To: The Coordinator-General
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Dear Coordinator-General,

I am writing to you as part of the Environmental Impact Statement (EIS) process for the Underground Bus and Train (BaT) project. I have worked in railway and Public Transport planning for most of the last 10 year and have spent quite some time reviewing the EIS documentation available for the BaT project.

The Executive Summary of the EIS, page 1, state that the EIS is to describe

> *The need for the Project, alternatives to it and options for its implementation*
>
> *The existing environment of the study corridor or other areas potentially affected by the Project*
>
> *The potential impacts of the Project on the natural, social and economic environment, including beneficial and adverse impacts, and direct, indirect and cumulative impacts*
>
> *Measures for avoiding, managing or mitigating the adverse impacts and maximising or enhancing the beneficial impacts of the Project*

Having reviewed the available documentation it is clear that the EIS fails to deliver on these stated aims. In fact, the problems with the EIS are often so glaringly obvious that it is a wonder the document was allowed to be released for public consultation at all.

Consider the following statements taken from the Technical Transport Report, page 134

> *By 2021, load factors (line loadings expressed as a proportion of seated capacity) on all rail lines are forecast to increase substantially. The Beenleigh and Gold Coast lines, are forecast to have load factors of up to 125 per cent (25 per cent more passengers than the seated load capacity) on average across the entire two hour morning peak period.*

Undoubtedly this is important and highlights the need for additional rail capacity approaching the city from the south. However, the report then continues by stating

> *To the north crowding would be worse with load factors over 150 per cent on sections of the Ferny Grove line and the north coast line north of Eagle Junction. Load factors would be this high on average across the entire peak period with the peak of the peak more crowded.*

So, the findings of the Technical Transport report are that the crowding on the northern lines will be worse than the southern lines in 2021. Given this rather startling statement it is worth asking some questions

a) Where are the problems with the northern lines investigated in the EIS?
b) What rail capacity benefit does the project provide to the northern rail lines?

The disturbing answers to these questions are

a) Nowhere
b) None

This is merely one example of many obvious failings of the project. Further detail and other examples are provided in the attached report.

This EIS is truly disappointing as the problems with the SEQ rail network are well known and there is little doubt that a large investment in infrastructure is needed to meet the growing demands for travel in the region.

If you want a transport project to work properly then you need to start by asking two fundamental questions:

1) What transport outcomes and services do we need in the future?
2) What infrastructure is required to deliver those services?

When you ask these two questions you will end up with a project that that delivers the right outcomes for the people of SEQ.

The EIS makes it very clear that these questions have been ignored and that the goal of this project is to deliver the BaT tunnel, regardless of the limited benefit it provides.

It is plain to see that the project never had the broad transport outcomes in mind because:

a) The tunnel fails to address the crowding issues on the northern rail lines, thereby triggering the need for additional significant rail investment by 2021 to address crowding on the northern lines

b) The project has failed to do any demand modelling of the Gold Coast, despite crowding on Gold Coast trains being one of the key drivers for additional rail investment

c) The project fails to plan for longer trains in future, thereby reducing the effective life of the tunnel

d) The capacity benefits of upgraded rollingstock and larger buses are incorrectly claimed as project benefits

e) The project provides a connection to the Northern Busway and Inner City Bypass/Legacy Way tunnel without identifying any bus capacity issues on the northern side of the city

f) It fails to model the capacity of key areas of the network including intersections on the busway network

g) The project does not address the capacity constraints at the Cultural Centre or Victoria Bridge

h) The project has failed to consider alternative cost effective approaches to increasing bus capacity

In addition, the BaT project provides significantly less rail capacity that the previous Cross-River Rail project and also has a significantly lower Benefit to Cost Ratio.

A robust planning process is needed to find the real issues in the system and address them head on. It is quite clear that the BaT process was only half-baked and will not deliver the transport outcomes that SEQ needs.

If you are going to spend billions of dollars of taxpayers money on this then we have a right to expect that the project has gone through a well thought out and robust planning process.

I call on you to do the right thing and reject the BaT project EIS until its many failings are independently reviewed and fixed.

Kind Regards,

Phillip Stewart

Review of the Underground Bus and Train (BaT) project EIS

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Introduction

This document is a review of the EIS for the BaT project released by the Queensland Government with a focus on the transport outcomes delivered by the project. A copy of this review is being submitted to the Coordinator General as part of the EIS review process.

All information in this document is taken from publicly available sources and references are made to available documents where possible. Every effort has been taken to ensure the accuracy of this document, however no guarantees can be provided due to the complex nature of the EIS and the many inconsistencies that exist within it.

Project background

There is little doubt that the Rail network in South East Queensland will not be able to provide sufficient capacity to meet passenger demand in the future. This has been established through multiple studies including:

- Rail Services and Infrastructure Requirements Study
- Rail Assessment of Capacity Alternatives Study
- Inner-City Rail Capacity Study
- Cross-River Rail
- Brisbane Inner Rail Solution study

These studies have determined that the Rail network will run out of capacity by approximately the year 2020. The studies have also identified a number of short-term improvements that could be made to the network to maximise the efficiency and use of the existing infrastructure prior to building additional capacity in the inner-city area.

Several studies have also identified future capacity problems with the bus network. This includes

- Bus Access Capacity Inner City study
- Suburbs 2 City Buslink study
- Busway to Light Rail Conversion study

The studies have identified a number of capacity problems on the South East Busway, a lack of kerbside space in the inner city and capacity problems with river crossings from the south side of the river.

[1] The Cross-River Rail EIS can still be found online in the Pandora Archive which can be accessed from the National Library of Australia website

The Bus and Train project is attempting to address the problems on both the rail and busway networks in a single project as this is viewed as more cost effective than doing separate bus and rail projects.

What problems in the BaT project trying to address?

The EIS identifies a number of Rail Capacity constraints that need to be addressed in future years including:

- Peak trains returning to Mayne Yard causing congestion
- Single platforms limiting capacity at Fortitude Valley and Bowen Hills
- Overcrowding and congestion on platforms at Central station
- Trains merging onto single tracks causing congestion:
    - Approaching Roma Street from Milton
    - Approaching the Merivale bridge from South Brisbane
    - At Park Road junction
- Merivale bridge nearing capacity
- Overcrowding and congestion on platforms at Roma Street

These constraints are shown below in Figure 1, taken from the EIS Chapter 2, page 10.

Figure 1: Rail Problems

The capacity constraints on the rail network have been identified multiple times in different studies and are largely consistent across the studies. The constraints on the rail network are interrelated and addressing one constraint in isolation will only have a very small impact on the overall capacity. A broad solution is needed that can address many of the constraints at the same time.

Up to January 2014 the capacity of the rail network was also limited by the complex operation of train services and the mix of express/all stations trains operating on the network. This was a legacy of old timetables on the network and was addressed through timetable changes in June 2011 and January 2014.

Bus Capacity constraints

The EIS also identifies a number of bus capacity constraints that need to be addressed, including:

- Buses caught in congestion on busy city streets
- Slow bus flows through King George Square Busway Station during peak hours
- Limited space for extra kerbside bus stops (in CBD)
- Queen Street Busway Station full during peak hours
- Cultural Centre Busway Station full during peak hours
- Bus delays along Melbourne street and South East Busway
- Congestion across Victoria Bridge and at North Quay intersections
- Buses queue approaching the platforms of South East busway stations
- Buses delayed getting onto Captain Cook bridge
- Buses slowed by traffic on Captain Cook bridge
- Demand for layover spaces exceeds capacity during peak hours

The constraints are shown below in Figure 2, taken from the EIS Chapter 2, page 13

Figure 2: Bus Problems

The bus network constraints have are consistent with those identified in the City2Suburbs study which proposed an alternate bus alignment through the city from the Cultural Centre to Fortitude Valley.

Limitation of the BaT project

Although the project seems to have identified a large list of problems that need to be addressed it is important to assess how well the project addresses these problems, as well as identify whether there are other problems that are not addressed by the project.

This must be consider the both the short and long term impacts of the project. The issues with the project and the EIS will be investigated in four different sections:

- Rail Network Issues
- Bus Network Issues
- Demand Forecasting Issues
- Capacity comparison with Cross-River Rail

Rail Network Issues

Issue 1: Rail capacity is forecast to be reached on all major approaches to the CBD in 2021. The BaT tunnel fails to provide any capacity for services approaching from the north

The Technical Transport report, page 134, states that

> *By 2021, load factors (line loadings expressed as a proportion of seated capacity) on all rail lines are forecast to increase substantially. The Beenleigh and Gold Coast lines, are forecast to have load factors of up to 125 per cent (25 per cent more passengers than the seated load capacity) on average across the entire two hour morning peak period.*

Undoubtedly this is important and highlights the need for additional rail capacity approaching the city from the south. However, the report then continues by stating

> *To the north crowding would be worse with load factors over 150 per cent on sections of the Ferny Grove line and the north coast line north of Eagle Junction. Load factors would be this high on average across the entire peak period with the peak of the peak more crowded.*

The Technical Report makes it clear that the crowding on the Beenleigh and Gold Coast lines are not the only issue, or even necessarily the worst issue, that requires addressing by 2021. Previous studies into providing additional rail capacity have implicitly understood this challenge and have attempted to address it at the same time as providing additional capacity from the South.

This was achieved in Cross River Rail by providing a tunnel that could be used by services from the south and the north, providing for an increase in capacity from both directions.

The BaT tunnel has instead taken the approach that the only capacity that matters is from the south side of the city. This means that the capacity issues on the northern lines will continue with the project, and will need to be addressed by an additional, as yet unidentified project with an unknown timeframe, scope and cost.

Issue 2: The Project fails to make any allowance for longer trains in the future

The Executive summary of the EIS states that:

> *Rail platforms would be of sufficient size to accommodate six car NGR train sets*

One of the key capacity benefits of the Cross River Rail project was the allowance for longer trains in the future. This was done be designing the stations with an allowance for the platforms to be lengthened.

By allowing the tunnel to handle 9-car instead of the existing 6-car trains the CRR tunnel provided a 50% future increase in the capacity of services using the tunnel with only incremental cost. This increase in capacity increased the length of time before the tunnel would reach capacity and defers the need for more investment in rail infrastructure.

Failing to design the stations to accommodate longer trains reduces the future capacity of the tunnel by one third compared to the original CRR tunnel.

Issue 3: The project incorrectly accounts for Next Generation Rail (NGR) Rollingstock and overstates the benefits of the BaT tunnel

The Department of Transport and Main Roads website provides the following information regarding the NGR project (extract from http://www.tmr.qld.gov.au/Projects/Name/N/New-Generation-Rollingstock.aspx)

> *The NGR project involves the delivery of 75 6-car trains currently being designed in Queensland and the construction of a new purpose-built maintenance centre to maintain the new trains for the next 30 years.*
>
> *The new trains will replace an aging fleet and increase the current fleet by 30%.*
>
> *The first train is scheduled for delivery in late 2015 to undergo testing prior to beginning service on the network from mid-2016. The remaining NGR fleet will be progressively rolled out onto the network until late 2018.*

The 75 6-car NGR trains will presumably replace the 87 3-car EMUs (originally purchased in 1979) and expand the existing fleet from 205 3-car sets to the equivalent of 268 3-car sets. This expanded fleet, including the NGR trains, will be in service by late 2018 – well before the proposed completion of the BaT tunnel.

The Technical Transport report assumes that trains using the BaT tunnel in 2021 and 2031 will be NGR rollingstock with 480 seats. However, it is assumed that services without the BaT tunnel would be done with existing rollingstock with only 450 seats. This is illustrated by table 6-7 (among others) from page 197, reproduced below.

Table 6-7 Gold Coast express trains – time passengers stand without and with the Project

Location	Time to Roma Street	2012		2021		2031	
		Passengers		Passengers		Passengers	
		Load	Standing	Load	Standing	Load	Standing
Without the Project							
Beenleigh	46	614	164	478	28	664	214
Altandi	38	645	195	530	80	717	267
Loganlea	24	645	195	541	91	731	281
Yeerongpilly	n/a	645	195	541	91	731	281
With the Project							
Beenleigh	43			423	0	363	0
Altandi	35			459	0	394	0
Loganlea	21			478	0	459	0
Yeerongpilly	15			478	0	459	0

Source: BaT Project Model

Note: Seated capacity of a BaT train is 480. Other trains have 450 seats

This table shows that without the project a train with 478 passengers has 28 standing (Beenleigh in 2021 without the project). With the project, a train with 478 passengers has 0 standing (Loganlea in 2021 with the project). This implies that the increase in capacity of the trains is a result of the BaT tunnel which is incorrect. This is because:

- The NGR fleet is scheduled to be delivered and in-service by 2018, 3 years before the forecast opening of the tunnel. From 2018 the NGR rollingstock will account for 75 6-car units (equivalent to 150 3-car units) from a fleet of 268 3-car units.

  This means that 56% of the fleet will already have a seated capacity of 480, regardless of whether the BaT tunnel goes ahead or not. Therefore the assumption that services will have 450 seated capacity in 2021 and 2031 without the tunnel is wrong.

- When the tunnel opens, the Gold Coast and Beenleigh services will be rerouted through the new tunnel. The services will continue to use the same vehicles as were available prior to opening. This means that if it was a 6-car IMU (Inter-Urban Multiple Unit, 450 seats) before the tunnel opens then it will continue to be an IMU after the tunnel opens.

  If the Gold Coast services are upgraded when the tunnel opens (from existing 450 seat IMUs to 480 seat NGR rollingstock) then this will consequently result in a downgrade of services elsewhere on the network from NGR rollingstock back to IMUs.

  This would result in a reduction in capacity elsewhere on the network. As the EIS has not identified this as an issue it can only be assumed that this will not occur.

The conclusion it that the EIS has incorrectly accounted for the NGR rollingstock in two ways:

- By failing to account for the already committed NGR rollingstock and associated capacity increase in the Base Case (prior to the tunnel opening).
- By implying the increase in seated capacity on the Gold Coast and Beenleigh services is a result of the BaT tunnel rather than the already committed NGR rollingstock project.

It is clear that the BaT project is attempting to claim the capacity improvements from the NGR rollingstock project as its own. This is a clear overstatement of the capacity benefit provided by the tunnel.

Issue 4:	The project fails to identify or disclose the additional rollingstock requirements however states that additional rollingstock costs are used in the Cost Benefit Analysis (CBA) to justify the project. The lack of information means that there can be no scrutiny of this.

Chapter 14, page 47 and 48 discuss the Cost Benefit Analysis (CBA) undertaken for the project. The actual assessment was undertaken separately and only some summary information was included in the EIS. The available information does state that:

> *Project costs include capital construction costs, annual operating costs and all ongoing maintenance costs on a whole-of-life basis. Construction and operation costs included in the economic evaluation for the Project include:*
>
> *• fixed infrastructure costs, including early and enabling works, tunnel, stations, rail track and other surface infrastructure*
>
> *• systems infrastructure, including busway systems, rail signalling and rail power*
>
> *• construction and operational risk*
>
> *• Principal's costs (including additional rollingstock requirements) and property acquisition costs*

- *recurrent costs, such as bus and train running costs and station operation costs*

This makes it clear that the CBA includes the cost of additional rollingstock and operating costs. However the EIS does not provide any information on the amount of rollingstock required or the assumptions related to the ongoing operating costs.

Given that the 75 6-car NGR trains were purchased at a cost of $4.4bn (from http://www.tmr.qld.gov.au/Projects/Name/N/New-Generation-Rollingstock.aspx), a cost of $58m a vehicle, it should be clear that the cost of additional rollingstock is not a small expense that can just be glossed over. Even basic operational information such as the number of additional train kilometres that would be operated on the network is not disclosed.

Interestingly the report does provide information on the bus fleet implications in the Technical Transport Report, page 183

> *The Project would result in a requirement for 46 fewer buses in 2031 compared to without the Project.*

The same page identifies that there is a requirement to purchase 2,081 between 2012 and 2031, including replacement buses.

So in short

- The project results in a reduction in the bus fleet requirement and this is calculated and disclosed in the EIS
- The project requires additional rail rollingstock to run the identified services and this is not calculated or disclosed in the EIS

This appears to be a deliberate lack of information, which makes it impossible to scrutinise the CBA. Surely a project of this size and importance deserves to have better transparency than this.

However, a look at the Benefit Cost Ratios (BCR) of the CRR and BaT projects may provide some insight.

Table 1: Benefit Cost Ratios for BaT and CRR

	BaT	CRR
BCR		1.42
BCR including wider economic benefits	1.16[2]	1.63

The first obvious point is that the BaT project has a significantly lower BCR than the previous CRR project – implying significantly lower economic benefits per dollar of investment. But a BCR of 1.16 also implies that the BaT project is only of marginally positive benefit if everything goes exactly according to plan. The low BCR leaves the project at significant risk of costing more that it provides in overall benefits.

Any unanticipated cost overrun or shortfall in benefits would be devastating to the economic effectiveness of the project.

[2] The EIS does not clearly state whether wider economic benefits are included in the BCR, however Chapter 14, page 50 discusses the wider economic impacts implying that they probably were included in the BCR.

The low BCR of the BaT project means that a truly thorough independent analysis of the costs and benefits should to be undertaken.

The EIS has failed to provide key information about the rollingstock and operations on the rail network and has made it impossible for the CBA to be effectively reviewed.

Bus problems

Issue 5: The EIS fails to acknowledge the underlying causes of the capacity constraints on the Busway network and promotes infrastructure investment without investigating alternative solutions.

The Technical Transport Report, page 142, provides diagrams of the volume versus capacity of key bus corridors. These show the number of buses scheduled to run across a road/busway section compared to the theoretical maximum number of buses that can be run in that area. An extract of the diagram for 2021 without the project is included below in Figure 3

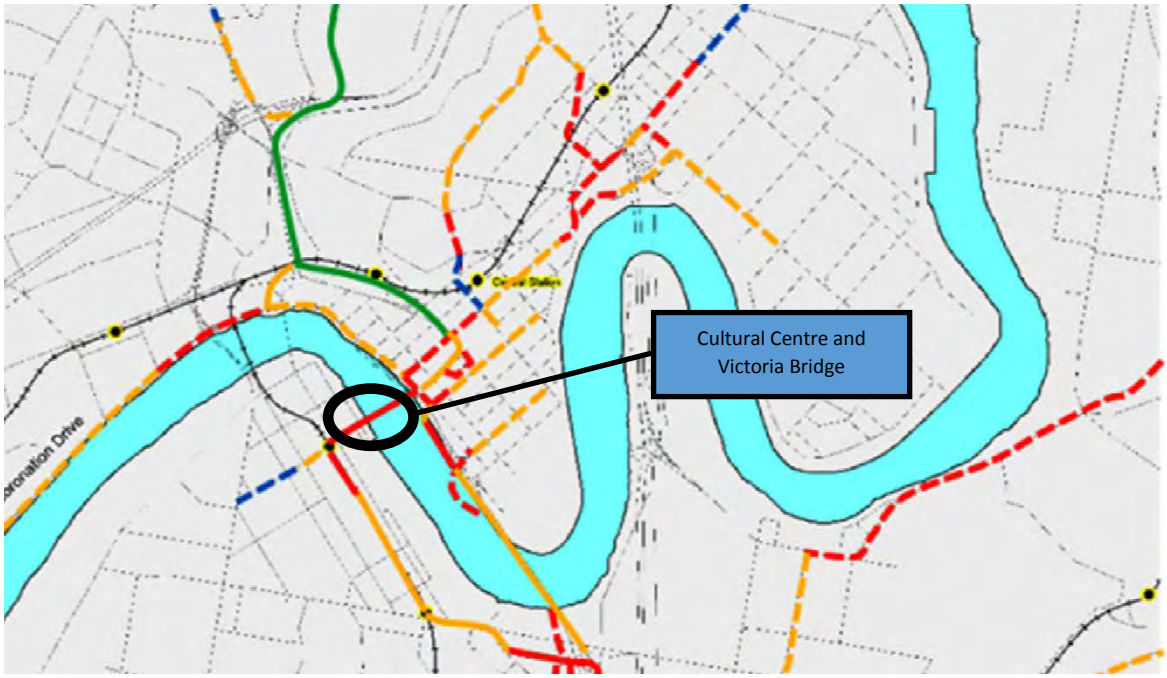

Figure 3: Bus volume vs Road capacity in 2021

The volume of buses around the Cultural Centre and Victoria Bridge is well over the theoretical capacity of the road in this area. This is leading to lengthy delays on the Busway inbound in the morning peak and on the Victoria Bridge/North Quay area in the afternoon peak.

Looked at in isolation this congestion of buses would seem to support the need for additional infrastructure to alleviate the congestion in this area.

Indeed, the EIS attempts to lead you to this conclusion. However, this conclusion is wrong.

The EIS includes modelling of the operation of the bus network in 2021 without the project (Technical Transport Report, page 144) shows the average number of passengers on each bus compared to the seated capacity of the bus. An extract of the diagram is shown below in Figure 4 with the key areas of the Cultural Centre and Victoria Bridge again identified.

The modelling shows that in 2021 without the project, inbound AM peak buses using the Cultural Centre and Victoria Bridge are not crowded. In fact the modelling has shown that on average, each inbound bus in the 2 hour AM peak has less than 1 person for every 2 seats on the bus.

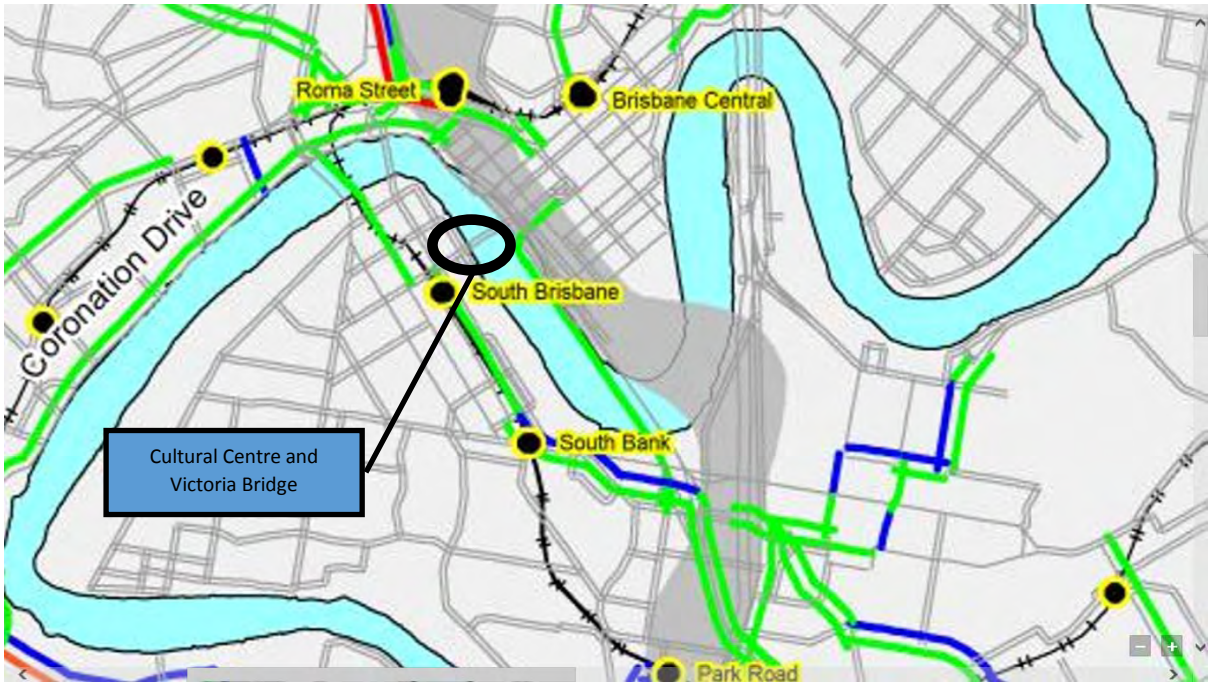

Figure 4: Average AM peak bus load factors in 2021

This is confirmed in section 3.3 (Table 3-19, pages 82-83) of the Transport Technical Report which identifies that services using key routes in the AM peak have seated loading factors of

- *Victoria Bridge – 27%*
- *Captain Cook Bridge – 55%*
- *Busway Allen Street to Mater Hill – 52%*

Similar patterns are evident in the PM peak.

This means that on average a bus going over the Captain Cook Bridge has slightly more than 1 person for every 2 seats on the bus. A Bus going over the Victoria Bridge has slightly more than 1 person for every 4 seats on the bus.

As of August 2014, there are 227 inbound buses[3] using the Cultural Centre during the busiest hour of the morning peak (7:30 and 8:29am). The BaT EIS identifies the maximum capacity of this area as 180 buses per hour.

Assuming a regular 12.5m bus with seated capacity of 44 (Sourced from www.btbuses.info) and total capacity of 62 it is possible to work out the actual utilisation rate of the Cultural Centre and Victoria Bridge. This is done by combining the utilisation rate of the busway and the load factor of the bus. The results are shown in Table 2.

[3] Extracted from public transport schedule data available from the TransLink website

Table 2: Victoria Bridge utilisation rate

	Buses per hour (% of theoretical capacity)	Seated capacity utilisation rate (%)	Effective seated utilisation rate (%)	Seated + standing capacity utilisation rate (%)	Seated + standing total utilisation rate (%)
August 2014 Operation	227 (126%)	27%	34%	19.2%	24.2%

This comes to a quite startling conclusion. Although the busway is carrying 126% of its theoretical bus capacity, it is only carrying 34% of its theoretical seated passenger capacity.

When you look at the total capacity (seated plus standing) the area is only carrying 24.2% of its theoretical passenger capacity. This means that the 227 buses using this area are only carrying a load equivalent to 55 full buses.

Even using a load factor of 55% (equivalent to the highest load factor found on the Busway) these 227 buses are only carrying a load equivalent to the seated capacity of 125. Essentially there is the equivalent of 100 buses going through the Cultural Centre in the busiest hour of the morning peak carrying air.

These extra buses do several things:

- Contribute to congestion and cause delays on the busway, Cultural Centre and North Quay resulting in an unreliable operation for all buses
- Contribute to passenger confusion due to the multitude of different routes on the busway (currently 51[4] northbound routes during 1 hour of the morning peak)
- Increase the bus fleet requirement; and
- Use up funds that could be invested elsewhere in the network

The EIS would lead you to believe that the Cultural Centre and the Busway in general is at capacity, however this is simply not true.

Rather than being at capacity, the busway has reached a point where the infrastructure can no longer accommodate the inefficiencies that exist in the current route design and the existing planning mentality that every service must go direct to the CBD.

The capacity of the busway can be increased significantly by shifting to a more Metro like operation, with fewer routes overall, but more routes running with very high frequency routes (every 5 minutes or better). The very high frequency routes would operate larger buses (articulated or bi-articulated) on key corridors towards the CBD. Other lower demand routes would be planned to connect to key locations and provide interchange opportunities onto these key routes.

Although this might sound like a large change it is even acknowledged in the EIS (Technical Transport Report, page 182), albeit 17 years and several billions of dollars of investment later.

> *To meet higher demand along key corridors, it is envisaged that many services on the key routes would be allocated articulated buses. Beyond 2031, it is envisaged that the Project and the whole busway network would migrate in stages to a more metro-like operation possibly shifting to bi-articulated bus.*

[4] A list of northbound routes using the Cultural Centre in the AM peak is included in the Appendix

The EIS attempts to make the case that the bus network has reached capacity. However the figures presented in the EIS clearly show that this conclusion is incorrect. Rather than supporting the supporting the need for additional infrastructure the facts presented in the EIS support the need for a thorough review of the planning used on the Busway network.

Issue 6: The proposed bus operation in 2031 with the BaT tunnel does not address the congestion at the Cultural Centre, busway portal and Victoria Bridge.

The capacity of the Victoria Bridge is identified in the Transport Technical Report, Table 3-20, reproduced below.

Table 3-20 Base year (2012) AM peak one hour bus demands and capacity

Link	*Buses/hour**	*Estimated capacity***
South East Busway (between Woolloongabba junction and Allen Street exit)	*379*	*300 (126%)*
Victoria Bridge	*225*	*180 (125%)*

** All buses that have their final stop in CBD between 7:30am and 8:30am (Source: TTA)*

*** per lane including station/stops (Source: BACICS)*

The future service levels for buses as outlined in the Executive Summary (Table 14) are shown below

Table 14 Bus volumes on major river crossings with the Project in AM peak one hour

	Volume		
Link	*2012*	*2021*	*2031*
Victoria Bridge	*225*	*179*	*199*
Captain Cook Bridge	*221*	*105*	*111*
BaT Project	*-*	*158*	*172*
Total	*446*	*442*	*482*

Table note – bus volumes are in-service buses and does not include dead running buses

Even the most cursory glance at the forecast bus numbers shows that the Cultural Centre is forecast to operate 199 buses an hour while the stated capacity is only 180 buses per hour. As the Cultural Centre continues to operate above its stated capacity the only reasonable conclusion is that the congestion issues and delays in this area will continue to occur.

Therefore the BaT tunnel does not address the capacity constraints at the Cultural Centre or on the Victoria Bridge. This is inexplicable as the congestion at the Cultural Centre was one of the key reasons put forward to justify the project.

Issue 7: The bus numbers using the tunnel do not align with the projected capacity increase and imply the capacity increase is not a result of the BaT project.

The capacity of the Victoria Bridge is identified in the Transport Technical Report, Table 3-20, and the capacity of the Captain Cook Bridge is identified in Table 4-15, reproduced below.

Table 3-20 Base year (2012) AM peak one hour bus demands and capacity

Link	*Buses/hour**	*Estimated capacity***
South East Busway (between Woolloongabba junction and Allen Street exit)	*379*	*300 (126%)*
Victoria Bridge	*225*	*180 (125%)*

** All buses that have their final stop in CBD between 7:30am and 8:30am (Source: TTA)*

*** per lane including station/stops (Source: BACICS)*

Table 4-15 Base year (2012) AM peak one hour bus demands and capacity

Link	*Buses/hour**	*Estimated capacity***
Captain Cook Bridge	*221*	*250 (88.4%)*
Elizabeth Street	*219*	*120 (103%)*
Adelaide Street (eastbound)	*153*	*120 (128%)*

** All buses that have their final stop in CBD between 7:30am and 8:30am (Source: TTA)*

*** per lane including station/stops (Source: BACICS)*

Collating the figures available in the report shows that the estimated capacity from the south to the CBD increases from 430 buses per hour (2012) to 660 buses per hour (2021 with BaT). The Executive summary also states that the benefits of the project include:

doubling bus passenger capacity to 24,000 passengers by 2021 from the south to the CBD

Assuming the current estimated capacity of the Victoria Bridge, Captain Cook bridge equates to around 12,000 passenger per hour in 2012 and the capacity of these two bridges plus the new BaT tunnel equates to 24,000 passenger per hour in 2021 the average vehicle capacity is shown below in Table 3

Table 3: Estimated vehicle capacity from the south to match stated capacity increases

	Estimated capacity	*Estimated capacity 2021 with BaT*	*Actual utilisation*	*Forecast utilisation*
Year	***2012***	***2021***	***2012***	***2021***
Victoria Bridge	180	180	225	179
Captain Cook	250	250	221	105
BaT		230		158
Total buses per hour	**430**	**660**	**446**	**442**
Stated capacity *	12,000	24,000		
Implied Average vehicle capacity	27.91	36.36		
Average vehicle capacity **			44	44
Estimated current capacity			19624	19448

* BaT executive summary states that the benefits of the project include doubling the capacity from the south from 12,000 to 24,000 by 2021

** Seated capacity of a 12.5m MAN 18.310 (CNG) Volgren bus is 44, source: www.btbuses.info

It is clear that the stated increase in capacity come largely from an increase in vehicle sizes – not an increase in services. This is confirmed by the Technical Transport Report, page 181 which states.

Despite the significant increase in inner-city distributor services, overall bus volumes across the Victoria Bridge reduce compared to base year (2012) volumes. Overall, to 2021, the number of buses (as opposed to the LoS) across the river decline slightly from the base year (2012), reflecting increased bus fleet capacity, better balancing of passengers across services, and greater efficiency of operations.

This is curious, as the report makes no distinction between the capacity increase from larger buses and from additional services, thereby implying that all of the capacity increase is due to the BaT tunnel.

This is obviously incorrect as the simple increase in bus frequencies is not compatible with the stated increase in capacity. It is also important to note that no specific infrastructure enhancements are identified or costed to allow for an increase in average bus capacity.

The conclusion is that a significant increase in capacity from the south could be achieved at low cost without the construction of a new tunnel. This option would defer the need for additional infrastructure but is not investigated at all in the report.

Issue 8:	The project has introduced additional intersections onto the northern busway and failed to model the impacts.

The connection between the project and the Northern busway has results in 3 intersections on the busway within close proximity to each other and another two intersections to access the ICB or Bowen Bridge road. These intersections are shown in Figure 5 below.

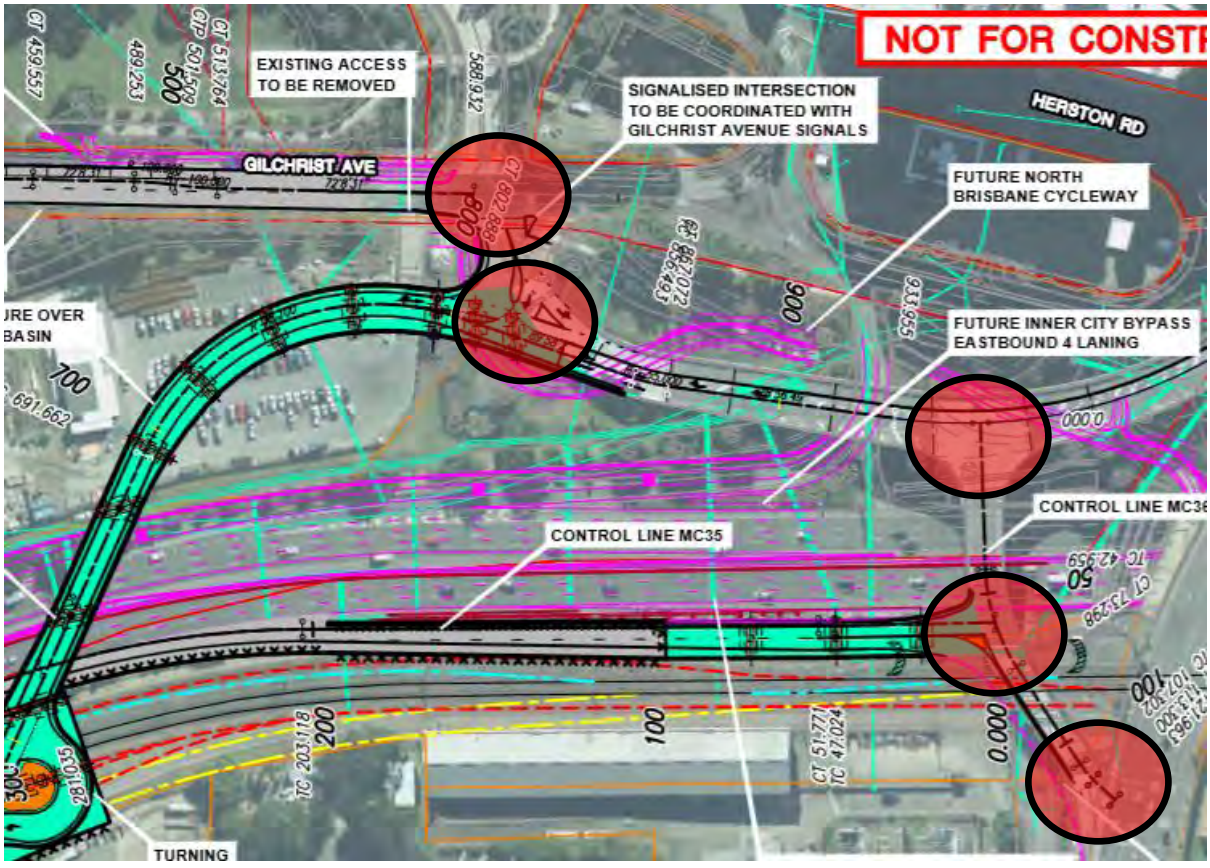

Figure 5: Intersections on the Northern Busway

The report does not detail the bus flows through these areas or the impact of these intersections on capacity and travel times.

This area should be of particular concern as during the morning peak it will have a high bus flows in both directions because it will handle peak buses approaching the city from the north as well as all of the buses that have come through the BaT tunnel from the south and buses heading north from King George Square on the existing Inner-Northern Busway.

This means that the area will effectively be handling peak period numbers of buses in both directions at the same time.

Other areas of the busway network that are reaching their vehicle capacities are only dealing with high bus flows in one direction at a time.

Having high bus flows in both directions combined with multiple intersections on the Busway should raise significant concerns about how well this area of the network will function. Failing to calculate the bus flows through this area and model the effectiveness of these intersections is simply not good enough for this kind of project.

Demand modelling limitations

Issue 9: The modelling area does not extend to the southern end of the Gold Coast rail line.

The demand modelling area for the project is limited to the Brisbane Statistical Division which is defined as

> ***Brisbane Statistical Division:*** *Covers an area of approximately 4,700km² and comprises the Brisbane Local Government Area (LGA) and the surrounding area to Caboolture in the north, Beenleigh in the south, Ipswich in the west and Redlands in the east. The Brisbane Statistical Division broadly represents the area cover by the Brisbane Strategic Transport Model (BSTM) and the BaT Project Model.*

The Brisbane Statistical division does not extend to the Gold Coast rail stations. This is a significant limitation in the project as the Executive Summary, page 12 identifies that

> *Much of the region's population growth is expected to be in areas outside of Brisbane City in the Gold Coast, Ipswich, the Sunshine Coast, Moreton Bay and Logan LGAs*

The modelling of the Gold Coast area is a key concern as crowding on the Gold Coast line was identified as one of the key reasons for needing additional rail capacity from the southern lines.

The Technical Transport Report, page 21, provides a diagram clearly showing that the modelling only extends as far south at Ormeau station – missing Coomera, Helensvale, Nerang, Robina and Varsity Lakes station. This diagram is shown below in Figure 6.

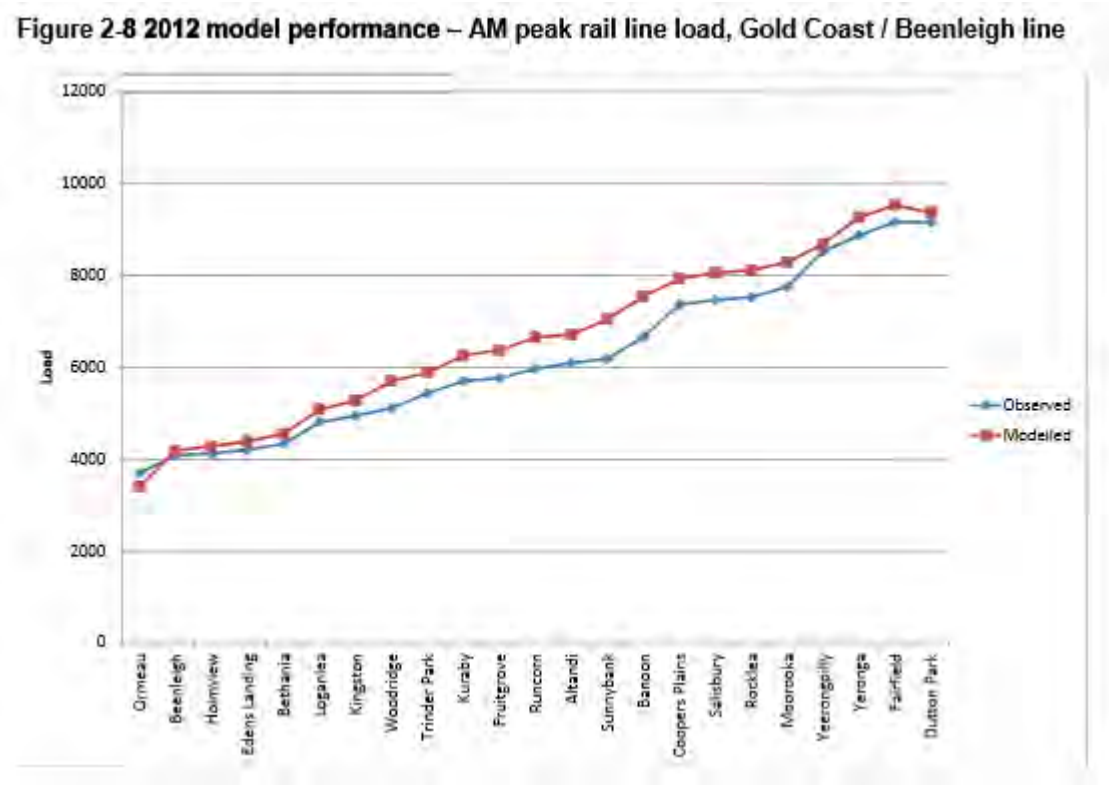

Figure 6: Model performance showing limit of modelling at Ormeau

There are no forecasts of the boardings, alightings or demand growth from the Gold Coast stations included in the EIS.

The lack of such forecasts is inexcusable as the crowding on the Gold Coast services was a key reason that additional inner-city capacity is required.

Issue 10:	The modelling results highlight only a marginal change in bus and rail patronage as a result of the project. The corresponding changes in mode share are negligible highlighting that the project does not address the long term transport challenges in SEQ.

The Technical Transport Report, page 188, provides the public transport users by mode across the Brisbane Statistical Division. The figures are reproduced below in Table 4.

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Table 4: Rail and Bus user growth in the Brisbane Statistical Division

Period	2012	2021				2031			
		Users		Growth		Users		Growth	
		Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
Rail Users									
AM 2hr peak	59,500	104,900	105,100	76%	77%	148,600	153,400	150%	158%
PM 2hr peak	54,300	98,800	98,800	82%	82%	143,600	146,600	165%	170%
Daily	214,500	395,500	397,000	84%	85%	558,000	568,900	160%	165%
Bus users									
AM 2hr peak	58,000	88,800	97,200	53%	68%	114,400	128,400	97%	121%
PM 2hr peak	49,500	70,800	78,000	43%	58%	91,300	103,900	84%	110%
Daily	248,700	381,300	408,200	53%	64%	496,600	539,500	100%	117%

Source: BaT Project Model

Note: The number of rail and bus users include those whom may use more than one mode for a complete journey.

Rather than actually highlighting the need and benefits of the project, the available figures demonstrate that the project is not delivering the outcomes that SEQ needs.

After several billions of dollars of rail investment the final result is an increase from 395,500 passengers a day to 397,000. This is a tiny increase of 1,500 rail trips a day in 2021 comprising 200 trips in the AM peak, 0 trips in the PM peak and 1,300 trips in the off-peak. This is not even half of one percent of the capacity of the network.

But then, on the very next page the report goes on to state that in the AM peak in 2021 the number of rail trips to the CBD increase from 30,200 without the project to 50,200 with the project – an increase of 20,000 trips.

So the project now claims to have generated 20,000 additional peak trips to the CBD, despite the total peak demand only increasing by 200 trips.

The Executive Summary, page 52, state that the BaT tunnel increases the public transport mode share from 9.4% to 9.5% in 2021 and from 10.8% to 11.0% in 2031. This means that for every 1,000 trips taken in SEQ on a daily basis the project attracts less than 2 of these onto the public transport network.

The forecast demand increases and public transport mode share improvements are so small that it calls into question the overall merits of the project. A miniscule increase of less than 1% of rail demand highlights a project that has lost track of what it was trying to achieve.

Comparison of the capacity benefit of Cross River Rail vs. BaT tunnel

A comparison of the additional rail capacity provided by the CRR and BaT projects can be compiled from the project documentation. Firstly the CRR project from the CRR EIS Executive Summary, page 53

> *Cross River Rail would allow up to an additional 48 trains per hour (two way) through the CBD, creating a combined total throughput of 132 trains per hour. This equates to a 57% increase in train paths compared to the current infrastructure's maximum capacity of 84 trains per hour through the CBD.*
>
> *The 2031 strategy with Cross River Rail would also allow the introduction of nine-car trains on inter-city/outer suburban sectors and high capacity suburban multiple unit trains on suburban sectors increasing passenger throughput. This would add a further 28 trains, or a 33% increase in capacity, to the Brisbane rail network during the morning peak compared to the situation without Cross River Rail.*

So CRR provided 48 additional train paths per hour in the morning peak and then the equivalent of an additional 28 paths per hour through the provision of 9-car services.

By comparison the BaT tunnel provides peak capacity for 24 additional trains from the south side. No additional capacity is provided from the northern lines. The project does not make any allowance for longer train lengths in future.

A summary of the proposed Cross River Rail and BaT tunnel capacities is provided below in Table 5.

Table 5: Peak hour rail capacity

	Additional peak trains per hour	Maximum vehicle size (seats)	Additional peak hour seated capacity available
BaT tunnel	24	6-car (480)	11,520
Cross River Rail	48	9-car (651)	31,248

The maximum peak capacity of the BaT rail tunnel is only 37% of the peak rail capacity of the Cross-River Rail tunnel. This is a result of trains not being able to access the tunnel from the north and the smaller vehicle sizes planned for the project.

The off-peak service levels provided by the projects are also significantly different as shown below in Table 6.

Table 6: Off-peak rail service levels with BaT and CRR

Direction	From station	BaT tunnel	Cross River Rail	Difference
South side	Varsity Lakes	2	4	-2
	Helensvale	2	0	+2
	Beenleigh	0	2	-2
	Kuraby	4	4	0
	Cleveland	2	2	0
	Manly	0	2	-2
	Coopers Plains	2	0	+2
Southside Total		***12***	***14***	***-2***
North side	Nambour	1	1	0
	Caboolture	2	2	0
	Redcliffe	2	4	-2
	Shorncliffe	2	4	-2
	Ferny Grove	4	4	0
	Airport	2	2	0
	Doomben	1	1	0
North side Total		**14**	**18**	**-4**

Overall the BaT tunnel provides 6 less off-peak services per hour compared to the Cross-River Rail project.

Conclusions

This report has identified a number of issues with the BaT tunnel project that need to be addressed before it can realistically proceed. These issues include

- That the tunnel fails to address the crowding issues on the northern rail lines, thereby triggering the need for additional significant rail investment by 2021 to address crowding on the northern lines
- That the project has failed to do any demand modelling of the Gold Coast, despite crowding on Gold Coast trains being one of the key driver for additional rail investment
- That the project fails to plan for longer trains in future, thereby reducing the effective life of the tunnel
- That capacity benefits of upgraded rollingstock and larger buses are incorrectly claimed as project benefits
- That the project provides a connection to the Northern Busway and Inner City Bypass/Legacy Way tunnel without identifying any bus capacity issues on the northern side of the city
- It fails to model the capacity of key areas of the network including intersections on the busway network
- That the project does not address the capacity constraints at the Cultural Centre or Victoria Bridge
- That the project has failed to consider alternative cost effective approaches to increasing bus capacity

In addition to these issues it has also been established that the tunnel provides only 37% of the additional peak rail capacity that was provided by the CRR project and also provides significantly less off-peak capacity.

The issues identified in this report are not a complete review of all aspects of the project. They are merely intended to highlight some of the more obvious failings of the project and to establish the need for a proper independent review of the project to be undertaken.

Appendix

During the busiest hour of the morning peak (7:30am to 8:29am) there are 51 routes operating through the Cultural Centre towards the CBD. The routes and number of services in the hour are listed below in Table 7.

Table 7: Routes using the Cultural Centre (northbound) in the AM peak

Route Number	Services through Cultural Centre (7:30am to 8:29am)	Route Description
111	12	Eight Mile Plains – City
196	12	Fairfield Gardens - City/Valley – Merthyr
60	12	West End - City/Valley - Teneriffe Ferry (Blue CityGlider)
66	12	UQ Lakes - City – RBWH
130	11	Parkinson – City
199	11	West End - City/Valley -Teneriffe Ferry
100	9	Forest Lake, Inala – City
140	7	Browns Plains - City Express via Mains Rd
150	7	Browns Plains - City Express via Runcorn
160	6	Garden City – City
230	6	Balmoral - City via Riding Road
204	6	Carindale - City/Valley
200	6	Carindale Heights - City Express
222	6	Carindale - City Express via Eastern Busway
61	6	Ashgrove Shops - City - Langlands Park (Maroon CityGlider)
180	5	Garden City - City Express via Mansfield
555	5	Brisbane City – Hyperdome
120	5	Garden City - City via Tarragindi
185	4	Garden City - City/Valley via Mansfield
214	4	Cannon Hill - City Express
330	4	Bracken Ridge - City Express
385	4	The Gap - City Express
444	4	Moggill - City Express
170	4	Garden City - City Express via Newnham Rd
345	4	Aspley - City Express via Maundrell Tce
333	4	Chermside – City
175	3	Garden City - City via Logan Rd
107	3	Yeronga – City
174	3	Garden City - City/Valley via Newnham Rd
192	3	UQ Lakes - City via Highgate Hill
300	3	Toombul - City via Hamilton
110	3	Inala – City
210	2	Cannon Hill - City/Valley
306	2	Nudgee/Toombul – City
113	2	Mt Gravatt Central – City
203	2	Carindale - City/Valley
172	2	Garden City - City via Greenslopes Hospital
116	2	Rocklea - City/Valley
112	2	Griffith Uni Mt Gravatt – City
202	2	Carindale – City

115	2	Calamvale - City via Acacia Ridge Express
301	2	Toombul - City via Hendra
135	2	Parkinson - City Express
212	2	Carindale - City/Valley via Seven Hills
250	2	Redland Bay - Brisbane City
124	2	Sunnybank - City/Valley
125	1	Garden City - City/Valley via Salisbury
235	1	Balmoral - City/Valley via Thynne Road
184	1	Garden City - City/Valley via Mt Gravatt Central
108	1	Indooroopilly - City via Tennyson
322	1	Chermside - City via Toombul

9 out of these 51 routes (those in the 3xx or 4xx series, accounting for 28 services) commence at the Cultural Centre during peak hour and do not provide any capacity for commuters from the Southside. These services could be removed from the Cultural Centre with minimal impact on commuters from the south side, except for changing the transfer location for some commuters heading to destinations beyond the CBD.

Out of the 51 routes there are 5 routes that operate only 1 service during the busiest hour of the peak and a further 14 services that operate only 2 services during the peak hour.