30 May 2018

To: Committee Secretary
Joint Standing Committee on the National Capital and External Territories

by email

Submission on *Commonwealth and Parliamentary approvals for the proposed Stage 2 of the Australian Capital Territory light rail project*

I respectfully submit that:

A. In relation to *possible impacts on the Parliamentary zone and Parliamentary precincts*, Stage 2 of the Australian Capital Territory light rail project:

1. would alienate approximately three hectares of land within or adjacent to the Parliamentary Triangle;
2. would offer less frequent services and fewer direct services, with longer walks to stops, than the alternatives of *bus rapid transit* or *transit lanes;* and
3. may result in increased local air pollution and increased demand for all-day car parking, especially when compared with the *transit lanes* alternative.

B: in relation to *matters that may be of concern prior to formal parliamentary or Australian Government consideration of the projec*t, Stage 2 of the Australian Capital Territory light rail project:

4. may result in increased greenhouse emissions;
5. is likely to result in higher greenhouse emissions than the *transit lanes* alternative;
6. offers only one twentieth to three quarters of the net economic benefits of *Bus Rapid Transit*, according to the ACT Government; and
7. is likely to offer even lower net economic benefits, relative to the *transit lanes* alternative.

These issues are explained in the attachment.

Yours sincerely

[redacted]

Leon Arundell B Sc Hons, M Env St, Grad Dipl Appl Econ.

Attachment

Contents

A. In relation to *possible impacts on the Parliamentary zone and Parliamentary precincts,* Stage 2 of the Australian Capital Territory light rail project:

1. would alienate approximately three hectares of land within or adjacent to the Parliamentary Triangle

A three kilometre long, ten metre wide easement light rail tracks would occupy three hectares.

That would be in addition to land occupied by roads.

2. would offer less frequent services and fewer direct services, with longer walks to stops, than the alternatives of *bus rapid transit* or *transit lanes*

Less frequent services

Purchasing more trams than are needed during peak times is an unnecessary expense. Each tram carries twice as many passengers as a bus. So on the Stage 2 route there would be only half as many trams as there would be buses. Consequently, at least during peak times, trams would travel only half as frequently as buses. This is the case with Stage One of light rail, where during the morning peak hour twenty bus services will be replaced by ten tram services.

Fewer direct services

Buses can currently offer direct services to any stop on the public transport network. Light rail will only be able to offer direct services to stops that are along the light rail route.

Longer walks to stops

Stage 1 of Canberra's light rail is reducing the number of stops between Gungahlin and Civic from nineteen to eleven (excluding the terminuses at Gungahlin and Civic). Fewer stops means, on average, longer walks to stops. The average stop spacing between Gungahlin and Civic will increase from 600 metres to 1,000 metres.

This appears to result from trams braking and accelerating more gently than buses. Reducing the number of stops reduces the time lost in slowing down to discharge or pick up passengers, and in returning to normal speed after stopping.

3. may result in increased local air pollution and increased demand for all-day car parking, especially when compared with the *transit lanes* alternative

The amount of local air pollution, and the demand for all-day car parking, are largely proportional to the number of commuters who travel as car drivers.

The number of people who switch from being car drivers to being light rail passengers will depend on the attractiveness of tram travel relative to bus travel.

The immediate impact of light rail is to reduce traffic congestion by removing buses from the roads. This reduces car travel times, and so promotes greater car use with attendant increased air pollution and increased demand for car parking spaces.

Relative to buses, light rail offers advantages of greater amenity and shorter in-vehicle travel times. These advantages are partly or completely offset by longer walk times to and from stops, longer wait times between services, and the delays and inconvenience of additional bus-tram transfers.

The overall impact of those differences may be an increase in the proportion of people travelling as car drivers.

Such an increase would increase demand for all-day car parking spaces, and increase local tailpipe pollution from cars. It would also offset some or all of the pollution reductions obtained through replacing fossil-fuelled buses by electric trams.

The overall impact on car numbers of a switch to light rail can be estimated using information from the ACT Government's *Capital Metro Business Case* and *ACT Transport Demand Elasticities Study*, combined with census journey-to-work statistics, as shown in the following table:

Factor	**Impact on public transport patronage**	**Impact on car numbers[1]**
Amenity advantage of light rail, equivalent to a 10% reduction in in-vehicle travel time[2].	+3.7%	-0.3%
Each 10% reduction in public transport in-vehicle travel time[3]	+3.7%	-0.3%

1 See Arundell, L, 2016, Transport demand elasticities

2 The Capital Metro Business Case estimates the amenity benefit of light rail at 10% of journey time (Table 55, p. 154.)

Factor	Impact on public transport patronage	Impact on car numbers
Each 10% increase in walk times to and from stops[4]	-2.5%	+0.2%
Each 10% increase in wait time between services[5]	-1.7%	+0.1%
Delays and inconvenience due to additional bus-tram transfers.	Not estimated	Not estimated

The transit lanes alternative

Transit lanes are more effective than light rail or bus rapid transit at reducing car numbers. They do this because they offer shorter journey times for cars that carry passengers. So in addition to reducing public transit travel times, they also encourage car drivers to become car passengers.

For each car driver who becomes a car passenger, the number of cars on the road is reduced by one.

In contrast, an increase in public transport patronage does not necessarily imply a reduction in car travel.

The ACT's experience from 2011 to 2016 shows that an increase in public transport patronage can be associated with an increase in the number of cars on the road:

- From 2011 to 2016, the proportion of ACT journeys to work by public transport increased from 7.8% to 8.2%. But the proportion of people who drove to work increased even more, from 73.3% to 73.8%. This surprising result can accounted for by the fall in the proportion of commuters who travelled as car passengers, from 8.6% down to 7.3%. In effect, the extra public transport passengers were not former car drivers, but rather were former car passengers.

The ACT has not created new transit lanes in recent years, in the mistaken belief that transit lanes are not effective. This belief arose in part from the ACT Government's 2012 *Transit Lane Warrants Study*, which found that the Flemington Road bus lane saved only 8.6 seconds of journey time in the AM peak, and the Adelaide Avenue bus lane saved only 8.2 seconds (AM peak) and 14.2 seconds (PM peak) of journey time.

The *Transit Lane Warrants Study* failed to take into account that:

- the potential choke point at the intersection of Flemington Road and the Federal Highway had not reached traffic saturation.

3 Based on the ACT Transport Demand Elasticities study, a 10% reduction in travel time will reduce car numbers by 0.3% - see http://grapevine.net.au/~mccluskeyarundell/TransportElasticities.html

4 Based on the ACT Transport Demand Elasticities study, a 10% reduction in walk time will reduce car numbers by 0.2% - see http://grapevine.net.au/~mccluskeyarundell/TransportElasticities.html

5 Based on the ACT Transport Demand Elasticities study, a 10% reduction in wait time will reduce car numbers by 0.1% - see http://grapevine.net.au/~mccluskeyarundell/TransportElasticities.html

- By 2016 the Flemington Road bus lane was saving several minutes during the AM peak, with traffic in the adjacent general traffic lane backing up for about 1.5 kilometres;

- the Adelaide Avenue transit lane will save much more time if it extends into the congestion zone at the southern approach to the choke point at the traffic signals at the intersection of Commonwealth Avenue and Coronation Drive. The transit lane currently terminates 800 metres from that intersection.

B: in relation to *matters that may be of concern prior to formal parliamentary or Australian Government consideration of the projec*t, Stage 2 of the Australian Capital Territory light rail project:

4. may result in increased greenhouse emissions

Light rail has three principal impacts on greenhouse emissions:

A) reduced emissions due to replacing fossil fuelled bus travel with tram travel that uses renewably generated electricity

- the immediate impact of Stage 1 of light rail on bus emissions will be zero because, as the Chief Minister announced on 28 October 2015, "*The introduction of light rail will benefit all of Canberra ... with more than a million kilometres of bus travel reallocated when stage one starts running. The first stage of the light rail network will free up around 1.2 million kilometres of bus travel every year. ,,, It makes sense to re-allocate these kilometres to provide more buses, on more routes, for the benefit of the broader community*."

B) increased greenhouse emissions, from additional car use that is induced as a result of the shorter car travel times that result from removing buses from the roads

C) changed emissions due to changes in the use of private motor vehicles as a result of the attractiveness of light rail travel relative to bus travel

- light rail's greater amenity and shorter in-vehicle times will encourage drivers to switch to light rail

- light rail's longer walking times, reduced service frequency and need for bus-tram transfers will encourage former bus passengers to switch to driving.

5. is likely to result in higher greenhouse emissions than the *transit lanes* alternative

As explained under point 3 above, light rail is less effective than transit lanes at reducing car numbers. This is because transit lanes offer shorter journey times for cars that carry passengers, but light rail does not.

6. offers only one twentieth to three quarters of the net economic benefits of *Bus Rapid Transit*, according to the ACT Government

The ACT Government's August 2012 *City to Gungahlin Transit Corridor Infrastructure Australia Project Submission* includes cost benefit analyses of bus rapid transit (BRT) and Light Rail Transit (LRT) at Tables 50 to 53 (pp. 80-81).

According to those analyses:

- Under the *Business As Usual* Land Use Scenario, light rail offers net economic benefits worth $10.8 million (total benefits $534.9 million, minus total costs $524.1m).

  That is only a twentieth of the $243.3 million net economic benefit of bus rapid transit (total benefits $491.8 million, minus total costs $248.5 million).

- Under the *Higher Density* Land Use Scenario, light rail offers net economic benefits worth $701.1 million (total benefits $1225.2m, minus total costs $524.1m).

  That is only three quarters of the $939.1 million net economic benefit of bus rapid transit (total benefits $1187.6 million, minus total costs $248.5 million).

7. is likely to offer even lower net economic benefits, relative to the *transit lanes* alternative.

In addition to lower initial costs than either both light rail or bus rapid transit, transit lanes offer greater reductions in car use, with attendant economic benefits in terms of car operating and parking costs, greenhouse emissions and exhaust pollution.