have a seat on the tram.

Whereas using commuter time for activities such as reading and catching up on email is quite easily and comfortably achieved whilst seated, it is much more difficult whilst standing and “strap hanging”.

In summary, the tram will provide a lower quality service than the current ACTION buses because many passengers will need to “change modes” from bus to tram and/or walk further to access the tram (resulting in a longer door-to-door journey time), and because once on tram, they are only half as likely to be seated during peak commuter times.

Hence, by adding the inconvenience of mode changes, greater distance between stops, much less seating and longer door-to-door travel times, the project fails to meet its own “high quality” criteria.

A3. Assessment of the project against the “prevent further decline in traffic speeds, increase travel times” criteria

In the Capital Metro EIS Technical Paper 5: Traffic and Transport and Traffic and Transport Appendix B, “VISSIM model outputs”, the EIS modelling compares “base-line 2021” travel times (no Capital Metro project) with the “project 2021” travel times (with the Capital Metro project). The results of this modelling include:

- Average combined AM and PM peak period vehicle speed over the road network around the proposed route (not just traffic on the direct route) decreases from 27.8 km/hr without light rail to 23.1 km/hr with light rail (Table 4.2, page 38).
- For traffic on the direct route, the travel time for a peak-period return trip from Gungahlin to Civic with the predominant traffic flow (to Civic in the AM, to Gungahlin in the PM) increases from 52 minutes 6 seconds without light rail to 55 minutes 23 seconds with light rail (Table 4.3, page 39).
- The analysis of intersection performance over AM and PM peaks shows that the combined number of intersections at which traffic will exceed capacity more than triples from 2 without light rail to 7 with light rail. Further, the combined number of intersections which will be operating at the limits of their capacity doubles from 3 without light rail to 6 with light rail (Table 4.5 to 4.10, pages 41 to 45).

- Increased delays attributable to the project both travelling along and across the route will be substantial. For example, the EIS model estimates these average delays during the AM peak in 2021:

Intersection	Travel Direction	Delay without light rail (sec)	Delay with light rail (sec)	Increased delay attributable to the light rail project (sec)
Flemington Road Federal Highway	East-South	29.4	125.0	95.6
	East-North	79.5	174.6	95.1
	North-East	11.6	49.5	37.9
	North-South	28.0	64.5	36.5
	South-East	24.5	56.0	31.5
Federal Highway Barton Highway	North-South	34.4	230.5	196.1
	North-West	141.0	268.4	127.4
	West-North	90.3	182.4	92.1
	West-South	132.8	266.7	133.9
Northbourne Avenue Mouat Street / Antill Street	North-South	66.4	36.9	-29.5
	West-North	34.2	124.9	90.7
	West-East	63.0	174.6	111.6
	West-South	63.5	155.2	91.7
Northbourne Avenue Barry Drive / Cooyong Street	North-South	23.7	9.7	-14.0
	West-North	14.7	177.5	162.8
	West-East	52.4	163.5	111.1
	West-South	51.5	151.9	100.4

Source: [Traffic and Transport Appendix B, Table B1.3 and Table B2.3.](#)

Car travel times on individual legs

Southbound				Northbound			
AM		PM		AM		PM	
No light rail	With light rail	No light rail	With light rail	No light rail	With light rail	No light rail	With light rail
31:26	27:37	21:38	23:59	20:42	22:24	20:40	27:52

Car travel times for commuter round-trips

Gungahlin - Civic - Gungahlin		Civic - Gungahlin - Civic	
No light rail	With light rail	No light rail	With light rail
52:06	55:23	42:20	46:23

Source: [Table 4.3, page 39](#).

As can be seen, both round trips and with one exception, the individual peak period route travel times are significantly longer with light rail. That one exception is the AM southbound trip. Looking at the route breakdown for this exception show that even for this trip, the time taken for the trip south of Wells Station Drive to Civic is 30 seconds **longer** with light rail: all the travel time savings are for the Gozzard Street to Wells Station Drive section, the modelled time for which drops from 16:58 (no light rail) to 7:27 (with light rail), a difference of 9:31.

This reduction with light rail seems rather extraordinary. Gozzard Street, on the western end of the Gungahlin Town Centre, Hinder Street at the eastern end, and Kate Crace Street will be the routes taken by cars from northern and western Gungahlin to the new Park and Ride facility (to the south of Hibberson Street), which is planned to accommodate commuters attracted to the light rail.

Yet the model assumes cumulative AM peak traffic volumes on the Hibberson/Gozzard, Hibberson/Hinder and Hibberson/KateCrace intersections will *drop* from 3645 vehicles to 2699 vehicles with the light rail project. It seemed that drop may be the cause of much of the modelled travel-time reduction on the Gozzard Street to Wells Station Drive section of the route, but if the Park and Ride facility is taken-up by light rail commuters more than bus commuters (in line with the modelled light rail patronage increasing), surely the traffic to the Park and Ride facility will increase as well, increasing, not reducing the vehicle traffic in these modelled intersections. However, there was another reason...

The uncosted duplication of Flemington Rd south of Wells Station Dr, providing advantage to the "tram" model

The improvement of 9:31 with light rail on this short segment from Gozzard Street to Wells Station Drive section seems incredible and is unexplained. The ACT Government Environment and Planning Directorate (EPD) also noted this anomaly in their response to the EIS. The EIS preparation team explained that the "base" (no light rail) times were longer due to delays at Wells Station Drive arising from the two-to-one-lane merge just south of Wells Station intersection:

"The travel times listed in Table 10.6 and Table 10.9, including for the Gozzard

Street to Wells Station Drive section in the Base case AM scenario, are correct. The travel time for the southbound AM peak travel on this section was forecast to be higher in the Base Case compared to the Project Case, primarily due to congestion experienced at the Wells Station Drive intersection as a result of the two to one lane merge just south of the intersection. In the Project Case, this section of Flemington Road is proposed to be upgraded to two lanes south of Wells Station Drive, removing the congestion, and resulting in the Project Case performing better than the Base Case."

Source: Capital Metro Light Rail Stage 1 - Gungahlin to Civic Environmental Impact Statement Addendum Report, August 2015, page 19

That is, the light rail "Project" case reduces travel time by 9:31 on this section by assuming construction of additional road lanes on Flemington Road as part of the project. However, the [Capital Metro Business Case](#), which described all associated road works in detail on page 40, makes no mention of this road duplication, and it was not costed as part of the Business Case.

Furthermore, Capital Metro admits in the above extract that this duplication results in the better performance of "project" case on this leg. Hence, a fair comparison would assume these road lanes were also constructed in the "base" case, greatly reducing the 16:58 road journey time from Gozzard to Wells Station, probably to around the same 7:27 as the light rail case, perhaps less (in keeping with other segments having lower travel times without light rail).

That is, although the "no-tram" return trip was modelled at 52:06, a fairer comparison in which Flemington south of Wells Station Drive is also duplicated, would give a time around **42 or 43 minutes**, compared to the "tram" model return trip time of **55:23**. That is, the EIS Model suggests the commuter round-trip car journey time between Gungahlin and Civic will be **around 13 minutes longer if the project goes ahead**.

The bizarre teleportation of cars away from the Barton/Federal intersection, providing advantage to the "tram" model

The 2021 PM "tram"-model vehicle counts at the intersection of the Barton and Federal Highways are even more mysterious. Whereas the "no-tram" model has almost 1500 vehicles travelling from south to north along Northbourne onto Federal Highway at the Barton Highway intersection, the "tram" model has exactly 0 vehicles.

The ACT Government's Territory and Municipal Services (TAMS) noted this anomaly:

"P43, Table 4.8. At the Federal Highway/Barton Highway intersection there is a reduction in the pm peak traffic volumes between the 2021 Base and 2021 Project predictions of over 1,500veh. This seems significantly larger than differences predicted at other intersections."

Source: Capital Metro Light Rail Stage 1 - Gungahlin to Civic Environmental Impact

Statement Addendum Report, August 2015, page 32

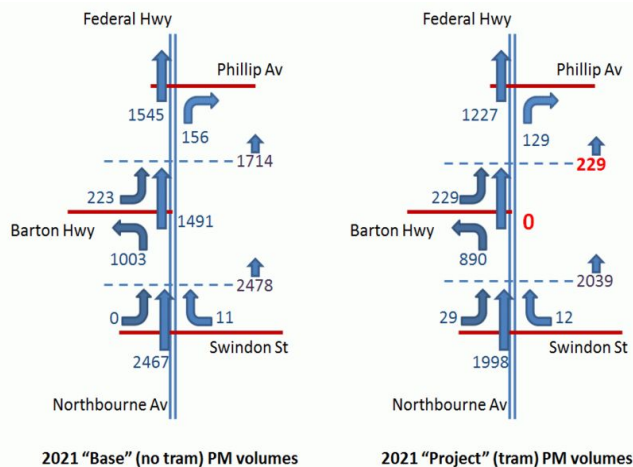
Capital Metro's response:

“Road network upgrades on parallel routes (e.g. Gungahlin Drive) assumed to be included in the Project Case scenario are anticipated to result in changes to the routes that vehicles take through the network.”

Source: Capital Metro Light Rail Stage 1 - Gungahlin to Civic Environmental Impact Statement Addendum Report, August 2015, page 32

Capital Metro's response acknowledge that over 1100 vehicles seem to have just disappeared from the model at between Swindon St and Barton Highway, only to reappear at the next intersection, Phillip Av.

Summarising the flows graphically reveals the problem - the "tram" model loses all vehicles travelling south to north at the Barton Highway intersection, only to have them reappear at Phillip Av:



Capital Metro's response to the TAMS query is illogical.

1. Firstly, the road network upgrades on Gungahlin Drive are neither described nor costed in the Business Case in which the road upgrades to be undertaken as part of the project are enumerated on page 40.
2. Secondly, the road network upgrade to Gungahlin Drive is independent of the Capital Metro project, and work started in [November 2015](#); hence, the benefits of teleportation of cars away from Federal Highway/Barton Highway intersection should be applied to both "base" and "project" cases, eliminating PM delays travelling north through this intersection.

3. Thirdly, if "changes to the routes that vehicles take through the network" really was happening, why do the cars reappear at Phillip Av, and how did they get there?

Unfortunately, this appears not to be a simple error, raising the possibility that it is a deliberate manipulation of the model to favour the "tram" case. It is implausible that the spreadsheets generated for the tables in EIS Volume 3, Part 5, Appendix B were generated by hand, and that these results are a simple omission. Firstly, the corresponding cell in the "signal delay" table is also missing for the "tram" model. Secondly, the same count is missing in the 2031 model. Thirdly, the VISSIM model "birds-eye" visualisation screenshots of traffic queues included at the end of EIS Volume 3, Part 5, Appendix B (page B-100) do indicate vehicles flowing in this direction in the "tram" PM models, which tends to suggest that one model was run for the screenshots and another for the detailed congestion data. Fourthly, when Capital Metro were given the opportunity to correct it as an error, they instead stated it was not.

The "tram" model benefits from the apparent omission of the traffic delay at Federal/Barton not being included in its PM travel time, but it is not trivial to estimate by how much.

Looking at the South-North PM travel time delays at surrounding intersections provides an estimate:

Intersection	Delay without light rail (sec)	Delay with light rail (sec)
Federal Highway /Phillip Avenue	15.1	28.9
Federal Highway/Barton Highway	29.8	[no delay modelled]
Northbourne Avenue / Swindon Street	11.5	77.6
Northbourne Avenue / Mouat Street / Antill Street	68.1	251.0

For the 3 intersections with corresponding data, the total delay is 94.7 seconds without light rail and 357.5 seconds with light rail, a ratio of 1 : 3.77. Applying this ratio to the unknown Federal Highway/Barton Highway delay gives an estimate of 112 seconds delay with light rail.

Adding this time to the previous PM north bound car trip time given by Capital Metro for the "Project" case (27:52) gives a trip time of 29:44, and hence the "Project" car commuter round trip time increases from 55:23 to 57:15.

That is, a fair comparison of the car commuter round trip time in 2021 between Gungahlin and Civic based on the EIS model is **42 or 43 minutes** without light rail and **57:15** with light rail. That is, the EIS Model suggests the commuter round-trip car journey time between Gungahlin and Civic will be **around 15 minutes longer if the project goes ahead**.

Note also the implications for average combined AM and PM peak period vehicle speed in

the road network, which Capital Metro model data shows as 27.8 km/hr without light rail, decreasing to 23.1 km/hr with light rail. Given the most trafficked route in the surrounding road network is Gungahlin-Civic, and given the "errors" leading to under-estimation of journey time with light rail and over-estimation of journey time without light rail, the difference in vehicle speeds for the two scenarios is certain to be considerably greater.

The cost of intersection delays along the route, AM and PM peaks, weekday

The Traffic and Transport Appendix B contains tables of traffic volumes and delays through intersections along the route in 2021 for both AM and PM peaks with the light rail and without.

By multiplying volumes and delays at each intersection and summing them across all intersections, it is possible to calculate the total delays for all vehicles traversing these intersections for both scenarios. It is also possible to estimate the difference in fuel consumption and carbon dioxide pollution attributable to intersection delays.

Because the EIS model mistakenly omits PM northbound traffic at Barton Highway, this was added to the calculation of total delay. However, the very substantial improvements to the "no light rail" scenario were not reflected in these calculations. That is, the calculations summarised below are still incorrectly biased in favour of the "light rail" scenario.

Scenario	AM peak delay (hours)	PM peak delay (hours)	Total delay (hours)
Without light rail	751	654	1405
With light rail	978	1041	2019

Even so, AM and PM cumulative delays at intersections on the route **increase by 614 hours each day, or 44%** with light rail in 2021, compared to the "no light rail" scenario in 2021.

Results from the revised traffic analysis released in February 2016

As part of the [revisions to Development Application 201528511 released in February 2016](#), an [updated traffic analysis was released](#) ("Canberra Light Rail (Stage 1) Traffic Assessment Report" by Transport Modellers Alliance). Unlike the traffic analysis in the Capital Metro Environmental Impact Statement, this new analysis only modelled traffic in 2031 (not also in 2021), and provided less detail (for example, signal phasing timings were omitted).

However, [like the EIS traffic analysis](#), it contains several serious errors (such as traffic

taking unavailable turns and missing data) and several contentious but unexplained assumptions, some of which are examined below.

The report's "bottom line" for the 2031 AM peak is that across all 27 intersections modelled, the average delay **will increase by 3 seconds per vehicle per intersection** if the tram is built. As discussed below, this estimate of degradation is extremely optimistic and the actual delay is likely to be significantly higher.

The report claims that vehicle volumes will be slightly lower with the project, but due to unambiguous mistakes in the model as reported (in which some rows were mistakenly duplicated, described below), vehicle volumes will actually be slightly higher with the project, which when combined with additional signals, more and longer signal cycles and disruption to optimal signal phasing, results in significantly increased congestion, delays and transport costs.

That is, this latest analysis confirms that far from addressing congestion, given the modelled assumptions of growth in population and demand for transport, the proposed tram only exacerbates the problem.

1. Travel times, 2031 AM peak, along the route

The following tables extract traffic volumes and signal delay only for "through" traffic (the dominant traffic flow) along the route. The extract begins at the intersection of Manning Clarke and Flemington closest to Gungahlin Town Centre, because different traffic arrangements with the Project closer to the Town Centre make comparisons invalid at Kate Crace and Hinder (basically, the project has added traffic signals at those intersections, and with the project, normal traffic does not travel along Highberson from Gungahlin PI to Hinder. The extract ends at London Circuit. Hence, this table shows traffic volumes and intersection delays south-bound down Flemington to London Circuit in the AM peak. Traffic volumes are given as vehicles per hour, delays are given in seconds.

Table 1 - travel within Gungahlin, AM Peak 2031

Intersection	Base (no tram)		Project (build tram)		Increase in delay with Project (s)
	vehicles/hr	delay (s)	vehicles/hr	delay (s)	
Manning Clarke	947	22	726	17	-5
Wizard	974	15	786	26	11
Mapleton	917	137	950	42	-95
Nullarbor	1042	52	1132	21	-31
Wells Station	1192	67	1350	36	-31
AVERAGE Vehicles, TOTAL delay	1014	293	1068	142	-151

Table 2 - travel south of Gungahlin, AM Peak 2031

Intersection	Base (no tram)		Project (build tram)		Increase in delay with Project (s)
	vehicles/hr	delay (s)	vehicles/hr	delay (s)	
Mitch ResCentre	1336	13	1464	21	8
Lysaght	1157	0	1296	19	19
Sandford	864	24	996	60	36
Randwick	961	8	1100	1	-7
Showground	966	2	1101	8	6
Federal Hwy	957	36	1107	48	12
Phillip	1681	16	1798	23	7
Barton Hwy	1409	50	1584	25	-25
Swinden	1998	20	2713	22	2
Mouat	1765	89	1915	75	-14
Morphett	2597	24	2751	11	-13
Macarthur	1830	41	1884	58	17
Ipima	1840	23	1885	35	12
Girrawheen	1691	13	1915	14	1
Elouera	1693	4	1950	10	6
Barry	1357	28	1459	45	17
Rudd	1752	10	1831	32	22
Alinga	1872	7	1991	22	15
London	1499	7	1708	25	18
AVERAGE Vehicles, TOTAL delay	1538	415	1708	554	139
AV/TOTAL ENTIRE ROUTE	1429	708	1558	696	-12

Observations on these tables

1. The (tram) project increases vehicle volumes.

An oft-stated objective of the project is to decrease the volume of vehicles on the roads. Indeed, the source document quotes as the first objective of the project: "get people out of their cars and on to Capital Metro" and goes on to expand: "The addition of transport capacity in a way that addresses current traffic problems and

integrates with other projects to revitalise urban areas and create a transformative urban living and working experience and allows Canberra to be free from a growing and unsustainable habit of car dependency, thus fulfilling Burley Griffin's vision for a truly liveable city." [Section 1.1]

However, as can be seen, the average vehicle volume travelling along the route increases by 9% from 1429 per hour if the tram is not built, to 1558 per hour if it is built. Average vehicle volumes increases along the route are even higher at 11% south of Gungahlin (Mitchell and North Canberra).

Hence, the proposed project fails to meet its objectives of decreasing vehicle volumes. Rather, vehicle volumes increase between 9% and 11%.

2. Intersection delays as modelled are inconsistent, and most notably inconsistent with increased volumes.

As can be seen from the above tables, delays on the route are modelled as decreasing by 151 seconds between Manning Clarke and Well Station, yet increasing by 139 seconds between Wells Station and London Circuit.

All things being equal, increased intersection volumes translate into increased delays. In the Project case, increased volumes should make delays even worse because signal phasing needs to accommodate additional cycles to give priority to the tram, and to accommodate the much greater pedestrian traffic crossing the route to access the tram stations in the medium strip. Furthermore, the project requires these additional signals: Hibberson/Hinder, Kate Crace, Mitchell Resource Management Centre, Lysaght, Light Rail Depot, Randwick Road, Pedestrian Crossing at EPIC, Swinden Street.

And indeed, for 16 of the 24 intersections shown, delays increase. However, 8 intersections have smaller delays with the Project, and these decreases are so great as to outweigh the increases in the model. As discussed below, this outcome is not credible.

3. Why the reduction of 95 sec at Mapleton is not credible

The base model shows a delay of 137 sec with 917 "through" vehicles on the route, compared to the project model of 42 sec with 950 vehicles. That is, whilst "through" vehicle volumes go up with the project, delays fall to one-third.

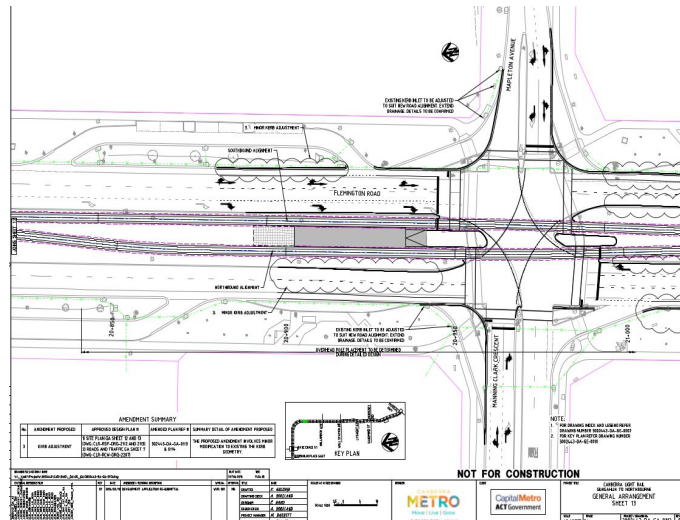
A possible explanation is that "downstream" volumes are greater in the base case, causing traffic to back-up at this intersection. However, this cannot be the case because as can be seen, volumes are lower along the route at ALL subsequent intersections with the base case, as far as London Circuit.

Another possible explanation is that the project case includes road-works to upgrade the intersection. However, the intersection diagrams show it looking much as it does now (same lanes, turning arrangements), so this is not the explanation.

Current intersection arrangement, Mapleton/Flemington:



Proposed intersection arrangement, Mapleton/Flemington:



Another possible explanation is that the Project model more strongly favours the main route "through" traffic, penalising cross traffic. However, whilst through traffic (for example from Mapleton crossing Flemington) is slightly higher in the tram case (80 compared to 67 vehicles/hr), delays for that traffic are also lower for the tram case (60s compared to 63s with the base case). Indeed, looking at the accumulated delays at this intersection (accumulated delays for all traffic on all routes across the intersection, the model shows them as averaging just 46s with the project and 80s with the base case, despite the total vehicle volumes at the intersection differing by less than 4% across both cases.

A final explanation is that the traffic signals have been (accidentally) deoptimised in the base case. Unfortunately, signal phasing times have not been published, so this is impossible to verify.

In summary, there are no plausible reasons why the lower volume of through traffic in the base case (917 vehicles/hr compared to 950 vehicles/hr) would not result in shorter delays, not longer delays. Hence, when coupled with the additional signal cycles needed to accommodate the tram and additional pedestrian movements to the station at Mapleton, the intersection delay for "through" traffic at this intersection is likely to be higher with the project, not lower.

4. Why the reduction of 31 sec at Nullarbor is not credible

The base model shows a delay of 52 sec with 1047 "through" vehicles on the route, compared to the project model of 21 sec with 1132 vehicles. That is, whilst "through" vehicle volumes go up by almost 9% with the project, delays fall to less than half.

As with the Mapleton case above, downstream volumes, roadworks and signal phasing to favour cross-traffic in the base case are not explanations (cross traffic is modelled as both having higher volumes and shorter delays in the project case). As with the Mapleton case, looking at the accumulated delays at this intersection (accumulated delays for all traffic on all routes across the intersection, the model shows them as averaging just 28s with the project and 47s with the base case, despite the total vehicle volumes at the intersection differing by less than 1% across both cases.

There are no plausible reasons why the lower volume of through traffic in the base case (1047 vehicles/hr compared to 1132 vehicles/hr) would not result in shorter delays, not longer delays. Hence, when coupled with the additional signal cycles needed to accommodate the tram and additional pedestrian movements to the station at Nullarbor, the intersection delay for "through" traffic at this intersection is likely to be higher with the project, not lower.

5. Why the reduction of 31 sec at Wells Station is not credible

The base model shows a delay of 67 sec with 1192 "through" vehicles on the route,

compared to the project model of 36 sec with 1350 vehicles. That is, whilst "through" vehicle volumes go up by over 13% with the project, delays fall to almost half.

As with the Mapleton and Nullarbor cases above, downstream volumes is not an explanation. However, cross-traffic volumes and delays (crossing Flemington along Wells Station) are higher with the project, which could indicate some extra signal priority being given to traffic along the main route. For example, traffic from Wells Station East crossing to Wells Station West increases from 255 to 341 (base to project), and their delays increase from 45s to 79s with the project. However, to perform a "like for like" comparison, this same relative signal priority should be given to traffic in both models.

As total intersection volume with the project is over 4% higher at Wells Station, it seems implausible that average delays at the intersection would go down. Hence, when coupled with the additional signal cycles needed to accommodate the tram and additional pedestrian movements to the station at Wells Station, the intersection delay for "through" traffic at this intersection is likely to be higher with the project, not lower.

6. Why the reduction of 25 sec at Barton Highway is not credible

The base model shows a delay of 50 sec with 1409 "through" vehicles on the route, compared to the project model of 25 sec with 1584 vehicles. That is, whilst "through" vehicle volumes go up by over 12% with the project, delays fall to half.

As with the cases above, downstream volumes is not an explanation: they are lower in the base case. The only cross-traffic in this case comes from Barton Highway turning right onto Northbourne. In the base case, there are 1104 vehicles crossing with an average 55s delay. In the project case, there are 1132 vehicles crossing with an average 68s delay. Hence, the project case signals may very slightly favour the "through" traffic at the expense of crossing traffic, but not enough to halve the delay. The latest drawings also show that it is not a case of roadworks at the intersection: if anything the merging lane just south of Barton intersection has been eliminated to accommodate a wider median, so this would be expected to increase delays in the project case.

There is a hint provided in the "base" case model which points to a deep problem with the base case calculations. Below are fragments of the base and project information for this intersection:

Base intersection flows:

141	Federal Highway / Northbourne Avenue	Barton Highway	Federal Highway (NE)	Right	383	151	F	303	57	F
			Through	1409	50	D	692	17	B	
			Left	1409	50	D	692	17	B	
			Northbourne Ave (SW)	Right	198	2	A	971	7	A
			Through	198	2	A	971	7	A	
			Left	198	2	A	971	7	A	
			Barton Highway (NW)	Right	1104	55	D	314	48	D
			Through	1104	55	D	314	48	D	
			Left	270	17	B	204	7	A	
			Total	All	5727	50	D	5771	21	C

Project intersection flows:

141	Federal Highway / Northbourne Avenue	Barton Highway	Federal Highway (NE)	Right	359	68	F	319	75	F
			Through	1584	25	C	736	11	B	
			Left							
			Northbourne Ave (SW)	Right	776	46	D	1438	49	D
			Through	776	46	D	1438	49	D	
			Left	209	3	A	1008	22	C	
			Barton Highway (NW)	Right	1132	68	F	363	47	D
			Through	1132	68	F	363	47	D	
			Left	248	26	C	227	10	A	
			Total	All	4308	43	D	4091	35	C

The columns are intersection number, intersection name, from direction, travel direction, and then 3 columns repeated first for AM peak and then PM peak: vehicles/hr, delay (s) and intersection rating (A for good to F for appalling). This discussion is only considering the AM peak information.

As can be seen, the base case contains 2 spurious rows: turning left from Federal Highway when approaching from the north (which would currently send you [into a row of trees](#)), and a non-existent (unnamed) approach road with a mysterious left turn. Both of these rows are duplicates of the Federal (North) "through" row (1409 vehicles/hr) and the Northbourne (S) turn left onto Barton row (198 vehicles/hr). As can be seen, these mistakes are repeated in the PM columns. These mistakes inflate the intersection volumes to 5727 vehicles - the correct figure is 4120 vehicles.

So, the base intersection combined volume is 4120 vehicles, and the project case volume is 4.5% higher: 4308.

As total intersection volume with the project is over 4% higher and "through" traffic on the route is over 12% higher at Barton it seems implausible that average delays at the intersection would go down, let alone halve. Hence, the intersection delay for "through" traffic at this intersection is likely to be higher with the project, not lower.

In summary, there are no plausible reductions for "through" delays at the four intersections examined of 95s, 31s, 25s and 25s with the project case. Instead, at all four intersections, the analysis suggests delays will be longer with the project case due to increased traffic volumes and signal delays. These 4 intersections alone will hence contribute an additional 176s delay on the route from that claimed by the latest model. Other intersections with claimed on-route improvements such as Mouat (14s less delay despite 15% more traffic at the intersection), Morphett (13s less delay despite 6% more traffic at the intersection), Randwick (7s less delay despite 4% more traffic at the intersection) are also very likely to be reversed because in each case, traffic volumes are higher (often considerably so) and signal cycles will be longer to accommodate the tram and greater pedestrian movement.

Hence, rather than a modelled 12 second reduction in intersection delays over the route, the reality is likely to be at least a **200 second increase in intersection delays attributable to the tram project**.

2. Vehicle volumes, 2031 AM peak

The "Canberra Light Rail (Stage 1) Traffic Assessment Report" accumulates the total traffic volume over all intersections along the route for both 2031 "base" and "project" case. This AM peak volume is 85121 vehicles/hr for the base case and 84619 vehicles/hr for the project case (Tables 3 and 4). However, the "base" case volumes contain at least 3 obvious errors:

1. 628 vehicles/hr at Flemington E at Wizard intersection (duplicated row)
2. 1409 vehicles/hr at Federal (NE) at Barton turning left (duplicated row)
3. 198 vehicles/hr on unnamed (non-existent road) at Barton turning left (duplicated row)

Hence, 2235 vehicles/hr have been erroneously added to the "base" case, and the corrected "base" figure is 82886 and hence 1733 vehicles/hr below the "project" case volume.

However, there are many other inconsistencies in the base-project data that suggest the increase in volumes in the project case may be slightly higher, such as:

- Federal Highway (approaching from north), turn right onto Flemington: "base" case is 113 vehicle/hr, "project" case is 87 vehicles/hr. It is hard to explain why this 23% fall would occur if the tram is built, as the origin of this turning traffic is distant from the tram line.
- Federal Highway (approaching from north), turn right onto Barton Highway: "base" case is 383 vehicle/hr, "project" case is 359 vehicles/hr. It is hard to explain why this 6% fall would occur if the tram is built, as the origin and destination of this turning

traffic is distant from the tram line.

- Macarthur Av crossing Northbourne to Wakefield: "base" case is 616 vehicle/hr, "project" case is 585 vehicles/hr. It is hard to explain why this 5% fall would occur if the tram is built, as the origin and destination of this crossing traffic is distant from the tram line.
- Barry Dr turning right at Northbourne: "base" case is 387 vehicle/hr, "project" case is 329 vehicles/hr. It is hard to explain why this 15% fall would occur if the tram is built, as the origin or destination of this turning traffic is distant from the tram line.

There is a further problem in the accumulated vehicle/hr intersection data in Tables 2 and 3 of the Traffic Assessment Report: the first two intersections (Gungahlin Pl, Hinder) will have incomparable traffic flows with the "project" case, as the road between them (Hibberson) will be closed to normal traffic and traffic will use intersections not included in the vehicle accumulation totals. The net result is to favour the "project" case by about 230 vehicles/hr, most of which will be spread across other (unmodelled) intersections.

In summary, for the AM peak period, after correcting for the large and obvious errors in the Traffic Assessment Report, **total vehicle volumes accumulated across the modelled intersections will be at least 2000 vehicles/hr higher if the tram is built**.

Another error in the model which affects intersection delay times is a consequence of the incompletely modelled removal under the project of right turns from Northbourne (southbound) at Rudd, Alinga and London Circuit. The project model has zero volumes at all three intersections, suggesting no right turns will be allowed. However, to compensate, the 194 vehicles turning right at these three intersections with the base case will presumably need to turn right at the last possible location before the Commonwealth Av Bridge, and that is at Barry Drive. (Alternatively, these 194 vehicles could turn left at London Crt, and loop around to the west, but the left turn volumes at London show no increase with the project, so that has not been modelled.) "Through" traffic from east to west of Northbourne at Rudd, Alinga and London is 6% higher with the project, so the "demand" to travel to West Civic is clearly still present in the project model, so it seems these extra 194 vehicles turning right have just been mistakenly omitted from the project model.

If re-added, they will increase the right turn volume at Barry from 334 (base) to at least 589 (project), a 76% increase in right turn traffic volume at Barry with the project, which will further increase delays at this intersection for this turning traffic (having to cross the tram), Northbourne northbound traffic (having to wait for this turning traffic) and cross traffic even more than the modelled increase (which already shows average delays at this intersection increasing by 23% with the project compared to the base 2031 model).

3. The elephant in the room: traffic congestion will be much worse in 2031 than 2014 if the tram is built, and only slightly better if it is not built

Despite numerous errors in the "base" and "project" models, there is one very clear message from the "Canberra Light Rail (Stage 1) Traffic Assessment Report": **between**

2014 and 2031, in the AM peak, vehicles per hour using intersections along the route will almost triple and average intersection delays along the route will at least double. Traffic will be slightly more congested/delayed if the tram goes ahead, but the tram makes things only marginally worse.

It could be argued that the model is flawed: looking 15 years into the future at a time of rapidly changing technology is fraught, and the forecasts for population growth, distribution of housing and workplaces and the demand for and usage of transport are almost certainly, all wrong. Work, shopping and study are all moving relentlessly "on line", a trend not considered in any of the Capital Metro planning documents. The Government could decide to promote more distributed services and workplaces, rather than the current fashion for concentrating employment and facilities in and around Civic.

But if the results of this traffic model are to be used as justification for anything, the inevitable conclusion must be that the proposed tram project is not the solution to Canberra's forecast traffic congestion it was prompted as being: as the model shows, it makes it even worse than the "do nothing" base case. That is, the results of this traffic model make it clear that a different approach is required.

This outcome is not surprising, as the addition of many traffic signals, signal priority for the tram which especially penalises the large volumes of traffic crossing the tram lines as well as damaging phasing flows for "on route" vehicles (necessary to give priority to trams travelling in both directions at average speeds different from road vehicles), and the very large numbers of pedestrians required to cross the route to access the tram stations in the medium strip, all reduce usable road capacity.

Separation of the rail from vehicles ("grade separation", as implemented by the Dulwich Hill light rail extension in Sydney and by almost all heavy rail systems) solves the degradation in road capacity, but at great expense. One approach now being widely discussed and modelled by urban and transport planners is based on a shared fleet of autonomous electric vehicles. Modelling [shows that this is a particularly appropriate approach for Canberra](#), addressing congestion as well as the availability and cost of transport.

A4. The ACT Government's "Rapid Service" Speed Requirement

As quoted above, the Planning Report claims "The goal to improve transport is consistent with the Transport for Canberra — Transport for a Sustainable City 2012–2031 Policy (Transport for Canberra)". It goes further, emphasising the importance of "Transport for Canberra in Section 3.2.6

"Transport for Canberra — Transport for a sustainable city 2012–2031 (Transport for Canberra) was published in March 2012 (ESDD, 2012b). Transport for Canberra is the ACT

Government's strategy for a more effective and efficient transport system to meet the needs of the community while reducing the environmental impacts of transport. It is the Territory's transport planning policy document and replaces the 2004 Sustainable Transport Plan (ACT Government, 2004) and is aligned with the land use plans and policies outlined in the ACT Planning Strategy (ESDD, 2012a)."

The ACT Government's 2012 document specifying its "foundation for transport planning for the next 20 years", "*Transport for Canberra: Transport for a sustainable city*", defines four service types. At the top of the pyramid is "Rapid Service", defined as:

"Public transport corridors for all day, high speed travel across the city along dense corridors. Analogous to a metro or rapid public transport system, and location for future light rail or bus rapid transit. Rapid services carry the majority of passengers, and can help achieve mode shift goals for work trips and associated emissions reductions."

[*Transport for Canberra: Transport for a sustainable city*, Table 2, page 19]

The speed standard for "Rapid Service" is set at 40km/hr including stops, in Action Item 17 of "*Transport for Canberra*":

"Adopt an operating speed standard of 40km/hr for the rapid service to guide the infrastructure investment program [within 2 years]"

Capital Metro adopted and publicised this goal in 2104, explicitly recognising the need to deliver rapid transport with an average speed, including stops, of at least 40km/hr. The Capital Metro website's FAQ page in March 2014 (archived by the Internet Archive, also in April 2014 version archived by NLA's Pandora) contained this commitment:

"How long will the journey/s take?"

The service will be a Rapid Service as defined in the Government's transport policy Transport for Canberra. An average speed of 40 km/hr (including stops) is required for this service."

Yet the Capital Metro Business Case and EIS specifies a 25 minute trip over the 12 km route, at an average speed of 28.8km/hr.

Much scepticism has been expressed by informed commentators that even this slow speed service will not be achievable on the proposed route. The new Gold Coast line, to which Capital Metro is often compared, with the latest light rail rolling-stock achieves barely 21km/hr under similar running conditions. Even the new Dulwich Hill light rail extension in Sydney which is entirely "grade separated", crosses no intersections and is entirely separated from other vehicles, achieves an average speed of under 26 km/hr, also with the latest rolling-stock. Capital Metro cannot nominate a comparable light rail system (running in an urban setting, not running in a segregated corridor, not protected by fencing

and level crossings, crossing over 20 intersections in 12 km) achieving an average speed of 28km/hr. It is noted that Capital Metro assert that the 3.2 km journey from Civic to Russell (Stage 2) will take 15 minutes at an average speed of 12.8 km/hr, casting further doubt on the practical day-to-day achievability of 28.8km/hr on the Stage 1 route.

The theoretical 25 minute journey time is achieved only with very high top speeds and very high traffic signal priority which, as the Capital Metro EIS model shows, increases congestion for other vehicles and greatly reduces vehicle average speeds.

From discussions with Capital Metro, they have not yet gained accreditation from the Office of the National Rail Safety Regulator (ONRSR) for the proposed high-speed travel needed to average even 28.8 km/hr, and even if it was granted, the achievement of this speed comes at the cost of reducing the average network speed of road traffic very substantially (more below).

In any case, the ACT Government's required 40km/hr for "Rapid Service" travel required in this corridor by their own planning document is 39% higher than the 28.8km/hr optimistically forecast by Capital Metro.

In summary, Capital Metro's own modelling shows a decline in traffic speeds, increased congestion and increased travel times resulting from the project compared to the "no project" base case. The project falls far short of meeting the ACT Government's own requirements for a rapid, inter-town service.

Section B - Assessment against the stated objectives for the project

The "NCA Works Approval Planning Report, Stage 1 – Gungahlin to Civic" section 1.2.2 "Project Objectives" states:

"Capital Metro Agency's project objectives for the project are to:

- increase the mode share of public transport
- optimise frequency and service reliability
- provide the Project at affordable capital and operational costs
- grow a more diversified Canberra economy
- stimulate sustainable, urban re-development along the corridor
- increase social and economic participation
- revitalise the Northbourne Avenue corridor
- reduce carbon and other emissions."

Each objective is examined below to see whether it is met by the proposed development.

B1. Increase the mode share of public transport

Increasing the mode share of public transport requires public transport to become more attractive than the alternatives of private motor vehicle, walking and cycling. The proposed route for light rail is already well served by ACTION buses. The primary claim for the light rail is to reduce peak period congestion and provide a better transport option for commuters from Canberra's fastest Gungahlin, into Civic. Hence, a fair test of the improvements or otherwise the light rail will provide is to compare the service it will offer to that of the current ACTION bus service in the weekday AM peak period.

As shown above, the proposed tram provides a lower capacity, less frequent, less convenient service.

Comparing average travel time on the route, Gungahlin to Civic in the entire AM peak period from 6:30am to 9:00am:

- the average time of ACTION "red rapid express" services (no stops) is 22.5 minutes
- the average time of all ACTION "red rapid" services is 29.5 minutes
- Capital Metro's current optimistic forecast for light rail is 25 minutes
- based on Gold Coast light rail and on rolling stock provision by Capital Metro, a more likely forecast is 32 minutes

Hence, even with much higher-than-normal running speeds (which are yet to be sanctioned by Office of the National Rail Safety Regulator) and very high traffic signal priority, the light rail is slower than the current "red rapid express" services on the same route. With likely speeds based on Gold Coast's actual operation and the rolling-stock requirements anticipated by Capital Metro itself (12 running trams plus 2 spares to provide

a 6 minute service frequency at peak times), the light rail will be slower than the average "red rapid" service from Gungahlin to Civic.

Outside peak periods, the current ACTION "red rapid" services are even faster: 21 minutes from Gungahlin to Civic, compared to 25 minutes currently forecast for light rail.

In summary, compared to the current ACTION bus service, the AM 7:30-8:30am weekday light rail service proposed in this application will be:

- less frequent, having **67% fewer services**
- be able to carry **19% fewer passengers** (seated and standing) on a 2021 population basis
- have **52% fewer seats**, and **60% fewer seats on a 2021 population basis**
- be able to carry **33% fewer bicycles**
- will provide a **longer journey time than the current "red rapid express"** and is very likely to provide a longer journey time than the average service on this route

Furthermore, many more passengers will be required to "change modes" to get to a light rail stop and reach their destination. Mode changes with their accompanying walk and wait are acknowledged as a strong disincentive to use public transport.

Consequently, it is very likely that light rail will not only fail to increase mode share of public transport, but it will trigger a further decline as potential passengers will be reluctant to be more likely to stand for a longer journey requiring multiple transfers.

Hence, the project is likely to contribute to a reduction in the mode share of public transport.

B2. Optimise frequency and service reliability

As noted above, light rail will reduce service frequency in the critical AM peak period by 67%, and provide 60% fewer seats using the 2021 population projections and 19% fewer total passengers (seated and standing) on the same basis.

Furthermore, as a single-line system, service reliability is not as robust as the bus alternative. As tram and light rail users in other locations know, an accident on the tram line or breakdown of a vehicle or problem with electrical infrastructure completely disables travel in one or both directions. Unlike buses, light rail vehicles can not be routed around trouble-spots. The road infrastructure contains redundancy, as was evidenced in Canberra recently with the Acton Tunnel closure.

In summary, the proposed light rail offers both reduced frequency and reliability to the current bus system.

B3. Provide the Project at affordable capital and operational costs

The Capital Metro Business Case estimates construction costs of \$783m and average

annual (real) operating costs of \$22.2m for the first 20 years. Assuming annual financing or equivalent asset holding costs of 10% (\$78m) and a 5% profit on assets (\$39m), the winning consortium hence requires annual revenue of around \$139m (\$22m + \$78m + \$39m). Assuming that the Business Case's projection of 6.37 million journeys in 2031 is the 20 year average, the real commercial cost of each journey is hence almost **\$22** (\$139m/6.37m journeys).

Assuming travellers pay an average net fare of \$2 per journey, a fair contract would require rate-payers to subsidise each journey by an average of **\$20**. An up-front capital contribution from the Government **does not change the effect of this subsidy on funds available for Government spending**, but does obfuscate it (by reducing the success payment to the consortium whilst not providing any return on the Government's contributed capital or accounting for the opportunity cost of the use of that capital in other productive ways such as health, education and community services)¹

Is 10% a realistic financing cost? The consortium bears all risks resulting from construction and operating cost overruns. Further, the Business Case estimate of construction costs (\$783m) seems low in comparison with [similar projects](#), and recent large civil engineering and construction projects in the ACT have a history of cost and time over-runs ([GDE](#), [Cotter Dam](#), [Alexander Maconochie Centre](#), [Constitution Avenue](#)). The construction is inherently complex and risky, and the project is not popular with the community. There is

¹ Consider the case where the Government makes an up-front capital payment of say, 50%, or around \$400m. It may be argued correctly that doing so reduces the Consortium's borrowing costs, but it is wrong to conclude that as a consequence, the commercial cost of a single journey on the light rail is reduced from \$22 to \$13. (Annual operating expenses of \$22m plus annual interest expense on \$400m of \$40m, plus profit on 5% of \$400 of \$20m give a total apparent annual costs of \$82m, which amortised over 6.37m trips gives a per-trip cost of almost \$13.)

This mistake arises from not considering the opportunity cost of spending \$400m as a capital contribution, that is, of not considering the opportunities forgone which could return a far better yield to the community than the 10% effective yield achieved by the capital contribution. For example, this \$400m could be applied to provide:

- Better insulation and heating for community housing. \$2000 spent on insulation and replacing gas heating with a heat pump typically returns much more than 10% pa in cost savings. Solar PV typically [yields over 10%](#), as does solar hot water.
- Preventive health and dental programs [are very cost-effective](#) in reducing demand for intensive and expensive health services and improving quality of life
- Improving early education [has a very high economic return](#), as does wider investment in education and training
- Prisoner rehabilitation programs [are very cost-effective](#) in reducing recidivism and improving lives

Alternatively, the ACT Government could just invest the \$400m in an ASX accumulation index vehicle, and with a high probability, achieve a long term return of 10%.

So, if the ACT Government could not achieve savings, income, or benefits to the community of at least \$40m per annum by investing a lazy \$400m in improving services and facilities, then using \$400m as capital to avoid additional "availability" payments of \$40m per annum may be the appropriate thing to do. However, with so many worthy projects currently waiting for funding, this is not the case.

Note that the direct and wider benefits to the community provided by light rail (and even whether it is net positive or negative) is a separate issue to this discussion, which is just about calculating the real cost of the provision of the service. Some component of that cost might be accounted as transfers of cash (by way of an availability payment), and some component might be accounted as a lost opportunity for more effective use of funds. Both components are equally "real" because it is the sum of both that determines the funds remaining to implement Government programs.

the added element of "sovereign risk" based on the Opposition's promise to "tear up" the contract noted above. In addition, if the Business Case assumptions on travel times are to have any hope of being met, the trams will need to travel at speeds far in excess of those operated by the new Gold Coast service, or on the Dulwich Hill extension in Sydney (which runs using latest rolling-stock in a completely separated and dedicated right of way). Such speeds will necessarily incur an operational safety risk premium.

Given these risks, an investor would need to compare an investment in Capital Metro with the risk and [100+ year \(long term\) return from the ASX accumulation index](#), of 10%.

These calculations do not include the added costs of capital which must be borne by the consortium prior to completion when the first "availability" payment becomes due. They also do not include the additional revenue to repay the loan principal: if the principal is repaid, annual loan servicing costs on \$783m over 20 years at 10% increase from \$78m to almost \$91m, requiring an extra \$2 revenue per trip.

In the unlikely event that financing at 7% is secured, annual asset holding costs fall from \$78m to \$55m and annual revenue required falls from \$139m to \$116m, giving a real commercial cost of each journey of just over **\$18**.

If, on the other hand, construction costs eventually come in at \$900m rather than \$783m, and financing can only be secured at 11%, and average patronage is 10% less than the optimistic estimate of the Business Case, then required annual revenue rises to \$166m, and the real commercial cost of each journey rises to **\$29**.

At a real commercial cost per journey of at least \$18, the Capital Metro project compares very unfavourably with ACTION..

B4. Grow a more diversified Canberra economy

The development application supplies no evidence that aside from providing very limited opportunities for light rail drivers and maintenance staff, it will diversify the Canberra economy. **To the contrary, the transport and economic inefficiencies it introduces will act as a dead-weight on the ACT economy for many decades.**

B5. Stimulate sustainable, urban re-development along the corridor

As demonstrated by the Capital Metro EIS and referenced above (B1, B2), the proposed development will increase transport travel times and congestion along the corridor. Consequently, transport-related pollution will also increase. Public transport services will be diminished in frequency, capacity and speed in comparison to the current ACTION bus services. **The effect of these negative developments will be to dampen demand for housing and workplaces along the corridor: far from becoming desirable, it will become a locality to avoid.**

B6. Increase social and economic participation

As demonstrated above (B3), the proposed development will act as a dead-weight on the ACT economy for decades. Furthermore, the reduced public transport capacity and capability (B1) and increased congestion and travel times caused by the project will make social and economic participation more difficult, particularly for the economically disadvantaged. **The effect of these negative developments will be to reduce social and economic participation.**

B7. Revitalise the Northbourne Avenue corridor

It is hard to know how this objective would be measured. However, as demonstrated by the Capital Metro EIS and referenced above (B1, B2), the proposed development will increase transport travel times and congestion along the corridor. Consequently, transport-related pollution will also increase. Public transport services will be diminished in frequency, capacity and speed in comparison to the current ACTION bus services. The effect of these negative developments will be to dampen demand for housing and workplaces along the corridor, including Northbourne Avenue. **Far from becoming desirable, it will become a locality to avoid.**

B8. Reduce carbon and other emissions

As shown in Section A, the proposed development will increase travel times and congestion and as a result, emissions of carbon and other pollutants will increase. The Capital Metro EIS model indicates that by 2021, emissions attributable to delays at on-route intersections in AM and PM weekday peaks alone will increase by over 44%.

There are two points to make regarding the replacement of diesel and LNG-burning buses with light rail:

B8.1 Replacement of buses on the route

The ACT Government claimed that light rail will "free up" one million bus kilometres (Mick Gentleman quoted in Canberra Times, 8 Nov 2015, "Gungahlin tram to free up more than one million bus kilometres, government says" [

<http://www.canberratimes.com.au/act-news/gungahlin-tram-to-free-up-more-than-one-million-bus-kilometres-government-says-20151108-gktneu.html>]

ACTION buses travelled 25.6 million km in 2014-15, and used 11 million litres of diesel and CNG to do so. Hence, "freeing up" one million km can be expected to save 1/25.6th, that is 430 kL of fuel, equating to **1160 tons** of greenhouse gases (CO₂-e) (based on the EIS calculations, as discussed below), which seems like a good thing to do.

However, by 2021, ACTION would probably be following many other jurisdictions around

the world in replacing diesel and CNG powered buses with electric buses, able to use the same 100% renewable power as the light rail, so these savings may be much smaller or even zero.

B8.2 Carbon cost of the construction

Table 11.4 of the Capital Metro Stage 1 EIS (Volume 1, Chapter 11, page 278) contains the following table of greenhouse gas emissions for the project:

Table 11.4 Summary of GHG emissions for the Project

	Quantity	Energy conversion	Energy GJ	Greenhouse conversion	GHG t CO ₂ -e
Diesel					
Fuel for transport purposes off and on site	3066.08kL	38.60 GJ/kL	118,350.69	69.90kg CO ₂ -e/GJ	8,272.71
Electricity					
Site offices	821,061kWh	3.6 GJ/kWh	2,955.82	0.86kg CO ₂ -e/kWh	706.11
Materials					
Steel					
■ Rebar	6,584 t				10,472.58
■ Rail tracks	3,003 t				3,557.29
■ Other	1,699 t				6,309.11
Concrete	156,874 t				29,436.11
Asphalt	9,356 t				600.69
Materials Subtotal					50,375.78
Vegetation cleared	7.17ha			209t CO ₂ -e/ha	1,499.16
Total					60,853.76

As seen, Capital Metro expect the project's construction will generate **60,864 tons** of greenhouse gases (CO₂-e) . In contrast, the predicted annual savings by removing the specified ACTION diesel and CNG buses is **1,160 tons** of greenhouse gases (CO₂-e). Even assuming the buses were not converted to electricity, the greenhouse "pay back" time of the project is $60864/1160 = 52$ years. It is very unlikely that greenhouse fuels will be powering buses in 15 years, let alone 52 years.

As has been noted, even Capital Metro's forecasts show that the light rail will change the commuting habits of very few people, and indeed, the planned passenger capacity per 1000 Gungahlin residents is lower with the light rail than with ACTION buses (see B1 above). Furthermore, Capital Metro's own modelling shows that as a consequence of increased congestion, greenhouse gas generation attributable to delays at intersections are at least 44% higher with light rail than without (an extra approximately 725 tons of

carbon dioxide).

In summary, the construction of this proposed development will generate more than 52 times the greenhouse gases generated annually by the buses it will replace, and its operation will greatly increase congestion and consequent production of greenhouse gases. The net effect of the development is to produce a net increase of greenhouse gases and other pollutants.

Hence the project will result in a net increase of carbon and other emissions

In summary, the project does not meet its objectives.

Section C - Assessment against the National Capital Plan

As described on the National Capital Authority website:

The National Capital Plan (the Plan) is the strategic plan for Canberra and the Territory. It ensures that *'Canberra and the Territory are planned and developed in accordance with their national significance'*

Capital Metro's NCA Works Approval Planning Report responses to various policies in the National Capital Plan, including the following:

5.2 Policies for Transport

Policy: "Transport strategies should promote the convenience and efficiency of public transport use."

Although CMA claim "Policy met", the analysis in sections A and B above based on Capital Metro's documents clearly demonstrates that the impact on transport, both public and private, will be strongly negative. That is, the proposed project provides poorer transport outcomes than the current ACTION bus services at both Capital Metro's 2021 and 2031 projections comparing the "base" (do nothing) and "project" (build the tram) case.

In particular, Capital Metro's modelling shows that in both 2021 and 2031:

- traffic volumes and traffic congestion will worsen if the tram is built
- average traffic speeds will be slower if the tram is built
- more intersections will be operating at or above capacity if the tram is built

Comparing current ACTION bus services against the proposed tram services shows:

- the tram provides a less frequent service
- the tram carries fewer passengers and bikes in total in the AM peak period
- the tram carries less than half the number of seated passengers in the AM peak period
- the tram requires more mode changes, longer journeys to stops and will result in much longer overall travel times for public transport passengers

As such, Capital Metro's claim that the project meets the NCP Transport Policy is contradicted by the evidence from their own Environmental Impact Statement, Development Applications and Works Application.

9.2 Policies for Infrastructure

Policy (12.3.c) : The planning and provision of electricity and telecommunications facilities should be undertaken in a manner which takes all reasonable steps to minimise the visual effects of transmission lines, substations and telecommunications facilities on the natural and built environments of the National Capital. Detailed policies for the installation of telecommunications facilities are set out at 12.4.

CMA's response to this policy is:

"Not applicable to the Project. This component of the Project does not involve any electricity or telecommunications facilities."

However, the project does indeed involve extensive "electricity facilities", namely overhead electric cabling along the route and numerous substations to supply power to this cabling, and associated tram control and signalling infrastructure.

Section 12 of the National Capital Plan addresses infrastructure but does not specifically address electricity *power* cabling, such as the tram is proposing to use in the designated areas along Northbourne Av and Federal Highway. However, the NCA has already stated that overhead cabling is not acceptable in other designated areas such as Constitution Av, as it would contravene the specific policy "vi" in section 12.4.2 of the NCP"

"Cable Rollout – Approval within Designated Areas for overhead cable rollout will only be given where overhead services already exist and where the National Capital Authority is of the opinion that the proposed cable will not impact adversely on the locality."

This policy is very clear: overhead cable rollout is only acceptable in those locations where it already exists, AND where it does exist, only when the NCA is of the opinion further rollout will not create an additional adverse impact.

Because the designated areas in the centre of Northbourne Av and Federal Highway do not have existing overhead cable, the proposed tram cable should not be approved according to this section 12.4.2.vi of the National Capital Plan.

Capital Metro cannot avoid this problem by claiming that this section is contained under the telecommunications section of the NCP, because overhead cable creates the same "visual pollution" regardless of whether it is carrying electricity or telecommunications. Both types of cabling requires poles for support, and indeed the need for electrical isolation and for mitigating the dangers of fallen cables requires poles supporting electrical cables need to be more resistant to damage and hence sturdier, more numerous and more imposing.

Imagine ACTEWAGL submitted a works proposal to run overhead power lines down the centre of Northbourne Av and Federal Highway: what would be the expected response of the community and the National Capital Authority?

Capital Metro's claim that the NCP's policies on infrastructure and cable rollout are not applicable to the project are contradicted by the intention in the NCP that overhead cables not be allowed in designated areas, and the NCA's previous determination that they will not be allowed along Constitution Av.

If the project had provided an improvement (rather than a deterioration) to Canberra's transport, it may have been worthwhile considering approval of the project subject to the same conditions that the NCA has already stipulated along Constitution Av: wire-free running.

3.4 Main Avenues and approach routes

Policy 2.2 ii. The Main Avenues and Approach Routes will be developed and maintained as high quality landscaped corridors...

Policy 2.5 Landscape Experience

- to ensure Canberra's unique setting within the natural landscape is reflected in the sensitive design and landscape treatment for the highway which reinforces the perception of the National Capital; and
- to recognise the significance of views to the surrounding hills and ensure engineering structures respect the landform and landscape patterns

The proposed tram is a major industrial infrastructure, requiring an imposing industrial landscape of tracks, poles, overhead cabling, additional signalling and signs, safety barriers/fences and extensive road signage and markings.

Proponents of such projects typically go to great lengths to down-play the strongly negative visual impact such infrastructure are associated with, and particularly during the project approval stage. Whilst often jarring in an already heavily urbanised setting, the visual impact along the currently beautiful centres of the avenues providing the main approach route to Canberra will be particularly damaging.

Many artists impressions of the Capital Metro have been circulated which deliberately down-play the visual impact: cabling is omitted, or barely visible, poles are rarely seen, accompanying necessary barriers, signage and road markings are somehow absent.

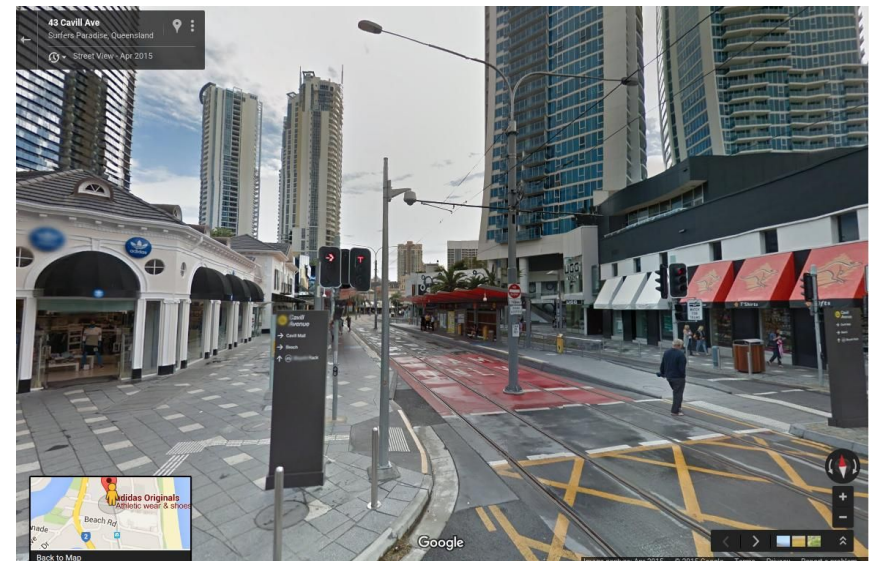
Comparing artists impressions of the Gold Coast light rail with reality is a reminder of how misleading this publicity can be. "Artistic license" is one thing, misrepresentation is another.

Some examples follow:

Cavill Av promotion ("artist impression")



Cavill Av reality (April 2015)



Scarborough St promotion ("artist impression")



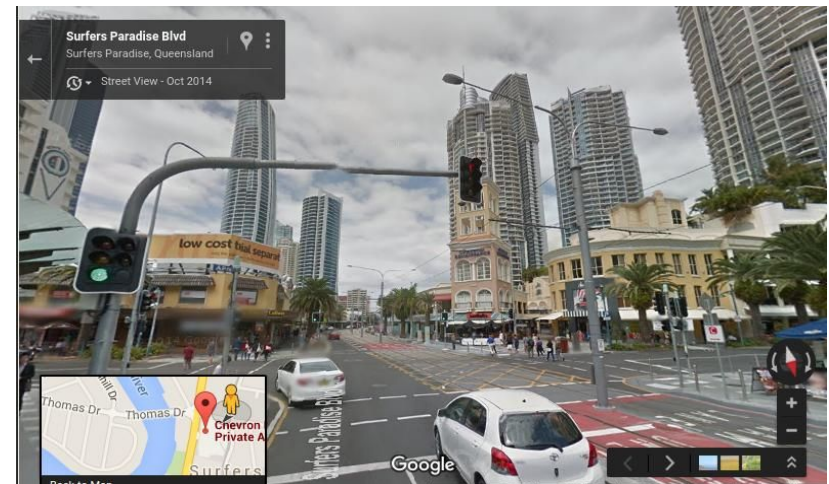
Scarborough St reality (April 2015)



Surfers Paradise Blvd promotion ("artist impression")



Surfers Paradise Blvd reality (Oct 2014)

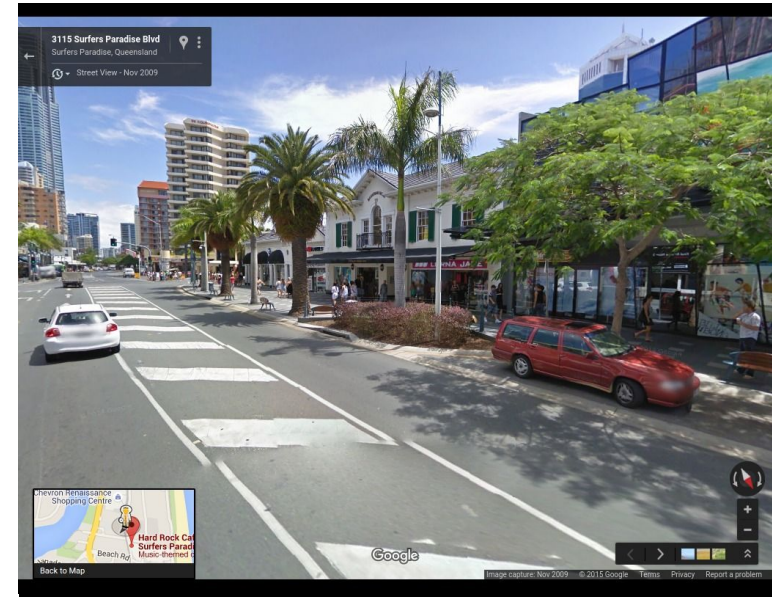


Google Street View offers the ability to compare stretches along the Gold Coast light rail route before and after construction:

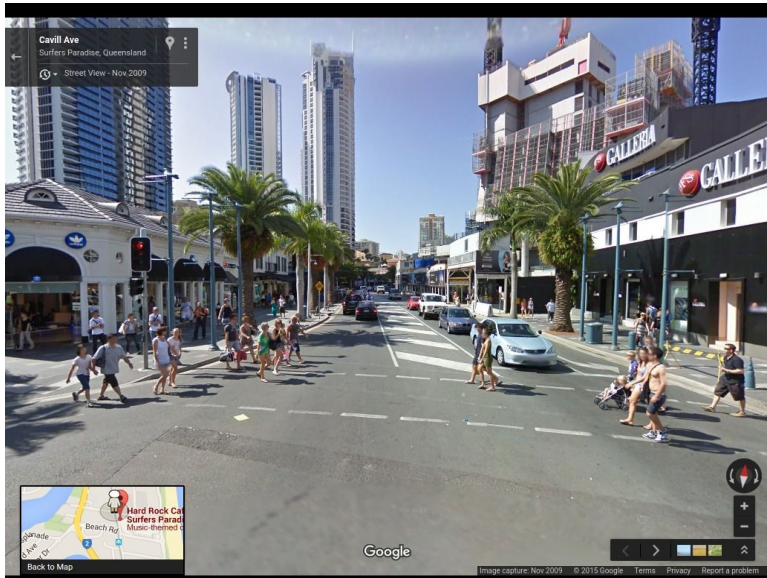
216 Queen St before and after



Surfers Paradise Blvd before and after



At Cavill Av, before and after



At Nerang St, before and after



At Scarborough St, before and after



Not only is the visual amenity reduced by the light rail, but the tram track acts as an additional barrier, increasing the isolation of the road-sides along the route.

This image of the Gold Coast tram line from Queen St to Wardoo St ([photographer: Simon Morris](#)) shows the impact of tram infrastructure on the street-scape:



It is also necessary to consider the inevitability of extensive safety barriers along the route. Capital Metro's claimed travel times require extensive operation at 70km/hr and 60km/hr along the route. These are very high speeds for light rail not operating in a dedicated (completely fenced off) right-of-way, and are the same travel speeds reached by heavy rail on, for example, the Cranbourne line from the south-eastern suburbs of Melbourne.

The emergency stopping distance under ideal conditions from 70km/hr of a loaded tram of the type CMA are proposing is over 96m, compared to 72m for a semi-trailer and 59m for a car. Indeed, given the weight of a loaded 33m tram is similar to a "b-double", the proposal is equivalent to running fully-loaded "b-doubles" with defective brakes and the inability to swerve, along some of Canberra's busiest roads and across many of Canberra's busiest intersections, at 70km/hr, every 6 minutes, in each direction.

Despite operating at similar speeds to that of the proposed Capital Metro, Melbourne's rail is completely segregated from traffic, with road crossings by tunnels, bridges but sometimes by level crossings; normal signalised intersections do not provide adequate safety. But these level crossings, such as those on the Cranbourne line, are so dangerous and congestion-causing that the Victorian Government is spending \$2.4 billion to remove

20 of them by 2018, and will spend more to remove 50 by 2023. Yet Capital Metro propose 23 rail crossings on their route across many of Canberra's busiest intersections, none with tunnels, bridges or even the basic protection of a level crossing.

Although extensive safety barriers have been omitted from the proposal for aesthetic reasons, should the project go ahead, the community and the NCA will inevitably be forced to accept their adoption for reasons of public safety.

In summary, the proposed light-rail project is inconsistent with at least 3 policies in the National Capital Plan:

- it proposes to replace a convenient and efficient public transport with one with less convenience and lower capacity which Capital Metro's own modelling shows will reduce the efficiency of transport in Canberra
- it proposes to rollout overhead cabling (and supports) in contravention of an explicit policy disallowing overhead cabling in designated areas, which has already been applied by the NCA on the proposed Stage 2 route along Constitution Av
- it will greatly diminish the visual amenity currently provided along the main approach route to Canberra.

Appendix A - The stage 2 extension

The Stage 2 extension is not considered as part of this application. However, the prospect of the future development of Stage 2 may be used in an attempt to mitigate some of the problems with Stage 1, for example, reducing mode change in Civic for commuters travelling from Gungahlin to Russell.

However, Stage 2 represents an even poorer transport service than Stage 1.

Between 7am and 9am each weekday, the proposed tram will offer 20 services from Civic to Russell at an interval of 6 minutes. Currently over this same period, 65 ACTION buses servicing 14 routes arrive in Russell from Civic, at an average interval of under 2 minutes. The tram's total AM peak passenger capacity on that route is 4120 with only 1320 seated. ACTION's equivalent capacity is 4615 with 2951 seated. The 14 bus routes collect passengers across North Canberra, many of whom would need to leave their bus in Civic, walk to the tram station and wait for a tram. The proposed tram will take 15 minutes to travel the same route serviced by ACTION in 8 minutes before Constitution Av became a semi-permanent construction site which will eventually reveal a new dedicated bus lane.

Capital Metro's Stage 2 Development Application warns of increased road congestion caused by the tram along London Circuit, Constitution Av, Coranderrk St, Northbourne Av and even Barry Dr.

References:

BACKGROUND PAPER 9: Population growth and demographic change, ACT Government, October 2011

http://www.planning.act.gov.au/__data/assets/pdf_file/0005/25682/Planning_Background09_Population.pdf

Transport for Canberra: Transport for a sustainable city, ACT Government, 2012

http://www.transport.act.gov.au/__data/assets/pdf_file/0003/397245/Pages_from_EDS_ACT_Transport_Policy_FA_final_web.pdf

Capital Metro Light Rail Stage 1 - Gungahlin to Civic, Draft Environmental Impact Statement Volume 1, Executive Summary

http://www.planning.act.gov.au/__data/assets/pdf_file/0018/41328/Capital_Metro_Light_Rail_Stage_1_Draft_EIS_Volume_01_Executive_Summary_and_Contents-printable_version.pdf

Capital Metro Light Rail Development Application, Stages 1 and 2

http://www.planning.act.gov.au/development_applications/capital_metro_light_rail_development_application

Capital Metro Draft EIS Technical Paper 5: Traffic and Transport:

http://www.planning.act.gov.au/__data/assets/pdf_file/0015/41352/Capital_Metro_Light_Rail_Stage_1_Draft_EIS_Volume_03_Part_5-Traffic_and_Transport.pdf

Attachment F Submission of John L. Smith

Attachment E

Capital Metro Light Rail Works Approval Application

To: National Capital Authority

Submission by: John L. Smith

March 17, 2016

I wish to comment on the works approval application before you to develop light rail along the Federal Highway and Northbourne Avenue corridor.

This corridor is identified as multi-use including public transport in the National Capital Plan.

Your authority is to assess planning, design and development.

This project is a defining project for the form and quality of public transport for decades into the future, in the northern part of Canberra at least, if not widely across Canberra. Therefore it should not only be of high quality design and promised development, but should be scalable to a doubling of Canberra's population.

Others have already shown that this project will not be a high quality development because even at its commencement it will not improve on the services that already exist. You will be able to verify this fact by consulting ACTION, the operator of Canberra's bus services.

However the design has little if any scope to expand its capacity or improve its service quality to respond to future growth. This is because it has the fundamental limitation of not having the right of way grade separated from road traffic, and completely open to pedestrians. In this respect the design is premised on having trams given priority over road traffic at every intersection. It is clear (see Appendix A) that this will have serious impact on road traffic congestion for marginal improvement in journey time.

You will note that the design documents presented to you show scope for increasing the platform length for tram stops by approximately 25%. This limited scope for expansion of capacity is a fundamental design flaw. Without grade separation, significantly increasing the number of modules on a light rail train is highly problematic and would not be an option for the future.

Because journey distance is the most significant factor affecting transport preferences in Canberra, it is paramount that any transport design yields and maintains fast services into the future. The design submitted to you is for slow services that will only get slower as Canberra grows (see Appendix A).

You would already be aware that, in the context of Infrastructure Australia, it has already been shown that bus-ways represent a cost effective means of improving Canberra's transport. Indeed there is a project on the Infrastructure Australia Priority List, February 2016, to develop two bus-ways in Canberra. Why is there an application to develop light rail before you if the ACT government has a major investment in bus ways in mind? Bus ways can deliver fast services. It would be a gross failure of your responsibility in assessing the application to ignore the new technologies that are becoming available and the way that they would merge with current investment in bus-ways.

A Model of Phase Loss due to Tram Priority at an Intersection

John L. Smith PhD,

76 Hawkesbury Cres Farrer ACT 2607

March 2016

Abstract

A 4 phase abstraction of a signalised intersection is combined with the advertised dynamic movement parameters of the Urbos 3 tram to show the affects of a representative tram priority algorithm. The affect on cross traffic is to reduce the hourly cross traffic movements by 15% for regular services of 10 trams per hour, and by 22% for a service rate of 15 trams per hour. The expected journey time from Gungahlin to Civic is 28 minutes with priority and 32 minutes without priority.

1. Intersection Priority Model

Figure 1 shows a possible traffic signal cycle and phases for road traffic at an intersection.

t_c = cycle time at an intersection;

t_g = time allocated to green in the major flow direction, which is also corresponds to the to/from tram directions;

t_n = green time during any other normal phase;

t_p = inter-phase time (yellow and red signals).

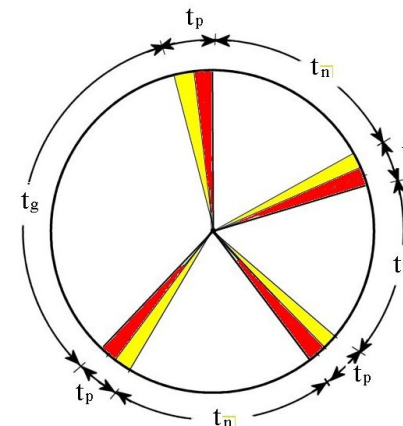


Figure 1. An example of four phases $t_c = t_g + 3*t_n + 4*t_p$. The phase of green time length t_g is the phase for movement in the to/from directions of trams. The interval t_p is for road traffic signals only. There is a different traffic light and stop signalling for trams that approach the intersection in either direction.

All trams will approach the intersection at a safe speed (30kph). There is a detector for the approach of a tram to an intersection so that its presence can be detected in advance of it reaching the intersection. Then, if necessary, it may be signalled to stop at the stop line.

t_s = time taken for a tram travelling at safe speed to decelerate to stop;

t_d = t_s + safe driver reaction time + any delays from detection to a signal to stop being apparent to the tram driver.

t_w = time taken for the tram to cross the intersection at safe speed

So there would be a signal placed more than d metres before the stop line (where d is the distance that a tram would travel at safe speed in t_d seconds) normally indicating to tram drivers to stop at the stop line. This signal would indicate to drivers to continue at safe speed and cross the intersection in the circumstance described below.

For this reason there would be two sets of lights in each direction to control trams. The lights further away from the intersection force trams that cannot reach the stop line before the special phase begins to delay until the next special phase. So if a tram's trajectory is such that it would not be able to stop at the stop line before the special phase begins it must be detected far enough away from the stop line that it can stop or slow down and subsequently proceed to the stop line where it will wait for the next special phase.

The cut off is defined by a tram at a distance from the stop line such that the driver can react to a signal and stop at the stop line (the equivalent time in the cycle being t_d seconds before the special green phase begins). However what signal placement and form of signalling that is used is an operational matter that is of no concern in the modelling

If the approach of the tram to an intersection coincides with the early part of the phase for traffic movement though the intersection in the direction of the tram, then the tram would proceed at safe speed in unison with the road traffic in its direction and there would be no additional lost time to cross traffic queued at the intersection.

If a tram approach is detected towards the end of the above phase, the phase will be extended (Figure 2) by a time necessary for the tram to travel to and across the intersection. There would be no extension if the tram is detected less than t_d seconds before the normal beginning of the next phase. The remote signal would have been set to stop, at least t_d seconds before the beginning of the next phase.

The road traffic end of extended phase signalling is shown in Figure 2. We assume that detection and signalling for trams will only permit one tram to cross an intersection during a cycle. We assume that a tram that has crossed the intersection is detected, thus allowing the next phase for road traffic to begin. The value for t_w and t_z (see below) should be adjusted so that there is a safe gap after the end of the tram has passed through.

There would be a period before the end of the green phase when it could be extended. Assuming that it is always extended by a period t_w , the expected time lost to road traffic crossing the tram line at an intersection per tram passing in either direction is (t_w^2/t_c) .

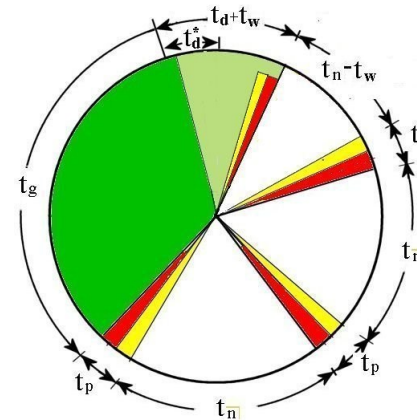


Figure 2. Extending the main phase for tram movement, the diagram shows the maximum extension. The yellow and red timings are for road traffic only.

In the above case a tram that is signalled to stop before the end of the phase or up to t_d seconds before the end of the next phase would stop at the stop line. The special tram phase would then be invoked at the end of that phase and the following phase would be truncated (Figure 3). The expected time lost to traffic at an intersection per tram passing in either direction is $t_z * (t_p + t_n) / t_c$ where

t_z = time taken for the tram to cross the intersection from stopped at the stop line.

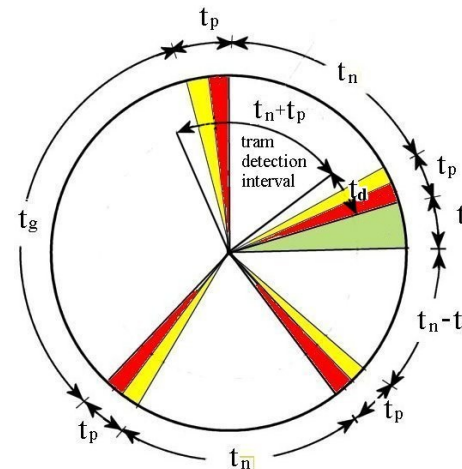


Figure 3. The special tram phase at the end of the first phase after movement in the tram direction.

Similarly a tram detected during the interval of length t_n+t_p shown in Figure 4 would be delayed at the stop line waiting for a special tram phase at the end of the next phase. The expected time lost to traffic at an intersection per tram passing in either direction is the same as for the situations in Figure 3.

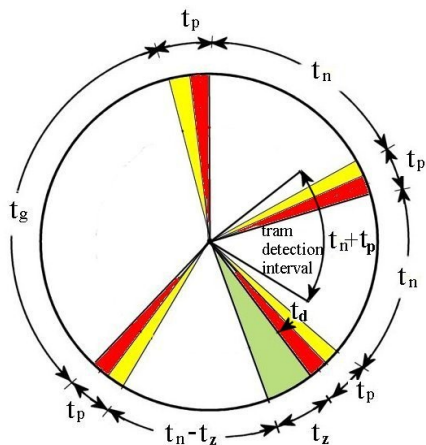


Figure 4. Another special tram phase.

Similarly if a tram detected during an interval of length t_n+t_p shown in Figure 5 in the phase that precedes the phase for movement in the tram direction, that phase will be truncated by a time t_z . Thus the green phase in the direction of the tram may start t_z seconds early if a tram is detected early in the previous phase. Trams detected in this case would stop at the stop line for a period before proceeding on the early green. Extending by any more than t_z would not advantage many trams and would be wasteful of scarce time for the phase being truncated. The expected time lost to traffic at an intersection per tram passing in either direction is the same as for the situations in Figure 3.

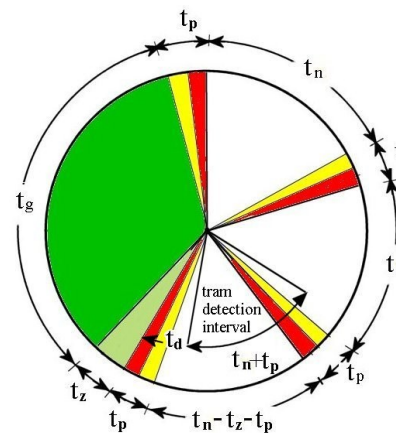


Figure 5. Early start of the phase for traffic in the direction of the tram.

Ignoring the possibility that trams travelling in opposite directions will cross at an intersection the expected time lost to traffic at each intersection per tram travelling in the “from” direction is the same as the situations analysed above.

Assuming that the safe speed for a tram approaching an intersection is 30 kph (8.3 metre/sec), and the width of an intersection is 25 metres, the time for a 33 metre tram to cross an intersection is 7 seconds. Allowing for a 3 second safety gap before starting the road phase,

$$t_w = 10 \text{ secs}$$

Tram stops are located at intersections, stops in the to and from directions being located on the same side of the intersection. Therefore a tram which has to stop before the intersection to wait for a green signal will have to accelerate and decelerate into the stop.

Assuming that the acceleration and deceleration rates are 1.3 metre/sec/sec, the time to cross an intersection from stopped and then stop at the tram station is 13.4 seconds. If the tram is stopped at a station, the time to cross an intersection from stopped before proceeding on to the next intersection is 10.8 seconds. As these situations occur pair-wise we will use the mean value of 12 seconds for the movement.

Allowing for a 3 second safety gap before starting the road phase,

$$t_z = 15 \text{ secs}$$

2. Movement Time Loss caused by Phase Loss

The time lost to traffic movements crossing the major flow per hour is

$$T_L = f * 2 * (t_w^2/t_c + (n_p - 1) * t_z * (t_p + t_n)/t_c) .$$

where f = number of tram services per hour, $f < 1 / t_c$

n_p = the number of phases in a signal cycle excluding the special tram phase.

The time available to movements crossing or turning across the major flow direction per hour when there are no tram movements

$$T_M = (t_c - t_g - t_p - (n_p - 1) * (t_p - t_y)) * 3600 / t_c$$

where t_y = yellow time during which movements occur at the end of a phase.

Table 1 Percentage of time available for cross traffic movements after phase loss

f	$(T_M - T_L) / T_M * 100$
10	89%
12	87%
15	83%

3. Queue Discharge Loss caused by Phase Loss

Acelik and Besley have developed and calibrated a model for queue discharge at an intersection:

$$n_s = q_n / 3600 [(t - t_r) - (1 - e^{-m_q(t - t_r)}) / m_q]$$

where n_s = cumulative discharge flow (number of vehicles) t seconds after the start of the displayed green period;

q_n = maximum discharge flow rate (vehicles per hour);

t_r = start response time (a constant value) related to the average driver response time for the first vehicle to start moving at the start of the displayed green period (seconds);

m_q = a parameter that can be observed at an intersection

Average site values observed for 18 intersections in Sydney and Melbourne are:

Site	m_q	q_n
Right turn (isolated)	.582	2033
Through (isolated)	.369	2086

The green time lost to any phase interrupted as shown in Figures 3, 4 and 5 is t_z .

Substituting $t_r = 1$ and $t_z = 15$ as above, Table 2 shows the number of vehicles to pass through a

t_n (normal green time for phase)	25		21		17		
Priority Interrupt	NO	YES	NO	YES	NO	YES	
n_s (number of vehicles passing per lane)	Right turn (isolated)	12.6	4.1	10.3	1.6	8.1	0.1
	Through (isolated)	12.3	3.7	10.0	1.6	7.7	0.1

4. Vehicle Movement Loss caused by Phase Loss

The number of phases available per hour for movements crossing the major flow is given by

$$n_M = (n_p - 1) * 3600 / t_c$$

The number of phases interrupted per hour for tram priority is given by

$$n_L = f * 2 * [(t_w/t_c + (n_p - 1) * (t_p + t_n)/t_c)] .$$

where f = number of tram services per hour, $f < 1 / t_c$

Defining N_M = the total number of vehicle movements per saturated lane per hour without trams

N_P = the total number of vehicle movements per saturated lane per hour with tram priority

$$N_M = n_M * n_s\{NO\}$$

$$N_P = (n_M - n_L) * n_s\{NO\} + n_L * n_s\{YES\}$$

where $n_s\{NO\}$ and $n_s\{YES\}$ are given in Table 1.

Using $t_c = 120$ sec, $t_g = 45$ sec, $t_p = 6$ sec, $t_y = 2$ sec, $n_p = 4$ we get

$$t_n = 17$$

f	$N_P / N_M * 100$
10	85%
12	82%
15	78%

5. The Expected Delay at Intersections for Trams.

Any tram that passes through an intersection during the special phase of time length t_z shown in Figures 3, 4 and 5 will be delayed according to when its approach occurs (see tram detection interval). Also a tram that approaches after the detection interval shown in Figure 5 and before the start of the major phase will be delayed.

The expected delay per tram passing in either direction is

$$(n_p - 1) * (t_p + t_n) / t_c * (t_p + t_n) / 2 + t_d + (t_d + t_z) / t_c * (t_d + t_z) / 2$$

Using the same parameter values as previously, $t_s = 6.4$ seconds, and allowing 1.6 seconds for signal response plus driver response, $t_d = 8$ seconds, the expected delay to a tram at each intersection is 13.4 seconds.

6. Time to Travel between Intersections

Travel between intersections consists of an acceleration phase, a cruising phase and a deceleration phase. If the cruising speed is 65kph (18.1 metres/sec), and the acceleration and decelerates rates are 1.3 metres/sec/sec, then the time to accelerate to cruising speed is 13.9 seconds, the time to decelerate is 13.9 seconds. The distance travelled during acceleration is 125 metres and the distance travelled during deceleration is 125 metres.

If the distance between intersections is 0.5 kilometre, then the distance travelled at cruising speed is 250 metres, taking a time of 13.9 seconds. Thus the travel time between intersections would be 41.7 seconds.

7. Journey Time

For a journey of 12 kilometres having 12 tram stops each with a dwell time of 30 seconds, the total journey time crossing 24 intersections would be

$$24*41.7 + 24*13.4 + 12*30 \text{ seconds} = 28 \text{ minutes}$$

If the dwell time at stops averaged 20 seconds then the expected journey time would be 26 minutes.

8 Journey Time without Priority

The expected delay at an intersection without priority is given by integrating the expression x/t_c over the range 0 to $t_c - t_a - t_y$ which gives $(t_c - t_a - t_y)^2 / (2 * t_c)$

Using the same parameters as above the expected delay is 22.2 seconds. This gives an expected journey time of 32 minutes

If the dwell time at stops averaged 20 seconds then the expected journey time without tram priority would be 30 minutes.

9 Reference

Akcelik R, and Besley M; Queue Discharge Flow and Speed Models for Signalised Intersections, 15th International Symposium on Transportation and Traffic Theory, Adelaide, 2002.



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