Subject: SSI-8862
Beaches Link and Gore Hill Freeway Connection EIS:

This submission is an objection to Beaches Link Tunnel Project.
A proposal of a better option in terms of lowering costs and increasing benefits is outlined below:

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E:[redacted]
M:[redacted]

23 February 2021.

To:
NSW Department Planning Industry and Environment:

Contents:

1. Introduction:

This submission is written in the spirit of creating a healthy future.
I have read the EIS and observed that the reality of existing traffic issues, including climate change are articulated and explained. The broad goals of a healthy future are also outlined.
One of the principal aims of the EIS report is to try and find solutions to the existing traffic chaos along existing key travel corridors. Public transport improvement as one of the keys to a solution is acknowledged but in my opinion underplayed. The positive aspect of the 'Covid 19' event has also been underplayed. People have been working from home, at least part time, with a reduction in traffic to and from the CBD. A vibrant city where people flock to the CBD is desirable, but a balance can be struck. The option of staggering work hours to some degree with a resultant reduction in peak hour problems does not seem to have been suggested.
The future of our transport system with a proposed tunnel is well explained to show that with an increase in traffic over the next few years by 2037, the AM and PM traffic frustrations are bound to stay and worsen with a Spit Bridge/Roseville Bridge/Tunnel route combination. Instead of a two corridor road system a three corridor system is being proposed in the EIS. The bottle necks at either ends are a fact and the leading to and coming from the corridors cannot change as we have destinations at either ends.
There may be a perception by the public that with an additional route, travel will be easier.
The tunnel proposal is actually an invitation to use our roads more.
The growth increase noted, in the report is inevitable and may grow further if the proposed tunnel is ever built.
We are well positioned to change the system now and encourage the use of our existing roads corridors, which are in fact sufficient and adequate, to be used less and also introduce vehicles which are environmentally friendly to navigate the existing road corridors in a more efficient way.
The number of people travelling may increase but the way they reach their destinations can be significantly improved.
Table A (Altman) and Table B (Altman) below reflects the traffic volume statistics in 2016, 2027 and 2037 if the Tunnel was built in peak hours and daily.

Table A (Altman): Showing comparisons in traffic volumes 2016, 2027 and 2037 in Morning Peak (MP) and Evening Peak (EP) on the Spit Bridge (SB) Location and Roseville Bridge location (RB) and Tunnel (T).
Percentages shown as **individual decreases** in traffic in relation to 2016 for (SB), (RB) and (T) individually
Percentage shown as **increase in traffic** in relation to the use of Tunnel from completion date on and **for totals** (SB), (RB) and (T) in (MP) and (EP) times in relation to 2016 data,
(Note all raw numbers are sourced from the tables and figures as shown in Appendix (Altman) as provided in the EIS and Tim Kwok, Senior Community and Stakeholder Engagement Manager. Beaches Link and Gore Hill Freeway Connection)

	2016. MP.	2016 EP.	2027 MP	2027. EP.	2037. MP	2037 EP.
Spit: (SB)	4250	4750.	3100. -27%	3350 -29%	3400. - 20%.	3600 -24%
Roseville: (RB)	5850.	5800.	4850 -17%	4550 -21%	5200. -11%	4900 -15%
Tunnel. (T).			4100.	4400. +7%.	4750 +16%.	4950 +21%
Totals: (SB)(RB)(T)	10,100.	10,550.	12,050.	12,300.	13,350.	13450
From above			+19%.	+16%.	+32%.	+27%

Table B (Altman): Showing total daily traffic in 2016, 2027 and 2037 for (SB), (RB) and (T) with percentage increase in volumes in relation to 2016.
(Note all raw numbers are sourced from the tables and figures as shown in Appendix (Altman) as provided in the EIS and Tim Kwok, Senior Community and Stakeholder Engagement Manager. Beaches Link and Gore Hill Freeway Connection)

	2016	2027	2037
Spit: (SB)	69 ,500.	48,500.	52,000
Roseville: (RB)	79,000.	62,000.	66,000
Tunnel: (T)	0	58,500.	64,500
Combined:	148,500.	169,000. + 14%	182,500 +23%

2. Broad goals:

The responsible goals and aims for our health and environment are outlined in *Overview* of the EIS report:
'25.1 Overview
Sustainable development refers to "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987).

The Infrastructure Sustainability Council of Australia provides a definition specific to sustainable infrastructure development, being that which is "designed, constructed and operated to optimise environmental, social and economic outcomes over the long term" (Infrastructure Sustainability Council of Australia, 2016c).'

The World Commission on Environment and Development, (1987) is broad.
The Infrastructure Sustainability Council of Australia, (2016c.) articulates our present position, more clearly as we are now in an accelerating environmental and health crisis, in a fragile world.

The EIS report has been compiled by experts who have shown interest in the crisis in the present and leading to the future.
The preamble and understanding in the EIS demonstrates an awareness of the direction in which our climate crisis and health consequences is heading.

3. Background to the Existing Context:

We need to start with the overall background.
The EIS clearly outlines the issues of the future and which our children are inheriting, including Tables 26-2 which outlines the inherit issues of our existing systems. (see Appendix (Altman)

Global warming and environmental issues are a fact which needs to be addressed and not prolonged. To disperse the same amount of pollution that is being generated, whichever way, does not address the problem.

To state that it won't be worse with a tunnel construction is really begging the question.
The pollution may be acceptable in relation to outdated standards.
The evidence may not be clear cut. How can it be ever clear-cut when there are many factors at play including other contributions and simple demographic variations?

The effects of warming and other factors are not just the result of road usage.
Road usage is a significant factor, however, and is increasing. (Covid 19 excluded)

The conversion to electric private vehicles especially buses is on the horizon.
The incentives, however, are minimal in terms of subsidising costs and the battery-charging facilities at present are underdeveloped, in the Sydney metropolitan area.

Figure 3-2, Key metrics for the critical Middle Harbour road crossings and
Figure 4-4, show average weekday trips via key transport corridors (existing conditions i.e. 2016 modelling).
Bus passenger numbers are shown with private car numbers which have one occupant or more which adds up to a significant number of people travelling in two road corridors.
Figure 4-4 shows a conservative passenger total which journey every day.
Table 4-1 Shows Modelled 2016 traffic demands at key locations (SPPM) and articulates 'Morning Peak hour (veh)'.

'Appendix F' of the EIS report clarifies that 'veh' denotes 'vehicles'.
Morning peak hour is understood to be the same as defined in AM peak hour:
'Appendix F' of the EIS report defines 'AM peak hour' as 'Unless otherwise stated, this refers to vehicle trips arriving at their destination during the average peak hour in the morning peak period between 7am and 9am on a normal working weekday'
The totals of 79,000 vehicles over the Roseville Bridge corridor and 69,500 vehicles over the Spit Bridge corridor of vehicles includes buses.
The vehicle figures clearly show that there are many vehicles on the road most are burning fossil fuels.
The statistics are general and the vehicle density along the routes changes depending on time of day and other factors.
Table 4-1 breaks down the two figures of 79,000 vehicles and 69,500 vehicles as discussed above. Into AM and PM peak hours.
Tables 7-1, 7-2 and 7-3 from Appendix F: show the statistics with Tunnel being built on the Spit Bridge (SB) Roseville Bridge (RB) Locations in 2027 and 2037.
If one looks at Figure 3-4 (Appendix Altman) one can see that the term 'AM peak' is an error. (See amendment in Appendix (Altman)).
Table 7-1 Modelled 'Do something' morning peak hour traffic demands
at key locations
Table 7-2 Modelled 'Do something' evening peak hour traffic demands
at key locations.
Daily demands are shown in:
Table 7-3 Modelled 'Do something' daily traffic demands at key location.

Table A (Altman) and Table B (Altman) demonstrate that in doing an analysis of the costs/benefits of building a Tunnel it is not a simple numbers exercise. It is not simply how many vehicles flow in particular corridors. It is important to see how they flow, distributed including an analysis of the 'health' of the environment and the people living in it.
There is no positive purpose in creating an additional corridor if the entry and exist points have the same congestion issues, with a flow on effect.

To state that there will be less traffic along a particular corridor and an increase in overall traffic is not sufficient to explain how the traffic will be able to negotiate these corridors.
The issues of flow are well articulated in the EIS 3.2, yet this issue is not married into the tables of analysis of Appendix 'F' of the EIS Tables 7-1, 7-2, 7-3.
There will be more vehicles from now on and highlighting 2027 and 2037 is demonstrating that in a three corridor system encouraging more vehicles is contrary to the spirit of the objectives as outlined in this report on Climate,

Environment and Health. The alarm bells are ringing when one reads Tables 7-1, 7-2, and 7-3 as outlined

There are no accurate analysis of how many people will actually use the tunnel. The EIS report articulates the issues of E-tolling the proposed tunnel and the consequent issue of avoidance of the tunnel route.

If we look at the future to 2027 (hypothetical opening of tunnel, which will not occur if built before 2028 according to latest reports) and 2037 the EIS states:

'…3.2 The North District's road transport challenge…Freight services, public transport and other road users travelling to and from the Northern Beaches region currently experience some of the slowest and most unreliable journey times across Greater Sydney. The transport challenges for the North District and Northern Beaches region are the product of a number of key issues, summarised below:

• High traffic volumes and limited capacity at the eastern Sydney Harbour and Middle Harbour crossings, and roads around the Harbour CBD

- Network data demonstrates that incidents on the Sydney Harbour crossings and their approaches heavily impact journey times for freight, buses and private vehicles travelling on the arterial network across the Northern Beaches region

- The limited alternative routes and high demand for the eastern Sydney Harbour and Middle Harbour crossings result in high levels of congestion, and make these cross-harbour corridors critical to the performance of the broader motorway and arterial road network

- The performance of the road crossings of Sydney Harbour and Middle Harbour are critical to the performance of the arterial network servicing the Northern Beaches (refer to Figure 3-4) – particularly for north-south trips

- *It has long been understood that the benefits of upgrading road capacity to the Northern Beaches region would not be realised without addressing downstream capacity constraints at the Sydney Harbour crossings and beyond…'*

If we look between 2021 and 2037 and mark the date the first vehicle would actually use the proposed Tunnel we are looking at approximately 2028

From today to 2028 the number of vehicles which will use the Roseville Bridge corridor and the Spit Bridge corridor would be approximately as follows:

Looking at figure 3-2 and 4-4, the daily figure given of 69,500 vehicles over the spit bridge and 79,000 over the Roseville Bridge corridor totals 148,500 journeys per day.

In one year: 148,500 x 260 (weekday trips per annum) = 38,610,000 vehicle journeys

By 2028, if the present volume of cars is, as at present, then the number of journeys will be:
38,610,000 x 7years = 270,270,000 vehicle journeys, by the date the tunnel is ready for use.

The costs associated with these journeys are:
1. Economic costs:
a. Cost in Use, including road maintenance
b. Fuel
c. Maintenance of vehicles, including tyres.
d. Life time of vehicles especially with eventual conversion to more electric vehicles
e. Hospitals as a result of accidents
f. Policing of traffic
g. Parallel costs of building the Beaches Link tunnel at a predicted 1 billion dollars a kilometre, i.e about 5.6 billion dollars
h. Parallel costs of building new electric infrastructure to deal with the future change to electric vehicles
i. Parking facilities

2. Environmental costs:
a. Burning fossil fuels, with negative health and environmental consequences.
b. Bi-products of building a tunnel

3. Psychological stress and other health costs:
a. Existing corridor congestion
b. Surrounding environment from building the tunnel .
c. Uncertainty as to future road planning

A simple 'cost-benefit' study is not possible, even with the most sophisticated modelling, since we are not dealing with pure mathematics but a mixture of factors.
'Costs' refer to matters such economic costs, social costs, environmental costs, psychological costs.
'Benefits' refer economic benefits, social benefits, environmental benefits and psychological benefits.

The undeniable reality is clear that in today's terms the well being and healing of our social, environmental and psychological fabric are of primary importance. Benefits turn into economic benefits in terms of productivity, maintaining a high health level and nurturing our environment.
The bottle necks at either end of the three corridor system is mentioned, articulated in the EIS report and a QED negative conclusion can be realistically deducted when one joins the issues which will remain either unchanged or exacerbated.
If we look at Pages: 3-8, 3-9 and 3-10 from Chapter 3 of the EIS, with the statistics in Figure 3-4 of the EIS (Appendix (Altman)) issues are highlighted at present and future:

<u>Excerpt Environmental impact statement 3-8, 3-9, 3-10:</u>
'…The region is particularly reliant on the most southerly corridors: the Warringah Road via Roseville Bridge and the Military Road/Spit Road via Spit Bridge corridors. Currently, these links carry 71 per cent of all interregional road journeys to and from the Northern Beaches, with traffic volumes forecast to increase by about 10 per cent by 2037 (see Figure 3-4).

Sydney's worst road congestion occurs between Balgowlah and Sydney Harbour through Mosman and Cremorne (Grattan Institute, 2017). The Spit Bridge opens regularly to allow boats to navigate Middle Harbour, resulting in traffic delays. However, even with the bridge down, morning delays on this route are greater and more unpredictable than other routes in Greater Sydney. As a result, Beaches Link and Gore Hill Freeway Connection
Balgowlah commuters to the Sydney CBD need to allow 40 minutes to get to work on time; or 23 minutes longer than the trip would take without traffic (Grattan Institute, 2017).

The Australian Infrastructure Audit 2015 (Infrastructure Australia, 2015), identified the east–west corridor (Warringah Road between Chatswood and Narraweena) as generating the third highest congestion cost of all road corridors across Sydney, Wollongong and Newcastle. This is based on a delay cost per lane kilometre of $2.18 million. The Audit estimates that by 2031 this will increase to $6.16 million, making it the second-most costly corridor for congestion behind the Warringah Freeway (Infrastructure Australia, 2015).
The heavy reliance on these corridors results in them being highly congested and journeys that rely on them are highly susceptible to delays caused by incidents. Current average travel speeds in the AM peak are below 30 km/h on

Military Road and Spit Road. Travel speeds are expected to fall by about 40 to 60 per cent in the southbound direction and about 20 per cent in the northbound direction by 2037. Similarly, average travel speeds for trips on Warringah Road in the westbound direction between Frenchs Forest and North Sydney are expected to drop below 15 km/h in the AM peak (a decrease of about 54 per cent) by 2037…'

As a result of the bottle necks at either end of the three route system there will be potential hold-ups with additional hold-ups from other incidences.
This poses extended problems and frustrations of the existing situation as outlined in Chapter 3 of the EIS.
'Access between the North District and employment hubs along the Eastern Economic Corridor is primarily provided by private vehicle and bus services using the Military Road/Spit Road (A8) and Warringah Road (A38)/Eastern Valley Way corridors. These arterial links are highly congested and unreliable during peak periods. As a result, a small proportion of jobs within Greater Sydney are accessible to North District residents within 30 minutes by private vehicle or public transport during the morning peak.'

'…. It has long been understood that the benefits of upgrading road capacity to the Northern Beaches region would not be realised without addressing downstream capacity constraints at the Sydney Harbour crossings and beyond….'

• Limited arterial road capacity servicing the Northern Beaches region
- The Northern Beaches is connected to the rest of Greater Sydney by a small number of transport corridors. Just three road corridors, including only two Middle Harbour crossings, connect the Northern Beaches with the rest of Greater Sydney:
o MonaValeRoad(A3)
o MilitaryRoad/SpitRoad(A8)
o WarringahRoad(A38)/EasternValleyWay.
These three corridors are required to accommodate journeys to and from strategic centres across Greater Sydney, as well as local and intraregional trips, including a large number of bus trips.

- *The Mona Vale Road, Military Road/Spit Road and Warringah Road/Eastern Valley Way road corridors generally operate well over capacity during peak periods. This contributes to high levels of congestion, long and unreliable journey times and,*
- *consequently, poor accessibility to and from the region. This poor accessibility hinders daily access for people and goods travelling to, from, and within the*

region, increasing the time people spend commuting and restricting opportunities for growth in the strategic centres

- *The limited number of corridors connecting the Northern Beaches to the rest of Greater Sydney means that the network is very susceptible to major delays caused by incidents. Network data demonstrates that an incident on one*
- *corridor servicing the region can have major impacts on journey times across the broader road network*

• Low population density across the Northern Beaches region

- While the Northern Beaches region is home to a large population, the population density is relatively low. This results in a wide variety of origins and destinations for transport journeys that are not well suited to high-frequency mass transit modes

- *Accordingly, the most appropriate transport modes for the region continue to be road based, including high-quality express bus services such as the B-Line. These modes provide the greatest flexibility to service the diverse trip needs of the dispersed Northern Beaches population'*

4. Conclusion:

The responsible goals and aims as outlined in the Overview of the EIS 25.1 (as shown above) will not be met if the tunnel is built with commencement use date 2028 and on, with the traffic encouraged to the degree as shown.

The traffic, hold-ups, bottle necks and subsequent frustrations and negative contribution to the environment will be as existing or worse than at present. This is demonstrated in Table A (Altman) if we look at the total number of vehicles in 2016, 2027 and 2037, as derived from Table A (Altman) in Peak times and Table B(Altman) for Daily traffic the evidence is of increased overall traffic

A. Extract from Table A (Altman):

	2016. MP.	2016 EP.	2027 MP	2027. EP.	2037. MP	2037 EP.
Totals: (SB)(RB)(T)	10,100.	10,550.	12,050.	12,300.	13,350.	13450
From above			+19%.	+16%.	+32%.	+27%

B. Extract from Table B(Altman) :

	2016	2027	2037
Combined: (SB)(RB)(T)	148,500.	169,000.	182,500
		+ 14%	+23%

There is no point of building a tunnel and associated supporting infrastructure if someone travelling along Roseville Bridge corridor, Spit Bridge corridor and Tunnel corridor in 2028 onwards will experience the same traffic holdups as at present or worse

The situation now, which is acknowledged, in the EIS, as chaotic will be worse while the Tunnel is being built from a traffic logistics at points of hold up where trucks and other equipment will need to negotiate traffic corridors and destinations. The EIS is clear that although working hours will be restricted there will be unrestricted schedules for concrete truck delivery.

The negative health consequences physiologically and psychologically as a result of work on the tunnel: noise, dust, vibration, uncertainty for seven years will be here to co-exist whilst the tunnel not being used for the purpose it is designed for.

Key features of the Beaches Link component of the project as described in the EIS by Jacobs Group (Australia) Pty Ltd, in the report demonstrate extensive work including twin mainline tunnels about 5.6 kilometres long at a construction cost of as I understand, 1 billion dollars a kilometre, in total, 5.6 billion dollars would be spent if the Tunnel is built to encourage the same problems as at present, maintaining and accelerating the issues our children are inheriting as outlined in Table 26-2. See Appendix (Altman).

It makes clear sense to adopt a different approach and spend 5.6 billion dollars on a user friendly environment which makes travel from A to B easier, cleaner and more relaxed.

The professionals contributing to the EIS are clearly showing that the negative issues existing and in the future.

The support by the professionals contributing to the EIS for a comprehensive bus system is outlined with issues of frustration to the system outlined, which are solvable by addressing the mass private vehicular traffic behaviour, by a series of options, including E-tolling, staggering work hours, encouraging people to work from home, and introducing a ‘supply-demand coupling’ incentive of electric buses as one can see in my proposal below.

Examples of support of a bus system is described comprehensively in the EIS by Jacobs Group (Australia) Pty Ltd.
Their outline of the 'Transport for NSW 2013a' is in line with my approach with the need of a mechanism as described in the EIS 4-12:
'…….Sydney's Bus Future (Transport for NSW, 2013a) acknowledges that improvements to the bus network are essential to meet changing customer needs, including access to major centres outside the Sydney CBD. Sydney's Bus Future aims for seamless connection to other transport modes to deliver the right mix of services. In response to changing passenger needs and an increase in demand, additional services have already been added to the Sydney bus network. However, without measures to improve journey times by increasing the road efficiency or capacity, the addition of more buses to the network can contribute to congestion, making bus services less effective at meeting customer needs…'

The following excerpt from Beaches Link and Gore Hill Freeway Connection Environmental impact statement 3-4 also supports an improved public transport system, stating unequivocally:
'….- However, the effectiveness of express bus services will diminish without appropriate improvements to road capacity and travel reliability.
• Travel time reliability and speed of public transport journeys constrained by a congested road network
- The effectiveness and travel time reliability of the public transport network servicing the region is constrained by the capacity of the arterial road network, particularly the Military Road/Spit Road corridor which is the primary bus corridor between the Northern Beaches and Harbour CBD

- *The Military Road/Spit Road corridor also serves as the key corridor for all other road traffic for both interregional journeys between the Northern Beaches and Harbour CBD as well as local trips, resulting in heavy and conflicting road transport demands on this corridor and consequently, poor travel speeds during peak periods….'*

The root of the problem at present is the counterproductive hold ups and inefficiencies, especially in AM and PM peak hour periods.
The 'Electric Vehicle Council' recent report supports the .'…electrification of bus fleets to reduce emissions, provide health and economic benefits, and create amenity improvements.
In NSW, transport greenhouse gas emissions comprised 21% of total emissions in 2016/17, making it the second largest source of emissions in the state. Road transport accounts for 85% of transport emissions and therefore needs to be a priority area of focus in order to reduce emissions. Electrifying public and private

vehicle fleets are a proven technology and cost-effective way to address emissions in road transport….'

5. Proposal:

I believe one can reach the 'numbers' goals as set for the Spit Bridge corridor and Roseville Bridge corridor for 2027 and 2037 in Tables 7-1 and 7-2 for AM and PM Peak as outlined in the doing something columns without actually building a tunnel.

Table C (Altman) below**:** Without the proposed Tunnel: Showing comparisons in traffic volumes 2016, 2027 and 2037 in Morning Peak (MP) and Evening Peak (EP) on the Spit Bridge (SB) Location and Roseville Bridge location (RB) with additional Electric buses, each carrying 45 passengers.

Note:

Numbers shown as +(25) for example in red denote number of additional electric bus numbers to compensate to allow overall decrease over 2016 numbers.

Numbers shown as +(45) for example in green denote number of additional bus numbers to compensate for overall vehicle number which would have crossed the Tunnel crossing corridor . (These numbers are distributed evenly over the Spit Bridge Corridor and the Roseville Bridge corridor

Numbers shown as -(20%). for example in blue denote percentage decrease in total vehicles in relation to the totals shown for 2016 (MP) and (EP)

(Note all raw numbers are sourced from the tables and figures as shown in Appendix (Altman) as provided in the EIS)

Please note that the bus numbers for morning peak (MP) and evening peak (EP) should not be totalled since the buses used for (MP) can be used for (EP) and of course during off peak times.

2027 date : Capacity derived from: EP 31,48, 28 and 48 = 160 buses with allowances for more than one occupant in some cars

2037 date : Capacity derived from: EP 25, 55, 20 and 55 = 160 buses with allowances for more than one occupant in some cars

The cost of 160 Buses is a phased cost. I understand from the manufacturer that I have been in contact with, that the new 45 passenger electric bus is being refined and will probably be ready for delivery from 2023.

The cost per unit 45 passenger electric bus, I was informed, may be about $750,000 per bus without the re-charging infrastructure. If we said $1,000,000 per bus, for argument's sake then 160 buses will be $160,000,000.

This figure is much less than the tunnel cost for 5.6 kilometres of about 5.6 billion dollars.

It is only a start, since the number of 160 is only being indicated here to match the traffic volume at AM peak and PM peak as ideally shown in the EIS.
If the number of Electric buses was increased above '160' then each bus which carried 45 passengers is introduced will equate to a reduction of about 45 private cars crossing the key points.
An introduction of another 100 electric buses, as an example, will equate to an estimated reduction of 4,500 private vehicles during AM and PM.
In reality that the capital cost of $1 million per bus converts to about $22,000 per passenger and the bus is in ongoing use during the day. The benefits of computer and satellite technology allows for costing planning of bus movement and allocation to demand areas.
The battery life-time and charging is an infrastructure with R&D as evolution,
There are companies which have a leasing arrangement and maintenance of the batteries at present and cost in use factor, may be higher initially but should reduce with time
A large portion of cars spend a significant part of the day parked, and only carry one passenger. A significant infrastructure is required to park these vehicles.

Supplying the road network with electric buses will create a demand by convenience. The experience of a new momentum will accelerate demand. The Government needs to invest in facilitating supply of electric buses.
Demand will not occur in this case, without supply at the forefront. The normal demand-supply coupling becomes supply-demand coupling.
Introduction of an additional electric bus fleet will improve 'road efficiency' and 'capacity'. (As noted in the EIS, page 4-12)

The key factors for the Beaches area are comfort and convenience.
The main motivational factors for using a bus service are economic and psychological:

a. Comfort: combination of larger and smaller electric buses.
b. Frequency: equals availability (including continual computer monitoring and modelling of passenger needs
c. Convenience
d. Status: The knowledge that one can ride comfortably with knowledge one is helping the environment
e. Safety. Computer assisted ensures incident free journeys
f. No parking needs at destinations. Minimising user costs, reducing on road parking and building parking stations (each take up space and resources including the inefficiency of idle vehicles)

g. The economics of scale. Larger number of buses with dedicated lanes means cheaper purchase price per unit and lower cost in use (especially using recycled materials).
h. Fewer lanes for cars with e-tolls creates a disincentive to drive for longer journeys.

Table C (Altman):

	2016. MP.	2016 EP.	2027 MP	2027. EP.	2037. MP	2037 EP.
Spit: (SB)	4250	4750.	3100. +(25). +(45).	3350 +(31) +(48).	3400. +(19) +(53).	3600 +(25) +(55)
Roseville: (RB)	5850.	5800.	4850 +(22) +(45).	4550 +(28) +(48).	5200. +(14). +(53).	4900 +(20) +(55)
Total Vehicles: (SB)(RB)	10,100.	10,550.	8,077. -(20%).	8,045. -(24%).	8725. -(13%).	8642 -(18%)

With an introduction of 100 additional electric buses, as an example, the total vehicles will even be less.

Total Vehicles: (SB)(RB)	10,100.	10,550.	3600 -(63%).	3600. -(61%).	4250. -(57%).	4150 -(60%)

(Note all raw numbers are sourced from the tables and figures as shown in Appendix (Altman) as provided in the EIS and Tim Kwok, Senior Community and Stakeholder Engagement Manager. Beaches Link and Gore Hill Freeway Connection)

6. Post script:

As a post script which perhaps could be placed as a preamble the following is pertinent.

In Canada which has similar demographics to Australia on many levels the move is to a cleaner healthier environment with EV buses being introduced at a larger scale.

I have just received news from the Canadian 'Clean Energy Review' to whom I subscribe.

'New public transit investments to build strong communities, fight climate change, and create new jobs across Canada

February 10, 2021

Ottawa, Ontario

'Investing in public transit infrastructure shortens commute times for families, creates good middle class jobs, grows our economy, and cuts air pollution. Since 2015, the Government of Canada has invested more than $13 billion in 1,300 public transit projects for communities across Canada. This is the largest public

transit investment in Canadian history, and as we build back better from the global COVID-19 pandemic, we will continue to make these smart investments that support Canadians.

The Prime Minister, Justin Trudeau, today announced $14.9 billion for public transit projects over the next eight years, which includes permanent funding of $3 billion per year for Canadian communities beginning in 2026-27. This announcement provides cities and communities the predictable transit funding they need to plan for the future, and is part of our plan to create one million jobs, fight climate change, and rebuild a more sustainable and resilient economy. These investments will:

- Help Canadians move around easier and create new jobs by building major public transit projects, providing dedicated planning funding to accelerate
-
- future major projects, and supporting the expansion of large urban transit systems that many Canadians depend on every day.
- Reduce pollution and create jobs for Canadians by enhancing public transit systems and switching them to cleaner electrical power, including supporting the use of zero-emission vehicles and related infrastructure, complementing the work of the Canada Infrastructure Bank.
- Support healthy lifestyles in our communities and meet the growing demand for active transportation projects, including by building walkways and paths for cycling, walking, scooters, e-bikes, and wheelchairs.
- Help Canadians living in rural and remote areas travel to and from work more easily and access essential services, by working with rural, remote, and

Indigenous communities to identify and create transit solutions that meet their needs.

- Support our cities and communities by making a permanent and stable federal commitment to funding public transit, and facilitate partnerships between all orders of government, Indigenous communities, transit agencies, and other stakeholders to develop an approach to permanent public transit funding in a manner that offers the greatest benefits to Canadians.

Investing in public transit infrastructure will build strong communities across the country and deliver a better quality of life for all Canadians. The government will continue to invest in projects that best support our recovery, create middle class jobs and economic growth, and help us reach our climate targets. Together, we can create a Canada that is cleaner, more competitive, and more resilient for generations to come.

Quotes:

"When we invest in public transit infrastructure, we are supporting good middle class jobs, creating better commutes, fighting climate change, and helping make life easier and more affordable for Canadians. We will continue to do what it takes to ensure our economic recovery from COVID-19 and build back a more resilient country for everyone."

The Rt. Hon. Justin Trudeau, Prime Minister of Canada

"As we build back better, it is time to ambitiously invest in modern and sustainable public transit across our country, to reduce congestion, to help create a million jobs, and to support cleaner and more inclusive communities. Permanent, long-term funding for public transit will mean new subway lines, light-rail transit and streetcars, electric buses, cycling paths and improved rural transit. It will mean that Canadians can get around in faster, cleaner, and more affordable ways. And it will help drive us to net-zero emissions and ensure a more sustainable future for our kids."

The Hon. Catherine McKenna, Minister of Infrastructure and Communities

"Our government is committed to investing in public transit in communities across the country. We are working in collaboration with municipal, provincial and territorial governments to support Canadians in building a strong economy and clean environment."

The Hon. Dominic LeBlanc, President of the Queen's Privy Council for Canada and Minister of Intergovernmental Affairs

"Investing in cleaner and more affordable modes of transportation is an important part of Canada's strengthened climate plan – one that means we will exceed our 2030 target and that will put us on a path to get to net-zero emissions by 2050.

Transportation accounts for one-quarter of Canada's emissions and represents an area that is in need of smart climate investments, like the ones that we have announced today, to support good Canadian jobs, a stronger economy, and a healthier planet."

The Hon. Jonathan Wilkinson, Minister of Environment and Climate Change

Quick Facts

- Since 2015, the Government of Canada has spent over $13 billion in more than 1,300 public transit projects across Canada. These investments have helped build more than 240 kilometres of new public transit subway and light rail line, purchase over 300 zero-emission buses, and create almost 500 kilometres of active transportation trails, bike and pedestrian lanes, and recreational paths.
- Through the Investing in Canada Plan, the Government of Canada is already investing $28.7 billion to support public transit projects, including $5 billion available for investment through the Canada Infrastructure Bank.
- In October, as part of the Canada Infrastructure Bank's three-year, $10 billion Growth Plan, the government announced that $1.5 billion of the available funding will be used to accelerate the adoption of zero-emission buses and charging infrastructure so Canadians can have cleaner commutes.
- Canada's strengthened climate plan committed to provide permanent public transit funding. The plan encourages cleaner modes of transportation, such as low and zero-emission vehicles, transit, and active transportation, to make communities healthier, less congested, and more vibrant.
- In July 2020, the Government of Canada announced the Safe Restart Agreement, a federal investment of over $19 billion to help provinces and territories restart their economies while protecting the health of Canadians. The investment included a contribution of up to $2 billion to support municipalities with COVID-19 operating costs for six to eight months, and a commitment to cost-match more than $2.3 billion to support any additional provincial or territorial contributions for public transit….'

6. Appendix (Altman):

Table 26-2 Summary of climate change projections – Sydney region

Climate variable	Baseline (1986 - 2005)	2030	2050	2090
Temperature				
Mean minimum temperatures (°C) – annual	14.4	15.5	16.3	18.4
Mean maximum temperatures (°C) – annual	22.4	24.3	24.4	26.5
Days over 35°C – annual	3.5	5.6	5.9	11.3
Rainfall				
Mean precipitation (mm) – annual	1238	1206	1151	1049
Extreme rainfall events – max 1-day rainfall	Projected to increase 2 – 22%			
Extreme rainfall events – 20-year return level of max. 1-day rainfall	Projected to increase 5 – 42%			
Evapotranspiration				
Annual change in potential evapotranspiration (% change)	375 mm (1961-1990)	4.2	No data	14.3
Fire regimes				
The number of days where the fire danger rating is 'severe' or 'extreme'	0.9	1.3	No data	2.1

Table 26-2 Summary of Climate change projections - Sydney region.

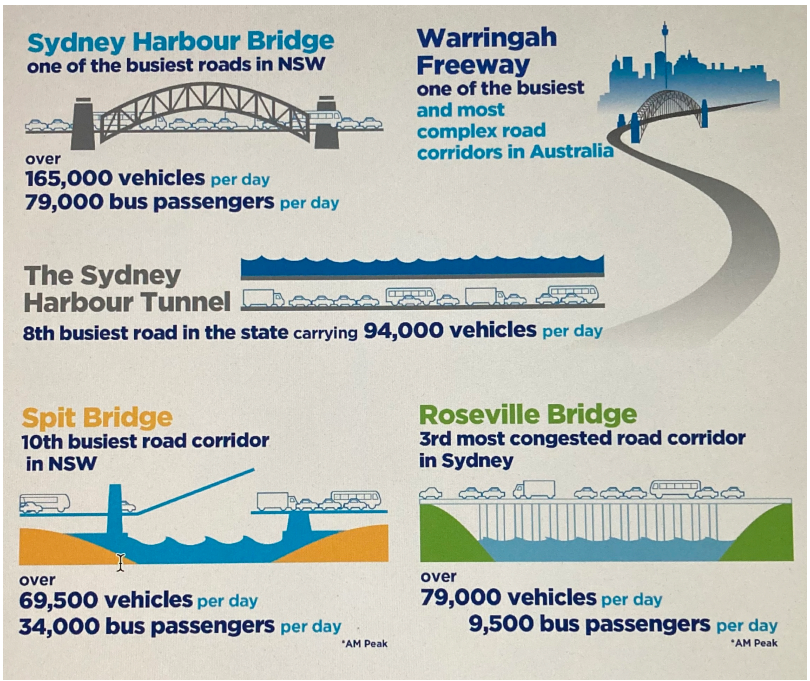
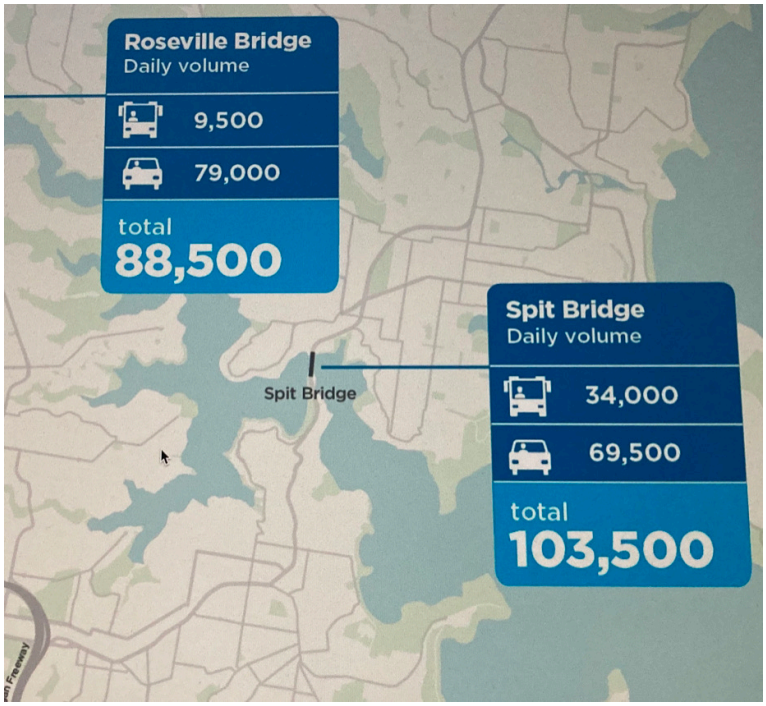


Figure 3-2 Key metrics for the critical Middle Harbour road crossings



Bus passengers Traffic (vehicles) *Existing (pre-COVID) weekday travel demand on the Spit Bridge and Roseville Bridge*

Figure 4-4 Average weekday trips via key transport corridors (existing conditions)

Sydney's Bus Future (Transport for NSW, 2013a) acknowledges that improvements to the bus network are essential to meet changing customer needs, including access to major centres outside the Sydney CBD. *Sydney's Bus Future* aims for seamless connection to other transport modes to deliver the right mix of services. In response to changing passenger needs and an increase in demand, additional services have already been added to the Sydney bus network. However, without measures to improve journey times by increasing the road efficiency or capacity, the addition of more buses to the network can contribute to congestion, making bus services less effective at meeting customer needs.

Figure 4-4: Average weekday trips via key transport corridors (existing conditions) with totals of passengers.
Please note: The numbers shown as vehicle numbers included buses as confirmed by Tim Kwok, Senior Community and Stakeholder Engagement Manager. Beaches Link and Gore Hill Freeway Connection)

Table 4-1 Modelled 2016 traffic demands at key locations (SMPM)

Road	Location	Direction	Morning peak hour (veh)	Evening peak hour (veh)	Daily (veh)
Spit Road	Spit Bridge	Northbound	1700	2800	36,000
		Southbound	2550	1950	33,500
		Combined	*4250*	*4750*	*69,500*
Warringah Road	Roseville Bridge	Northbound	1950	3450	39,000
		Southbound	3900	2350	40,000
		Combined	*5850*	*5800*	*79,000*
Mona Vale Road	St Ives Showground	Northbound	2250	2450	28,000
		Southbound	2600	2250	28,000
		Combined	*4850*	*4700*	*56,000*
Northern Beaches screenline		Northbound	5900	8700	103,000
		Southbound	9050	6550	101,500
		Combined	*14,950*	*15,250*	*204,500*
Eastern Valley Way	Castle Cove	Northbound	750	1350	14,500
		Southbound	1750	950	13,500
		Combined	*2500*	*2300*	*28,000*

Table 4-1 Modelled 2016 traffic demands at key locations, showing morning peak (AM) and Evening peak (PM) and daily vehicles.

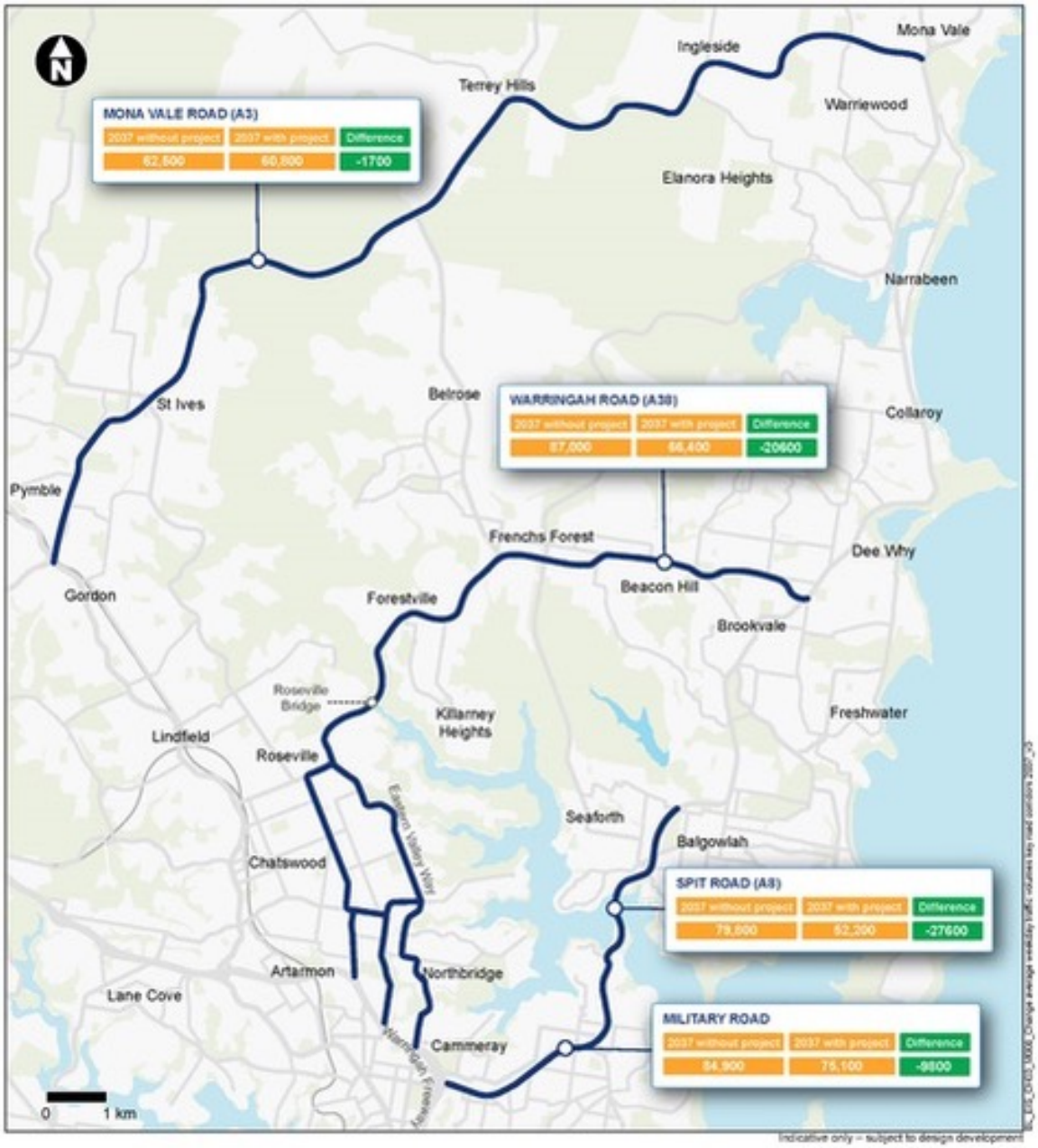


Figure 3-4 Forecast change in weekday traffic volumes average (two-way) in the AM peak on key Northern Beaches corridors by 2037

'Figure 3-4 Forecast change in average weekday traffic volumes ~~average~~ (two-way, daily) ~~in the AM peak~~ on key Northern Beaches corridors by 2037' amendment as advised byTim Kwok, Senior Community and Stakeholder Engagement Manager. Beaches Link and Gore Hill Freeway Connection)

Table 7-1 Modelled 'Do something' morning peak hour traffic demands at key locations (SMPM)

Road	Location	Direction	2027 'Do minimum'	2027 'Do something'	2037 'Do minimum'	2037 'Do something'
Spit Road	Spit Bridge	Northbound	1750	1350	1850	1450
		Southbound	2700	1750	3050	1950
		Combined	*4450*	*3100*	*4900*	*3400*
Warringah Road	Roseville Bridge	Northbound	2100	1550	2250	1650
		Southbound	4100	3300	4300	3550

Road	Location	Direction	2027 'Do minimum'	2027 'Do something'	2037 'Do minimum'	2037 'Do something'
		Combined	*6200*	*4850*	*6550*	*5200*
Mona Vale Road	St Ives Showground	Northbound	2450	2350	2600	2450
		Southbound	2750	2500	2900	2600
		Combined	*5200*	*4850*	*5500*	*5050*
Beaches Link Tunnel	Killarney Heights	Northbound	N/A	1250	N/A	1400
		Southbound	N/A	2850	N/A	3350
		Combined	*N/A*	*4100*	*N/A*	*4750*
Northern Beaches screenline		**Northbound**	**6300**	**6500**	**6700**	**6950**
		Southbound	**9550**	**10,400**	**10,250**	**11,450**
		Combined	***15,850***	***16,900***	***16,950***	***18,400***
Eastern Valley Way	Castle Cove	Northbound	950	550	1000	600
		Southbound	1900	1550	2050	1800
		Combined	*2850*	*2100*	*3050*	*2400*

Table 7-1 Modelled 'Do something' i.e with Tunnel, at morning peak hour at key locations (SMPM)

Table 7-2 Modelled 'Do something' evening peak hour traffic demands at key locations (SMPM)

Road	Location	Direction	2027 'Do minimum'	2027 'Do something'	2037 'Do minimum'	2037 'Do something'
Spit Road	Spit Bridge	Northbound	3000	1750	3250	1900
		Southbound	2050	1600	2150	1700
		Combined	*5050*	*3350*	*5400*	*3600*
Warringah Road	Roseville Bridge	Northbound	3650	2600	3750	2850
		Southbound	2450	1950	2650	2050
		Combined	*6100*	*4550*	*6400*	*4900*
Mona Vale Road	St Ives Showground	Northbound	2600	2450	2700	2450
		Southbound	2450	2250	2550	2450
		Combined	*5050*	*4700*	*5250*	*4900*
Beaches Link Tunnel	Killarney Heights	Northbound	N/A	2950	N/A	3300
		Southbound	N/A	1450	N/A	1650
		Combined	*N/A*	*4400*	*N/A*	*4950*
Northern Beaches screenline		**Northbound**	**9250**	**9750**	**9700**	**10,500**
		Southbound	**6950**	**7250**	**7350**	**7850**
		Combined	***16,200***	***17,000***	***17,050***	***18,350***

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Table 7-2 Modelled 'Do something' i.e with Tunnel, at evening peak hour at key locations (SMPM)

Road	Location	Direction	2027 'Do minimum'	2027 'Do something'	2037 'Do minimum'	2037 'Do something'
Eastern Valley Way	Castle Cove	Northbound	1550	1050	1700	1300
		Southbound	1100	750	1200	1050
		Combined	*2650*	*1800*	*2900*	*2350*

Note: Comparing the 'Do something' scenario with the 'Do minimum' scenario, a reduction in demand greater than 10 per cent is highlighted in green while an increase in demand greater than 10 per cent is highlighted in blue.

Table 7-3 Modelled 'Do something' daily traffic demands at key locations (SMPM)

Road	Location	Direction	2027 'Do minimum'	2027 'Do something'	2037 'Do minimum'	2037 'Do something'
Spit Road	Spit Bridge	Northbound	38,500	24,000	41,500	25,500
		Southbound	36,000	24,500	38,500	26,500
		Combined	*74,500*	*48,500*	*80,000*	*52,000*
Warringah Road	Roseville Bridge	Northbound	41,500	29,500	43,500	31,500
		Southbound	41,500	32,500	43,500	34,500
		Combined	*83,000*	*62,000*	*87,000*	*66,000*
Mona Vale Road	St Ives Showground	Northbound	29,500	27,500	31,000	28,000
		Southbound	30,000	27,000	31,500	28,500
		Combined	*59,500*	*54,500*	*62,500*	*56,500*
Beaches Link Tunnel	Killarney Heights	Northbound	N/A	32,000	N/A	35,000
		Southbound	N/A	26,500	N/A	29,500
		Combined	*N/A*	*58,500*	*N/A*	*64,500*
Northern Beaches screenline		**Northbound**	**109,500**	**113,000**	**116,000**	**120,000**
		Southbound	**107,500**	**110,500**	**113,500**	**119,000**
		Combined	***217,000***	***223,500***	***229,500***	***239,000***
Eastern Valley Way	Castle Cove	Northbound	17,500	10,500	19,000	12,000
		Southbound	15,500	10,500	16,500	13,000
		Combined	*33,000*	*21,000*	*35,500*	*25,000*
Brook Street	Naremburn (north of Merrenburn Avenue)	*Combined*	*35,500*	*33,500*	*37,500*	*36,000*

Note: Comparing the 'Do something' scenario with the 'Do minimum' scenario, a reduction in demand greater than 10 per cent is highlighted in green while an increase in demand greater than 10 per cent is highlighted in blue.

Table 7-3 Modelled 'Do something' i.e with Tunnel, daily traffic at key locations (SMPM)