Public Works Committee Inquiry into the impact of the Western Harbour Tunnel and Beaches Link Hearing 17 September 2021

Supplementary questions

Questions for Baringa Bush Residents Group

With attachments:

Bitzios traffic report

UNSW water quality impacts report

Transport Survey – Zali Steggal MP

1. **Does the project increase traffic on the Northern Beaches? If so, by how much?**

As a residents' group we have to rely on experts. In this case, we have sought out information and modelling developed by traffic experts from Northern Beaches Council, as well as obtaining, via GIPA, the report by Bitzios Consulting, for DPIE, a copy of which is attached (Beaches Link and Gore Hill Freeway Connection EIS: Peer Review of the Traffic and Transport Assessment Project: P4839 Version: 002).

The Northern Beaches Council found that '*the tunnel decreases traffic demand on Spit Road, Warringah Road, Eastern Valley Way and Mona Vale Road, however, increases traffic demand into and out of the Northern Beaches by up to 9 %.*' This is projected to include more trucks flowing onto and along northern beaches roads.

This raises immediate concerns given that the Beaches Link tunnel is not integrated into a carefully modelled upgrade of local roads. Hence whatever time savings might be claimed in the tunnel itself, there is a real risk that drivers expecting a faster trip will find any potential time savings in the tunnel will be eaten up by increased local congestion. This will, perhaps, be most marked for those travelling longer distances north – and expecting the greatest time savings - as the NBC's traffic modelling suggests that Wakehurst Parkway north of Frenchs Forest Road *'will suffer from increased travel times and delays and measures to offset these impacts must be explored.'*

NBC also points out numerous local choke points of induced congestion, given the anticipated increased levels of traffic from Balgowlah/Manly Vale/Fairlight/Manly using local streets to access the Beaches Link, as well as from Frenchs Forest and surround suburbs.

For example, even with the tunnel (Do Something) the Frenchs Forest Road and Sydney Road intersection continues to perform poorly, with Level of Service 'F' remaining in PM peak and a Level of Service drop. The Sydney Road and Condamine Street intersection performs worse in PM peak with only a minor improvement in AM peak. The Condamine Street and Burnt Bridge Creek Deviation has increased delays in both AM and PM peaks. Increased traffic on local roads will also occur between Kitchener Street and Sydney Road as traffic from North Balgowlah seeks to access tunnel (LATM on Wanganella, Rickard and West Streets to encourage use of Woodland & Condamine Streets).

The Bitzios report also highlights numerous congestion issues. For example, on pg 18, it notes:

6.6 Interface Area: Frenchs Forest and Surrounds: The EIS identifies that the localised impacts of the 'drawing in' of traffic to the project are significant. Whilst the users of the project will benefit, the results show that users of the network that do not use the Beaches Link will be significantly impacted with longer travel times and more stops. Also, the volumes of unreleased vehicles in the VISSIM models increases with the project (i.e. the Do Something case) meaning that there is less demand able to feed into the network at peak times. ***Morning peak southbound travel times on Wakehurst Parkway will increase substantially as traffic draws into the corridor to access the tunnel.***

The Bitzios report also calls for new modelling to taking into account recent significant changes in travel patterns and preferences: "….*there appears to be a pressing need for TfNSW to re-base its strategic models to a more recent year, particularly given that the preference surveys upon which they are based are nearly 10 years old and that the rate of change in travel behaviours continues to increase." Pg 8.*

While northern beaches residents are certainly concerned about traffic congestion, we believe that the Beaches Link tunnel overlooks the real solution: putting more people into

fewer vehicle via public transport or even ride share options, school buses and working from home.

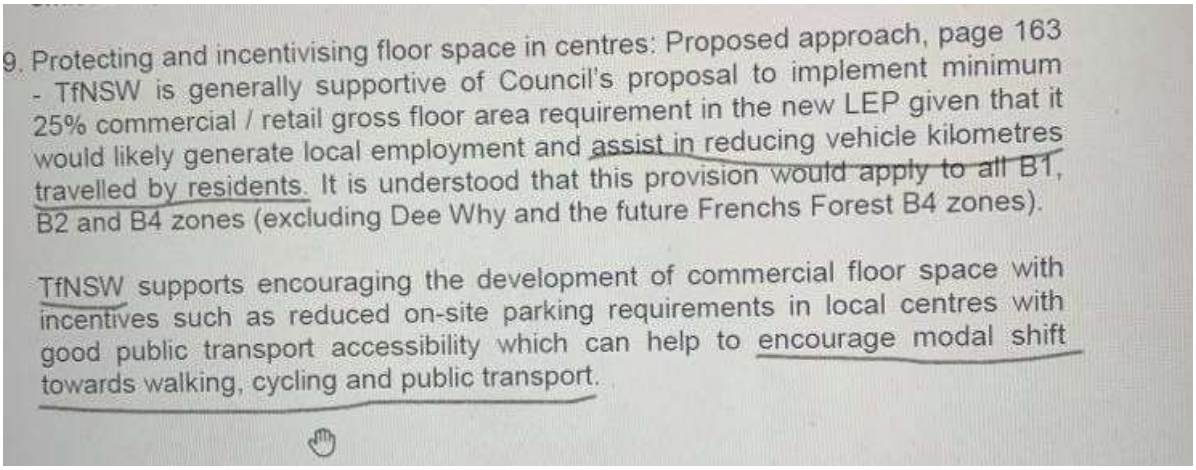
The 2019 and 2020 transport surveys conducted by Zali Steggal's office (attached) *show that 88% of residents of the seat of Warringah say climate change and/or preservation of the environment is the issue that most concerns them.* Some 51% of residents commute within the electorate or towards the north (away from the CBD) and 57% use public transport. Of all the areas surveyed (2020 survey) it was only in Mosman/Cremorne/Neutral Bay that a majority wanted the tunnel (58%). Other areas favoured other transport options including public and active transport. See details within the attachment.

a. Are Northern Beaches residents aware that the traffic will be increasing? b. Has there been any information available on this?

a. A substantial increase in traffic on the northern beaches is NOT what people have been promised. They have been promised fanciful reductions in travel times, not new local congestion. b. No information has been provided about local traffic congestion beyond that buried within the EIS.

One of the key concerns is that the tunnel appears to be locking the region into a private car based travel model, the least efficient – both in terms of carbon emissions and travel time. By contrast, public transport has proved very popular with the introduction of the various B-line services.

It also seems strange that Transport for NSW, in its own recent submission to the NBC Local Environment Plan support a modality shift away from private vehicles – at the same time as it was spruiking a car-based tunnel.



9. Protecting and incentivising floor space in centres: Proposed approach, page 163 - TfNSW is generally supportive of Council's proposal to implement minimum 25% commercial / retail gross floor area requirement in the new LEP given that it would likely generate local employment and assist in reducing vehicle kilometres travelled by residents. It is understood that this provision would apply to all B1, B2 and B4 zones (excluding Dee Why and the future Frenchs Forest B4 zones).

TfNSW supports encouraging the development of commercial floor space with incentives such as reduced on-site parking requirements in local centres with good public transport accessibility which can help to encourage modal shift towards walking, cycling and public transport.

2. Are there any swimming areas you are concerned about as a result of the project?

The construction and operation of the Beaches Link tunnel will adversely affect multiple popular swimming areas including Middle Harbour (particularly Clontarf Beach and Northbridge Baths), Manly Dam and Queenscliff Lagoon with potential impacts on Manly Beach; with increased risks to marine life and recreational users.

Figure 17-6 Sediment deposition two weeks after completion of dredging activities

The construction of the coffer dams and the laying of the tunnels in Middle Harbour will require the dredging up of toxic sediment. Contaminants within the sediment to be disturbed include heavy metals, hydrocarbons, pesticides, organotin, per- and polyfluoroalkyl substances (PFAS), according to the EIS. The Australian Government states the toxicity, mobility, persistence and bioaccumulation potential of PFAS pose potential concerns for the environment and for human health. The maps within the EIS show the dispersal of contaminated sediment across Middle Harbour, reaching popular local swimming and kayaking spots.

While dispersal clouds are temporary, the contaminants dredged and redeposited across Middle Harbour are not: many persist over very long time periods in the environment, so the damage and risks are long term.

Likewise, potential impacts on water quality upstream from the tunnel are also long term. The tunnel 'sill' is almost 10m high, which will impede the tidal exchange of water upstream. We sought and received documents through GIPA which included a damning report by independent experts that found Transport for NSW (TfNSW) had failed to properly assess serious risks to sensitive groundwater, freshwater and marine waters posed by the tunnel – and that extensive, long term studies must be carried out before construction proceeds. (document attached)

The experts, commissioned by the NSW Department of Planning, Industry and Environment (DPIE), concluded TfNSW, did not use best practice, nor the most recent data to determine

the project impacts on water systems. The experts said at least a year of continuous assessment of the water column in Middle Harbour was required to determine risks to vital dissolved oxygen levels upstream of the tunnel due to the disruption in tidal water exchanges due when tunnel tubes are laid on the sea floor.

In response TfNSW said the "sill effect" would be similar to "already occurring natural events, such as after heavy rainfall". This is extremely concerning as it is not possible to swim in Middle Harbour or at other beaches for 72 hours after rainfall. This suggests water upstream will no longer ever be safe for swimming, and likely be of poorer quality to support marine life – as the sill effect is permanent. See: https://www.smh.com.au/national/nsw/inadequate-experts-take-aim-at-gaps-in-beaches-link-documents-20210914-p58rkv.html

For Manly Dam, the widening of Wakehurst Parkway along the elevated ridge will mean the continuous runoff of contaminants into the catchment of one of the state's last swimmable dams. In addition, the various retention ponds planned for the construction period have already been shown to be inadequate, based on recent rainfall. This means, they will overflow and contaminate the Dam's clean waters, putting at further risk rare flora and fauna and one of the last remaining areas of Duffy's Forest within the catchment, as well as aquatic life and recreational users.

The discharge during construction of some 428,000 L per day of wastewater down Burnt Bridge Creek and into Queenscliff Lagoon and Beach (when the lagoon is open) will put water quality and marine and aquatic life at risk both in the lagoon, and along one of Sydney's busiest beaches.

The projected permanent reduction in flow of Bridge Bridge Creek (up to 96%) will continue to jeapordise water quality downstream to Queenscliff Lagoon and Beach, with permanent drastic flow reductions expected to reduce dissolved oxygen levels with detrimental effects.

3. What are the costs per Northern Beaches resident for the project?

Based on an estimated cost of $10 billion and a population of 274,041 within the Northern Beaches LGA the Beaches Link tunnel will cost the taxpayer $36,490 per resident, with additional costs to imposed through tolling into the future**.**

Other analysis includes:

Assuming 50% of the population live in the north of the LGA and use Mona Vale road/Warringah Road then the cost per resident using the tunnel becomes $72,980 PP

Considering Northern Beaches workers > 15yo = 129,684 residents
Cost per worker = $77,110
Assume 50% live NORTH & use Mona Vale road/Warringah Road – cost per worker goe sup to $154,220 PP

48% of workers travel out of area to work = 62,248
Cost per travelling worker = $160,648 (includes those using public transport)
Assume 50% live NORTH & use Mona Vale road/Warringah Road - $321,296 PP

4. What are the projected numbers of Northern Beaches residents who will be using the tunnel?

Unsure, as any projections made in 2021 would need to take into account significant changes in working patterns during COVID19. Current projections made in 2016 cannot be valid into 2022 and beyond.

The 2016 Census data shows:
NB Population: 274,041
NB employed > 15yo = 129,684
48% of workers travel out of area to work = 62,248

Projections will have changed since the project was scoped based on the beneficial impact of B-line buses, significant Covid impacts on people WFH - leading to longer term changes in work patterns for the future.

The Bitzios report requested the traffic/tunnel use modelling assumptions be revisited. TfNSW dismissed this in their response, saying it was too big a job.

Given that the NSW government is facing many other demands for investments and infrastructure, we believe this must be reassessed before a major investment decision is made for a small percentage of Sydney's residents. (NB residents as a % of greater Sydney?)

5. If the project was adjusted for working from home behaviour changes following COVID19, how do you believe this would impact the usage of the tunnel?

Even before the pandemic, over half of the residents of the Northern Beaches LGA worked within the LGA. This has increased markedly over the past two years, and numerous reports state that major employers will continue to support a hybrid model which is expected to see a long term reduction in fulltime commuting in favour of 2-3 days in offices or workplaces.

Evidence of the popularity of working from home on the northern beaches can be seen in the soaring costs of renting or buying homes within the LGA. Proximity to beaches, waterways and nature and the anticipation of at least some days working from home into the future have led to rent increases of up to 30% in a year. In Seaforth, the average rent increased to $1,470/week, for example, and in Warriewood to $1200/week.

House prices too have soared. New data released by CoreLogic in September 2021 ranked the northern beaches as the region with the greatest house price increases over the previous 12 months, nationwide, of 37.2%. CoreLogic analysis attributed changes in the popularity of region like the northern beaches to the strong 'sea change and tree change' trend thanks to the popularity of working from home. Northern Beaches homes were also on the market for the shortest period of any region in Australia.

www.news.com.au/finance/real-estate/selling/suburbs-where-properties-are-rising-by-up-to-51k-every-month/news-story/d22ce704d01767e7aa8c3974c2d1618f

www.9news.com.au/national/national-sydney-property-market-houses-selling-fast-post-lockdown/213c1126-7934-4a87-b2d5-407a78ab3af8

Given such significant investments in homes with pleasant coastal or bush outlooks and home offices, it is unlikely Northern Beaches residents will be keen to return to commuting full time, reducing demand for the tunnel. A new study should be undertaken to determine the LGA's transport needs that reflects these major changes - and is better aligned with the NSW Government and Council's emissions reduction goals.

6. Where do you see the major environmental impacts of the project for the Northern Beaches?

With the NSW Government planning to halve emissions by 2030, serious questions must be asked about a private-vehicle based tolled tunnel due to open at about the same time. Construction alone is extremely carbon-intensive given the huge quantities of concrete and other materials required and the heavy machinery and diesel trucks/barges/vehicles used. The EIS estimates construction alone will contribute an additional 1,521,365 t CO2-e (cumulative) to our greenhouse gas emissions – the equivalent to 5.3% of annual NSW's transport emissions. see EIS, Appendix X, Table 3-28 Construction and operation greenhouse gas emissions summary pg. 44).

With no dedicated public transport lane, the project will then lock the region into a predominantly petrol/diesel private vehicle based transport model; the least efficient of all transport options. Although electric vehicles are widely spruiked, sales remain miniscule and incentives non-existent. Instead, Australia's highest selling vehicle, dual cab Utes, are incentivised due to a FBT exemption, driving up diesel and petrol emissions. In the first quarter of 2021, sales of diesel passenger cars, SUVs and light commercial vehicles in Australia jumped 20.7 per cent over the same period in 2020; driving increases in emissions per vehicle, not the decreases a shift to electric vehicles might achieve.

The operation of the tunnel will also be carbon-intensive, given the energy needed to continually pump out groundwater and to drive emissions into the stacks (EIS, Appendix X, pg. 44.). To 2037, the EIS estimates operation of this single tunnel within the vast Sydney tunnel and tollways network will add an extra 139,363 t CO2-e, cumulative, at a time when every sector is looking for deep cuts to meet the 2030 goals.

Climate change impacts come on top of the substantial damage to sensitive ecosystems and otherwise protected reserves during construction, as well as the many permanent losses

that will be felt long into the future. These include but are not limited to the felling of almost 2,000 trees from the Manly Dam catchment with known risks to biodiversity (including endangered species), the de-watering of the Burnt Bridge Creek catchment leading to drying up of a critical water system running from Seaforth to the ocean at Queenscliff, the removal of hundreds more trees along the creek and the risk to Middle Harbour posed by the dredging of contaminated sediment and unavoidable sediments plumes across the Harbour. Over 40 endangered species will be impacted across the project.

Where biodiversity offsets are proposed, we have no confidence these will limit net losses to the environment. We are also painfully aware that offsets have no effect locally, so cannot make up, for example, for the felling of one of the last patches of endangered Duffy Forest, now one of the rarest forest ecosystems on the planet. Likewise, the removal of habitat supporting our local endangered fauna species means they will simply die in situ, they will not be moved elsewhere. A TfNSW briefing session confirmed offsets for trees lost could not be achieved in the vicinity of Manly Dam and Burnt Bridge Creek. We have already witnessed the ineffectiveness of replanting around the Northern Beaches Hospital and other development sites where numerous trees have died. A recent investigation revealed the NSW government has failed to deliver conservation offsets for large areas of bush cleared in Sydney's west for housing and toll road developments over two decades, including the M7 offset at Colebee Reserve that remains an 'ecological wasteland'.

https://www.theguardian.com/environment/2021/feb/10/its-an-ecological-wasteland-offsets-for-sydney-tollway-were-promised-but-never-delivered

We also recommend reading submissions to the EIS by Northern Beaches Council including the covering letter with additional information. The following key areas of concern were raised in the NBC submission:

- Bushland and biodiversity impacts and associated offsetting.
- Groundwater drawdown in the local catchments.
- Ecological impacts on the local creeks and Middle Harbour.
- Construction impacts on the local residents and how this is managed through the Environmental Licence.

- Impact on the adjoining road network, congestion during construction and operational impacts around the peripheral network approaching the tunnel.
- Public Transport Priority over private car usage.
- Tunnel emissions including ongoing monitoring.
- Active transport and bus connectivity (during and post construction).
- Local road network being used to bypass the work zones.
- Balgowlah Golf Course precinct and the reuse of the clubhouse for the community.

7. If you included all the Northern Beaches schools impacted by the project - what do you believe would be the numbers of residents/students impacted?

Please see below the list of local schools impacted by the project on the Northern Beaches. The majority of these schools put in their own submissions into the EIS objecting to the project, and a number put in submissions to the PI detailing the impacts to their community.

The first 4 schools will be the most impacted by the project during construction and operation. Assume 6-8 years construction. Based on current enrolments this means about 6,400 students every year will be directly impacted, extrapolating out to include their families is about 18-24K residents every year for many years. Some students will experience their entire high school life next to a major construction site with significant noise, pollution, congestion and other issues (Balgowlah boys).

1. *Balgowlah Boys High School - 1200 students per year (aged 12-18)*
2. *St Ceclia's Catholic School, Balgowlah - 281 students per year (aged 4-13)*
3. *Balgowlah North Public School - 568 students per year (aged 4-13)*
4. *Seaforth Primary Public School - 520 students per year (aged 4-13)*
5. *Balgowlah Heights Public School - 711 students per year (aged 4-13)*
6. *St Keiran's Catholic School, Manly Vale - 296 students per year (aged 4-13)*
7. *Manly West Public School - 871 students per year (aged 4-13)*
8. *Manly Vale Public School - 512 students per year (aged 4-13)*
9. *Mackellar Girls High School Campus - 1400 students per year*

8. How were the schools in the tunnel impacted areas consulted about changes to stack locations and truck movements prior to the release of the EIS?

Our understanding is that there was no specific consultation with the School Principals or the P&C groups.

The timing of the release of the EIS coincided with the school holiday period and additionally the Northern Beaches was in lockdown for the Christmas period. Requests for extended period for responses were dismissed by TfNSW.

It is still unclear when and why the stack locations were moved - no consultation occurred. No consultation regarding truck movements or parking were initiated with schools during the EIS consultation period.

St Cecilia's Primary School was completely overlooked as the proponent thought it was only a place of worship and would therefore have no occupants, traffic implications or noise constraints during the week!

An extract from St Keiran's submission to the EIS:

Some important matters that do not appear to have been considered adequately in the Environmental Impact Statement. 1) The EIS does not acknowledge the existence of St Kieran's School nor St Cecilia's School, places of education.
2) This omission is highlighted in the Northern Beaches Council Submission where specific mention is made of project traffic impact on local government primary and secondary schools but no mention of either St Cecilia's School or St Kieran's School (Manly Vale) which are located in the general project area.
St Cecilia's School is around 220 metres southeast of the proposed link road and in close proximity to the tunnel ventilation outlet. While St Kieran's School is further away, it is not far from Manly Vale Public School and closer than Mackellar Girls High School, both of which are listed in project documentation.

9. What sort of mitigation costs do you believe should be included in the costings for the project?

It is not for the community/residents to estimate the costs of mitigation arising from the construction of the project and from its ongoing operation. What the community groups and residents have done is to identify and highlight the potential problems that are likely to arise during construction phase and those that will arise once the project has been built. It is the role of DPIE to assess mitigation costs by reviewing the submissions to the EIS (where the problems are identified) and in seeking the opinions/views of independent experts to provide their views on the extent of the damage and what needs to be done to limit the damage to the environment or to the residents. Community groups cannot quantify the cost of mitigation measures deemed necessary to reduce or limit the damage to an "acceptable level". However, below are some of the concerns raised in submissions that would require mitigation - and to our knowledge have not been included in the costing of the project:

- Release of buried pollutants into Flat Rock Creek and into Middle Harbour from the old tip in Willoughby, the location of one of the dive sites
- Release of pollutants from the excavation work in Middle Creek for the immersed tubes that will form the tunnel crossing from Castlecrag to Seaforth
- Fall in the water table in Seaforth and North Balgowlah from the dewatering of groundwater due to the tunnel being constructed under Seaforth and North Balgowlah
- Environmental damage done during the widening of Wakehurst Parkway from the tunnel portal in North Seaforth to Warringah Road - this includes damage from silt and excessive water flows into Manly Dam after heavy rains
- Increases in traffic congestion in Manly Vale, Balgowlah, North Balgowlah and North Seaforth during the morning and evening traffic peaks as motorists try to make their way to the entrance portal in the Burnt Bridge Creek Deviation. There is no provision for any funding of roadworks to limit congestion or manage the rat runs.

- Cost of reducing construction noise and construction traffic in the areas close to the construction sites in North Seaforth and on the Balgowlah Golf Course - these include the many schools that are close to these sites.

Beaches Link and Gore Hill Freeway Connection EIS

Peer Review of the Traffic and Transport Assessment

For the Department of Planning, Industry and Environment

15 February 2021

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Figures

1. INTRODUCTION

1.1 Background

The Western Harbour Tunnel (WHT), Warringah Freeway Upgrade (WFU), Beaches Link (BL) and the Gore Hill Freeway Connection (GHFC) are part of an integrated proposal to '*manage traffic growth north of Sydney Harbour'*. This combined proposal is presented in Figure 1.1.

The **Western Harbour Tunnel and Warringah Freeway Upgrade** Environmental Impact Statement (EIS) has been produced, exhibited and a Response to Submissions (RtS) document has been produced and submitted. The Minister for Planning and Public Spaces approved the project on 21 January 2021.

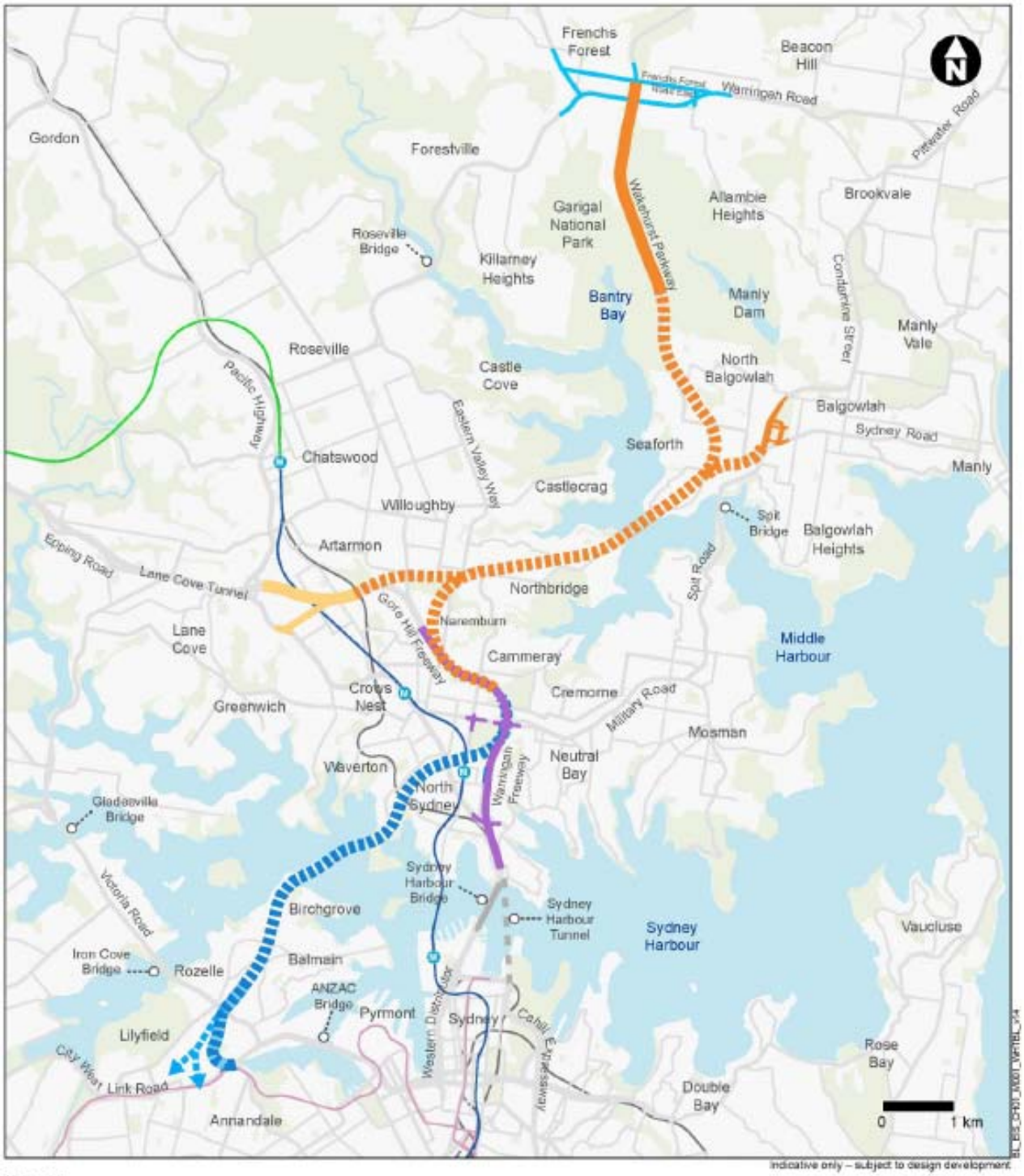
The **Beaches Link** comprises a new tolled motorway tunnel connecting the Warringah Freeway at Cammeray, the Gore Hill Freeway at Artarmon, the Wakehurst Parkway at Seaforth and the Burnt Bridge Creek Deviation/Sydney Road at Balgowlah.

The **Gore Hill Freeway Connection** component involves surface works along the existing Gore Hill Freeway to connect the Beaches Link tunnel with the existing surface road network.

Transport for NSW (TfNSW) is the proponent for the BL and GHFC project and is seeking approval to construct and operate it. This approval is being sought under Part 5.1 of the *Environmental Planning and Assessment Act 1979*. The project is State Significant Infrastructure and the EIS has been prepared in response to the Secretary's Environmental Assessment Requirements (SEARs) dated 22 April 2020.

This peer review has been prepared for the Department of Planning, Industry and Environment (DPIE) for its review and assessment of the EIS and in its preparation of its submission to the proponent.

This peer review is limited to the EIS prepared for the BL and GHFC components. The WHT and WFU components are not within the scope of this EIS and a separate peer review of that project has previously been undertaken by Bitzios Consulting in its report dated 18 September 2020. The implications of the BL and GHFC project on the WHT and WFU project(s) is however covered in this report.



Source: Beaches Link and Gore Hill Freeway Connection Environmental Impact Statement (December 2020) Figure 1-1

Figure 1.1: Western Harbour Tunnel and Beaches Link Components and Extents

1.2 Scope and Limitations

This report provides an independent peer review of the traffic and transport assessment published in the Beaches Link and Gore Hill Freeway Connection EIS. The parts of the EIS that this review has considered are:

- **Chapter 3:** Strategic Context and Project Need
- **Chapter 4:** Project Development and Alternatives
- **Chapter 8:** Construction Traffic and Transport
- **Chapter 9:** Operational Traffic and Transport
- **Appendix A:** SEARs checklist
- **Appendix F:** Traffic and Transport.

This peer review report is structured as follows:

- **Chapter 2** reviews the need for the project and the options analysis process that led to the definition of the project
- **Chapter 3** assesses the detail provided in the project description in terms of its sufficiency to assess the traffic and transport impacts of the project in accordance with the SEARs
- **Chapter 4** reviews the assessment methodologies, key assumptions and breadth and depth of coverage of each impact assessment item
- **Chapter 5** reviews the construction period impacts and management measures for traffic and transport
- **Chapter 6** reviews the traffic and transport impacts with the project in its operational phase and the management measures proposed
- **Chapter 7** summarises the key conclusions drawn from the peer review and requests additional assessments or clarifications to complete the assessment of the project against the SEARs.

This review has not included detailed verification of transport models, though some basic checks of published outputs have been completed based on site investigations and local knowledge of prevailing traffic patterns and conditions.

This review has assumed that the construction methodologies and construction period traffic estimates are reasonable and has focused on the documentation of the impacts of construction activities on traffic, public transport, pedestrians and cyclists during the construction period.

1.3 SEARs

The revised SEARs (dated 22 April 2020) lists the items that the EIS must address and replaced the previous SEARs, dated 15 December 2017.

1.3.1 General Requirements

The relevant general SEARs for the EIS include:

(b) a description of the project and all components and activities (including ancillary components and activities) required to construct and operate it, including:

- the proposed route
- design of the tunnels, interchanges (inclusive of tunnel portals and entry and exit ramps), road user, pedestrian and cyclist facilities, and lighting
- surface road upgrade works, including road widening, intersection treatment and grade separation works, property access, parking, pedestrian and cyclist facilities (including appropriate locations for overbridges) and public transport facilities
- if required, additional infrastructure (such as tolling infrastructure)
- location and operational requirements of construction ancillary facilities and access
- the relationship and/or integration of the project with existing and proposed public and freight transport services.

(c) a statement of the objective(s) of the project

(d) a summary of the strategic need for the project with regard to its State significance and relevant State Government policy

(e) an analysis of any feasible alternatives to the project

(f) a description of feasible options within the project, including:

- alternative methods considered for the construction of the project, including the tunnels; and
- staging of the proposal.

(g) a description of how alternatives to and options within the project were analysed to inform the selection of the preferred alternative / option. The description must contain sufficient detail to enable an understanding of why the preferred alternative to, and options(s) within, the project were selected, including:

- details of the short-listed route and tunnel options considered, and the criteria that was considered in the selection of the preferred route and tunnel design
- details of the short-listed route and tunnel options considered, and the criteria that was considered in the selection of the preferred route and tunnel design

(i) a demonstration of how the project design has been developed to avoid or minimise likely adverse impacts during construction and operation of the project

(l) measures to avoid, minimise or offset impacts must be linked to the impact(s) they treat, so it is clear which measures will be applied to each impact

(o) an assessment of the cumulative impacts of the project taking into account other projects that have been approved but where construction has not commenced, projects that have commenced construction, and projects that have recently been completed.

1.3.2 SEARs Related to Transport and Traffic

The EIS notes the desired performance outcomes for Transport and Traffic as:

- Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts
- The safety of transport system customers is maintained

- Impacts on network capacity and the level of service are effectively managed
- Works are compatible with existing infrastructure and future transport corridors.

The SEARs requirements related to *Transport and Traffic* are:

1. The Proponent must assess construction transport and traffic (vehicle, marine, pedestrian and cyclists) impacts, including, but not necessarily limited to:
   (a) a considered approach to route identification and scheduling of marine and land transport movements, particularly outside standard construction hours
   (b) the number, frequency and size of construction related vehicles (passenger, marine commercial and heavy vehicles, including spoil management movements)
   (c) construction worker parking
   (d) the nature of existing traffic (types and number of movements) on construction access routes (including consideration of peak traffic times and sensitive road users and parking arrangements
   (e) access constraints and impacts on public transport, pedestrians and cyclists
   (f) how construction of the project affects the capacity of, and the need to close, divert or otherwise reconfigure elements of, the road, cycle and pedestrian network
   (g) details of how construction and scheduling of works are to be coordinated in regard to public events and cumulative traffic impacts resulting from concurrent work on the project and other major projects, under or preparing for or commencing construction in the vicinity of the proposal
   (h) alternatives to road transport of construction spoil including marine and rail options as well as potential re-use in existing land reclamation areas or in association with Resource Recovery Exceptions (if obtained from the EPA) to minimise traffic impacts on the road network
   (i) the likely risks of the project to public safety, paying particular attention to pedestrian safety and users of Middle Harbour; and
   (j) impacts to water based traffic on Middle Harbour.
2. The Proponent must assess and model the operational transport impacts of the project including, but not necessarily limited to:
   (a) forecast travel demand and traffic volumes (expressed in terms of total numbers and heavy and light vehicle numbers) for the project and the surrounding road, cycle and public transport network, including potential shifts of traffic movements on alternate routes outside the proposal area (such as toll avoidance) and impact of permanent street closures directly attributable to the SSI
   (b) accessibility impacts in commercial centres within the vicinity of the project
   (c) travel time analysis
   (d) performance of key interchanges and intersections by undertaking a level of service analysis at key locations
   (e) wider transport interactions (local and regional roads, cycling, public and freight transport)
   (f) induced traffic and operational implications for existing and proposed public transport (particularly with respect to strategic bus corridors and bus routes and permanent closure/relocation of bus stops) and consideration of opportunities to improve public transport;
   (g) impacts on cyclists and pedestrian access and safety
   (h) property and business access and on street parking; and
   (i) an explanation for the scope of the modelled area, including justification of the nominated boundaries.

2. PROJECT NEED AND OPTIONS ANALYSIS

2.1 Review of the Project Need

From a strategic transport network perspective, the EIS makes a clear case that the Northern Beaches road network is vulnerable to congestion, delays and economic loss because of its geographical constraints. With limited traffic and public transport options for longer distance travel to/from the Northern Beaches it is clear that the economic and social impacts of doing nothing would be significant.

The EIS correctly identifies that the land use structure along the Northern Beaches does not suit high frequency, high capacity public transport, such as a rail line. Some centres such as Dee Why, Brookvale and Manly are densifying however the vast majority of the Northern Beaches catchment includes low density development that is best served by conventional bus-based transport. Large parts of the area will continue to rely on the B-Line however private transport has a key role to play in this catchment, particularly for longer distance trips to/from the south and south-west given the spread of resident population across the Northern Beaches. Also, while the B-Line runs on sections of bus lane, much of it still requires interaction with traffic and bus travel times and reliability are tied to traffic congestion levels in its corridor.

The proposal will allow buses to use the tunnel for access between the Northern Beaches and the CBD and between the Northern Beaches and Macquarie Park; a significant area of residence for Macquarie Park employees opening up a contestable public transport market.

Overall, the EIS makes a strong claim that a road project is needed for this corridor and the grounds for such a project are well substantiated.

2.2 Review of the Options Analysis

Chapter 4 of the EIS deals with '*Project Development and Alternatives*'.

The EIS puts forward a compelling case of significant increases in traffic and public transport travel times under the Do Nothing scenario, derived from strategic transport modelling. In reality, conditions will worsen to an extent where realisation of the forecast demographic growth will be dampened due to reduced accessibility and reduced amenity; displacing some of this forecast growth to other parts of Sydney or further afield. Arguably, displacing some of the growth forecast for the Northern Beaches to more remote locations is less efficient than addressing the accessibility constraints in this location.

The EIS makes a strong case that both the Do Nothing option and the Travel Demand Management option (alone) will lead to significant deterioration in congestion and quality of life. It also identifies that widening existing roads is not a pragmatic option given the extent of impacts on businesses and residents. Just improving public transport (only) is also correctly identified as an option with significant limitations because there is insufficient demand to warrant a separate bus or train tunnel (only) and increasing bus services would only be effective if bus travel times were reduced through reduced congestion. Additional ferry services were also identified but the scale of demand is well in excess of what could be reasonably accommodated on an expanded ferry system which the EIS identifies as currently carrying a relatively small number of journeys. Walking and cycling improvements were also identified as strategic options and the EIS correctly identifies that improvements for these modes are limited in benefit to mostly short distance trips, still leaving the issue of longer distance traffic congestion.

The preferred strategic option of a new tunnelled motorway linking to the Western Harbour Tunnel and Warringah Freeway Upgrade project is logical and is supported. In terms of the preferred alignment option, the need to connect into Wakehurst Parkway is made clear in the EIS as are the travel time benefits of the preferred 'Blue Option'. The preferred option for the surface connection at Balgowlah also appears logical from traffic accessibility and capacity perspectives.

3. PROJECT DESCRIPTION DETAIL

3.1 General

The project is well described and the logic for key design decisions are clear.

3.2 Interface Area: Warringah Freeway and Surrounds

The interface area design is clearly presented and well explained. However, there is no detail showing the bus priority works proposed at the interface area to join into the southbound bus lane included in the WHT-WFU project. This should be marked or at least noted on Figure 5-1 or provided separately to show how this transition is proposed to occur.

Figure 5-1 should be updated in the RtS to show how bus priority works with the southbound bus lane included in the WHT-WFU project.

3.3 Interface Area: Gore Hill Freeway and Artarmon

This area is generally well presented and clear. However, it is not clear in Chapter 5 of the EIS if Dickson Avenue is proposed to be converted to one-way westbound which is what Figure 5-2 suggests. This figure also suggests that Dickson Avenue will be reduced to a single traffic lane with parking lanes either side between Clarendon Street and Reserve Road. The figure also suggests that Curry Lane is converted from one-way westbound to one-way eastbound.

The RtS should clarify the configuration changes associated with Dickson Avenue, Curry Lane and Carlotta Street and describe the impacts of these changes.

3.4 Interface Area: Balgowlah and Surrounds

The interface area design is clearly presented and well explained.

3.5 Interface Area: Frenchs Forest and Surrounds

The interface area design is clearly presented and well explained.

4. METHODOLOGIES & ASSUMPTIONS REVIEW

4.1 Traffic Modelling Methods

4.1.1 Models and Processes

The process of using the Strategic Travel Model (STM), Sydney Motorway Planning Model (SMPM) and localised operational models is the same process as used for the EISs for the WestConnex projects, and other major road projects in Sydney in recent years, and is the most appropriate hierarchical modelling process available to assess a project of this scale.

The SMPM was validated to traffic surveys in 2014 and based on value of time sensitivities in 2012-2013. There is a reasonable probability that value of time while travelling has changed significantly since that year, particularly given recent influences. There is also likely to be some short-medium term effects on modal choice as individual's mode choice considerations have also been influenced significantly over the past 12 months. In terms of the strategic route choice modelling, value of time changes affects all trips and so would have minimal effects on route choice. In terms of modal choice, the long term effects are unknown as there is little evidence to suggest a permanent shift in modal choice sensitivities. On this basis, the strategic models used for the EIS (i.e. the STM and SMPM) are still considered to be the most appropriate set of models available for this purpose.

However, there appears to be a pressing need for TfNSW to re-base its strategic models to a more recent year, particularly given that the preference surveys upon which they are based are nearly 10 years old and that the rate of change in travel behaviours continues to increase.

VISSIM microsimulation models have been prepared for the Beaches Link tunnel as well as the four interface areas where the tunnels connect back with surface roads. The microsimulation model areas appear to be large enough to capture both the primary and secondary effects of the project on the adjacent surface road system at/near interface locations. The VISSIM models took their growth in traffic volumes from the SMPM. The EIS states that where the strategic model forecasts exceeded network capacity (in the SMPM) that the demands input into the microsimulation model were adjusted such that they do '*not substantially exceed nominal capacity*'.

While this approach is considered appropriate in principle, the degree to which peak period demand has been suppressed is important to understand to enable judgements to be made regarding if the input demographic assumptions made are completely out of alignment with traffic capacity, even after accounting for potential peak spreading and modal shift. This is important to understand so that it can be fed into future updates to Local Environment Plans (LEPs) within specific council areas.

The RtS should document the volume and percentage of suppressed strategic model traffic demand compared to what was used in the future year microsimulation models.

SIDRA intersection models were prepared for key intersections in each interface area, taking their input volumes from the microsimulation models. This methodology is considered appropriate, given that the capacity-capped demand input from the SMPM into the microsimulation models would reduce the likelihood of excessive congestion limiting what traffic arrives to specific intersections in peak hours. Also, when intersections approach capacity microsimulation much more sensitively accounts for the fluctuations in approach flows from cycle to cycle at traffic signals compared to the 'averaging calculation' used in SIDRA. Due to this SIDRA will usually output longer delays than what is revealed through microsimulation in these situations.

For these reasons, it is relevant to review the microsimulation model outputs in parallel with the SIDRA outputs considering delays, queue lengths and Levels of Service (LoS). The EIS has not published microsimulation outputs in this detail at intersections and would benefit from doing so.

The RtS should provide microsimulation model outputs for intersection delays, queue lengths and LoS for comparison to SIDRA results where SIDRA results 'cut out' at maximum values (e.g. 'DoS >1', or 'queue >500m').

4.1.2 Calibration and Validation of Models

The EIS (Appendix F, Section 3.4.3) infers that the micro-simulation models were calibrated and validated to the requirements of the Roads and Maritime Traffic Modelling Guidelines and that the models were independently peer reviewed. There is no mention of the SIDRA intersection models being calibrated and validated. These models were used for near term construction period impacts assessment and should have been calibrated to back of queue or average delay data for this purpose.

The RtS should identify if the SIDRA intersection models have been suitably calibrated and validated, and if not, why not.

4.1.3 Construction Period Modelling Approach

The methodology to collect additional counts near construction sites to refine the microsimulation model and SIDRA model validation in these locations is a very good initiative. SIDRA was used for intersection modelling when haul material truck movements were at their peak and the VISSIM network modelling was used for the combined peak construction activity including other projects being constructed concurrently and impacting North Sydney in particular. This approach is supported.

4.2 Assessment Criteria and Methods

The statistics used to assess the performance of each modelled scenario considered network performance (for each sub-network area for which microsimulation models were built), travel times (for corridor-level evaluation) and intersection levels of service.

The premise of the approach used to assess impact, and the need to mitigate impact was 'no worsening' of conditions with the project compared to the 'Do Minimum' condition. This criterion was considered at the network, corridor and intersection level for the corridors and intersections assessed. Mid-block capacity, which is rarely a limiting congestion consideration in congested urban networks, was also assessed and presented.

The metrics used for assessment are generally considered to be adequate and aligned with methods used in recent road project EIS's. The assessment of queue lengths and pinch point patterns from the microsimulation modelling would have allowed the identification of where pinch points were created or exacerbated by the project in order to more sensitively target any mitigation works.

The RtS should publish typical queue length screen captures in future years under each scenario for midway through each peak period.

5. CONSTRUCTION PERIOD IMPACTS

5.1 General

Each of the construction support sites were assessed in terms of the impacts of their traffic generation on nearby intersections, on local streets and on parking.

Impacts of changed conditions such as construction access driveways and lane narrowing on walking and cycling movements were not assessed and were deferred to the Construction Traffic Management Plan (CTMP) for each work site. Similarly, overflow parking impacts on local streets was not covered nor was access to nearby bus stops for the construction workforce to the extent that bus usage was noted as a means of site access for some construction staff. It is highly unlikely that a large proportion of workers would use buses or walk or cycle to site given their equipment needs. Public transport should not be relied upon as a parking impacts mitigation strategy.

The EIS essentially defers key traffic and parking needs to the future CTMP. This provides no certainty that the impacts can and will be mitigated. To address this, and in order to sufficiently address the SEARs requirement under Traffic and Transport Item 1(e) 'access constraints and impacts on public transport, pedestrians and cyclists', it would be reasonable to publish guiding principles, criteria and/ or metrics to inform the writing of each CTMP and to provide the community some assurance of the minimum objectives that will need to be met.

As for traffic and parking impacts, key principles/minimum requirements to develop and publish in the RtS could include (for example only):

- Measures are to be put in place to ensure that no on street parking is used by construction workers in residential streets
- Where barriers are installed, lane widths are to be sufficient to allow a minimum 1m clearance to on road cyclists
- The relocation of bus stops as temporary facilities must ensure the same level of pedestrian access along and across the road to and from the temporary facility as was available for the permanent facility
- Traffic control must be used to manage pedestrian crossings at construction site access driveways where pedestrian volumes exceed 20 pedestrians per hour (two-way).

The RtS should publish exactly what metrics and principles will be used to form the basis of the CTMPs.

5.2 Warringah Freeway and Surrounds

5.2.1 BL1: Cammeray Golf Course

This site is close to the Warringah Freeway and generates a relatively small increase in traffic in this heavily trafficked area. Both proposed access points appear to generate minimal impacts on all transport modes. Overflow car parking is unlikely given the absence of street parking in close proximity. There are no significant local street or parking impacts with this site. Also, the site is being used for the recently approved WHT-WFU project and will have a CTMP in place which will most likely be in place before the CTMP for this project is activated.

5.2.2 BL2: Flat Rock Drive

There are no issues with the traffic and transport impacts of this construction site. The proposed signalised access is expected to cater for the traffic generated by the site.

The Brook Street / Merrenburn Avenue intersection is shown in the EIS to operate over capacity without and with construction traffic. Site observations suggest that these over-capacity operations are likely to be infrequent or for short durations. This isolated impact is not considered to be significant. Brook Street does have residential street frontages however the volume of additional traffic, including truck traffic, added to this four lane road is not significant.

The site is forecast to generate 165 light vehicle movements in the AM period (6am - 10am), many of which will want to park on site. There is only a very small parking area shown for this site and it is likely that it will be insufficient.

The RtS should specify exactly how light vehicle parking will be accommodated or managed on site to prevent overflow into the adjacent public car park.

5.2.3 Local Network Intersection Impacts

Construction vehicles are forecast to add a relatively small volume of traffic to key intersections such as at the Warringah Freeway / Falcon Street interchange, which is forecast to operate at capacity in 2024. The EIS does not distinguish what delay or queue length impacts this generates but 'caps' outputs at DOS >1 and queue length of >500m. The intersection results should report changes in average delay to allow the impacts to be understood. If these results are unable to be extracted from SIDRA (because of over-capacity operations), then they should be extracted from VISSIM.

The RtS should present VISSIM results where SIDRA produces DoS >1 or queues > 500m.

5.3 Gore Hill Freeway and Artarmon

5.3.1 BL3: Punch Street

The Punch Street site is forecast to generate about 80 vehicles per hour in each peak period, which is not significant in the context of traffic on Hampden Road-Herbert Street. The access routes are through an industrial area and there are no local traffic issues with this site.

The on-street parking along the northern side of Punch Street is heavily occupied by workers in the nearby industrial area. It appears that these bays will be retained, and this should be confirmed. The loss of 25 bays along Lambs Road is locally significant and should be mitigated. When these bays are fully occupied Lambs Road between Cleg Street and Punch Street becomes very important for vehicle circulation purposes to find a car park. It appears that the footprint of BL3 could be modified to allow a road connection to be retained between Punch Street and Cleg Street.

The demand for parking in this area is highlighted by the marked parking on approaches to the Hampden Road bridge which will also be impacted by the temporary removal of 20 bays. The impact of this is likely to push overflow parking demand further into the residential area to the north which already has street parking capacity issues.

The RtS should confirm the retention of on-street parking along the northern side of Punch Street and identify if a road link between Punch Street and Cleg Street can be maintained with a smaller BL3. The method of replacement of the 'lost' 25 bays along Lambs Road and the 20 bays along Hampden Road should also be identified as this is critically needed parking.

5.3.2 BL4: Dickson Avenue

The Dickson Avenue site will resume the highest traffic and parking-generating uses in this light industrial area, minimising the impacts associated with the loss of on street parking on Dickson Avenue. The site is estimated to generate 50 vehicle movements per hour in the AM peak, which is not significant and probably less than the volume of traffic removed from the resumed sites.

5.3.3 BL5: Barton Road

The Barton Road site generates approximately 12 vehicles per hour in the AM and PM peak periods, which is insignificant in terms of traffic capacity impacts. However, the access streets to this site pass existing residential three-storey walk ups. Overflow parking from these units occupies the end of Barton Road and along Butchers Lane.

The impacts of removal of this parking for site access are not covered in the EIS and should be specifically addressed in the RtS (i.e. not deferred to the CTMP later). The issues of street parking loss around this site would be exacerbated if overflow parking from construction-related traffic used the remaining areas and this specific impact should be highlighted in the RtS so that the CTMP can address it.

The RtS should address how the removal of parking along Barton Road and Butchers Lane will be mitigated as it is a significant impact.

5.3.4 BL6: Gore Hill Freeway Median

This site generates approximately 5 vehicles per hour in each peak period, which is insignificant in the context of the volumes on the Gore Hill Freeway. With access directly to/from the Freeway, there are no local traffic or parking impacts for this site. The EIS makes no mention of the potential safety issues with the left shoulder merge from the site into the Gore Hill Freeway eastbound, which is likely to have sight-line constraints and limited acceleration lane length.

The left shoulder merge sight lines and limited acceleration lane length issues when leaving the site eastbound should be acknowledged in the RtS for further consideration in the CTMP.

5.3.5 Local Network Intersection Impacts

Construction traffic adds about 10% more traffic to the Gore Hill Freeway / Reserve Road interchange and pushes it from LoS E to F in the 2024 AM peak. Consideration could be given to building the Reserve Road bridge modification and approach works upgrades early in the construction process to provide some additional early capacity to absorb some of the impacts of construction traffic.

The RtS should determine if the Reserve Road bridge modification can be built as early works to cater for subsequent construction traffic.

5.4 Balgowlah and Surrounds

5.4.1 BL9: Spit West Reserve

This site is expected to generate about 35 vehicle trips per hour in each peak period, which is not significant. The EIS suggests a reasonable LoS for the intersection of Spit Road / Parriwi Road / Spit West Reserve Access in 2024 however site observations suggest that due to the combination of the bridge merge arrangements, the steep grades either side and the signal phasing arrangements, this intersection is already at capacity in 2020. It may be that the SIDRA analysis, using constrained demand volumes from VISSIM, is not realistically capturing actual arrival flows at the intersection.

The key risk with this site is construction worker parking in the highly demanded public parking within the reserve. Although the EIS states that construction worker parking will be at BL10, with shuttle buses back to BL9, it is highly probable that workers will simply park in the 10P parking area adjacent to the site unless this is strictly managed.

There are no local road impacts associated with this site.

The RtS should identify how the 10P parking area adjacent to this site will be managed to ensure that construction workers do not park in this area.

5.4.2 BL10: Balgowlah Golf Course

This is the construction site with the highest vehicle volumes, and it is expected to generate about 150 vehicle trips per hour in peak periods, which is significant, particularly considering that 25% of these movements would be by trucks. The proposed early signalisation of the intersection of Sydney Road / Maretimo Street/site access mitigates much of the impact of the additional movements at this intersection.

The new signals at the BL10 access off the Burnt Bridge Creek Deviation has not been assessed in the EIS and needs to be assessed as part of the RtS. In any case, if the intersection upgrade works proposed at this location are constructed before the major tunnel construction movements are generated, it is expected that this intersection would operate within its capacity.

Site BL10 is expected to accommodate most of the construction worker parking for BL9, BL10 and BL11. No estimates have been made on parking demand versus possible parking supply at BL10.

The RtS should assess the new signalised intersection of the BL10 access and the Burnt Bridge Creek Deviation.

The RtS should calculate peak construction worker parking demand at BL9, BL10 and BL10 and determine if it can be accommodated in the areas marked for parking in BL10. If it can't, specific and pragmatic mitigation measures should be recommended for carriage through to the CTMP.

5.4.3 BL11: Kitchener Street

The Kitchener Street construction access is proposed for light vehicles only and is expected to generate about 7-8 trips per hour in the peak periods. Most of this access is expected via left in/out movements off Burnt Bridge Creek Deviation which will have negligible impacts. There is no on-street parking on Kitchener Street and the local street impacts would be negligible.

There may be sight-line issues turning out of the site access onto Kitchener Street and these would need to be addressed in the CTMP.

The RtS should show an on-site parking area for site BL11 which is sufficient to accommodate workforce demands.

5.5 Frenchs Forest and Surrounds

5.5.1 BL12: Wakehurst Parkway South

This site is estimated to generate about 30 trips per hour in each peak period, which is not significant in this area. Access is off Wakehurst Parkway at two locations.

The southern access is off Judith Street via the Judith Street/Wakehurst Parkway intersection. Given the closure of Kirkwood Street north and the diversion of its traffic to the Judith Street/Wakehurst Parkway intersection plus the size of the Judith Street catchment, an assessment of construction period impacts at the intersection and its proximate site access points is warranted.

The RtS should analyse the intersection of Judith Street/Wakehurst Parkway and the safety of the short distance from it to the BL12 site access points.

5.5.2 BL13: Wakehurst Parkway East

This site is estimated to generate about 55 trips per hour in each peak period, which is not significant in this area. Access is directly off Wakehurst Parkway and there are no local traffic or parking impact issues. The closure of the northern end of Kirkwood Street is not expected to impact the residents in this area although the CTMP should clarify that access to the site (or nearby parking) could not be achieved via Kirkwood Street south.

5.5.3 BL14: Wakehurst Parkway North

This site is estimated to generate about 20 trips per hour in each peak period, which is not significant. Left in/out access is directly off Wakehurst Parkway and off Warringah Road and there are no local impact issues to traffic or parking.

5.6 Public Transport and Active Transport Impacts

There are no public transport impacts of significance during construction.

A key active transport impact is the closure of the shared use path south of the Gore Hill Freeway between Station Street and Reserve Road. The alternative route proposed in the EIS is far more indirect/contorted and would require significant signposting and consultation on it as the alternative.

Conflicts between active transport movements and construction site access vehicle movements have been adequately addressed in the EIS.

The RtS should recommend that an objective for the construction staging strategy is to re-instate the Station Street to Reserve Road shared path south of the Gore Hill Freeway as soon as possible.

5.7 Maritime Impacts

Maritime vehicle movements generated by the construction sites are not significant. The key impacts relate to physical restrictions on navigation routes, including some closures. The closures are not expected to impact business activities but will impact recreational activities on the relatively few weekdays that they occur.

A key impact is on the Mosman Rowing Club given the number of members it has and the safety issues with constrictions in the bay, particularly with early morning rowers (before sunrise). A specific management plan should be considered to manage the impacts on rowers in this location.

The RtS should specify the management measures that will be put in place to ensure the safety of Mosman Rowing Club rowers near BL9.

5.8 Cumulative Construction Impacts on Traffic

Traffic modelling for the Warringah Freeway and surrounds area has identified that peak travel times would reduce by 4% on average due to the impacts of additional construction vehicles. This is not significant in aggregate. There are specific localised impacts at the Willoughby Road/Gore Hill Freeway interchange, at Brook/Merrenburn and at Brook/Warringah Freeway; all due to the scale of increased movements at the Cammeray Golf Course Construction Site. No mitigation measures are nominated for these construction impacts and they should be considering the extended life of this construction site. This could include targeted upgrades to these locations such as additional side street approach capacity to enable additional through phase green time.

Overall though, the results suggest that there are expected to be some localised effects but these are not considered to be significant in the context of a growing city that is regularly under construction.

The greatest impacts on bus travel times are southbound in the AM peak on the Warringah Freeway. These are considered to be significant enough at eight minutes per bus on a highly patronised corridor to be investigated now, rather than deferred to the construction phase. For example, consideration could be given to how the WHT-WFU bus lane could possibly be extended to the north during early phases of the construction program to mitigate this impact during the majority of the construction period.

The RtS should further consider measures to mitigate southbound AM peak impacts to bus travel times when entering the Warringah Freeway, including the possible extension of the WHT-WFU bus lane further to the north.

5.9 Cumulative Parking Impacts

Overall, the EIS does not detail expected on-site construction worker parking demands by site versus available parking areas, nor does it contemplate truck access, manoeuvring and storage capacity. Rather, it defers these considerations to later CTMPs.

While it is understood that site configurations will change based on specific construction contractor methodologies, the EIS should at least demonstrate configurations that could operate without excessive impact as a 'Reference Case' or minimum requirement of what levels of impact management needs to be achieved.

The RtS should define, for each site, peak construction worker parking demand, parking supply, truck queuing demand and storage areas, and truck manoeuvring areas in order to demonstrate a 'Reference Case' that does not generate external impacts.

5.10 Environmental Management Measures

The measures in the EIS for construction period traffic and transport impacts mitigation are generic. They provide no principles or guidance on addressing site/location-specific issues identified in the EIS. They should preferably consider a suite of minimum requirements, or guiding principles for the construction issue areas identified in the EIS, and as detailed in the preceding sections of this report.

6. Operational Period Impacts

6.1 Broader Transport Network

It is not unexpected that the project will deliver substantial travel time benefits to the broader network and particularly to the areas north of the Harbour given the scale of additional capacity it provides in constrained corridors. The project case includes the WFU project but does not include the WHT project. The EIS identifies when using the SMPM, there is only a marginal benefit of the project to Sydney region VHT. This is most likely because the benefits of the Beaches Link are magnified only if it is connected to the WHT project via the WFU upgrade, as reflected in the cumulative scenario results.

In practical terms, just building Beaches Link and WFU, without the WHT project will simply create a severe southbound bottleneck at the Harbour crossing whilst also undermining the northbound benefits of both projects. It is logical that the Beaches Link project should not be separated from the WFU, WHT or the M4-M5 link projects and should not proceed without these other projects. The EIS does not highlight this.

The RtS should clearly state that the Beaches Link project should not proceed before the WFU-WHT and M4-M5 Link projects.

6.2 Beaches Link and Gore Hill Freeway Connection

The EIS claims that the Gore Hill Freeway diverge is at LoS E. It is unclear exactly which diverge this relates to because there are multiple diverge points in the Gore Hill Freeway Connection. Outputs from the VISSIM modelling could be provided to better describe this effect in the RtS. Also, if the performance further to the west is similarly at a LoS E or F in 2027, then the issues associated with the LoS E performance is not as important. If the issue relates to the diverge from the Gore Hill Freeway directly to Beaches Link eastbound, then the only reason that this would be at LoS E is the short preceding weave, which could be addressed in the design (unless there is a specific need to restrain tunnel entries at this location for flow management purposes).

The RtS should use VISSIM model outputs to show the issues in the Gore Hill Freeway diverge area and their impacts, including for areas further to the west.

In the cumulative scenario, LoS is further worsened, as expected, because the connection to the WHT attracts even more traffic to use Beaches Link-Gore Hill Freeway.

6.3 Interface Area: Warringah Freeway and Surrounds

It is expected that the AM peak traffic performance in this area worsens with the project both at a network level and consequentially at an intersection level. The key issue is that unless the greater arrival flow rate of traffic southbound towards the Harbour can be released into additional capacity (i.e. the WHT project), then there is little benefit of the Beaches Link project, except possibly for additional queue storage. That is, the Harbour crossing pinch point will be worsened without WHT.

In the northbound/evening peak, the traffic arriving into Beaches Link is constrained by the capacity of the Harbour crossing and the benefits of the project are therefore understated compared to if the WHT was included in the project case. This assertion is reinforced by the 2037 Cumulative Scenario results which see the total number of stops almost halve in 2037 and average speeds increasing by 20% in the AM peak when WHT is included.

In consideration of the above, it is difficult to contemplate a scenario where the Beaches Link exists without the WHT. This means that the published 'Do something' intersection results are academic.

The intersection modelling results for the morning peak infer that the intersections on the alternative routes to the Warringah Freeway, such as Miller Street and the Pacific Highway are impacted, as are feeder roads such as Amherst Street.

The RtS should acknowledge the scale of impact at the intersections of Amherst Street with Miller Street and with West Street and recommend mitigation works to be included as part of the project.

In terms of bus travel time impacts, there are substantial impacts northbound in the morning and evening peaks, probably due to excessive congestion in the VISSIM models as traffic manoeuvres on local streets to avoid accessing the heavily congested Warringah Freeway until as far south as possible. This cannot be verified without viewing of the VISSIM models or at least production of screen captures from the models which demonstrate these issues.

Many of the travel time impacts related to excessive congestion on the Warringah Freeway are reduced with WHT in the cumulative scenario as traffic is drawn back into the primary corridor. Although, this does introduce other impacts at intersections on access routes to the corridor, such as along Berry Street.

Most of the active transport changes in this area are related to the WFU project and its EIS.

The RtS should confirm that the Do Something results are now superseded by the approval of the WHT-WFU project and the evaluation of impacts should rely on the Cumulative Scenario, or, the Do Something scenario assessment should be re-run and re-written with WHT-WFU and M4-M5 Link as part of that scenario.

6.4 Interface Area: Gore Hill Freeway and Artarmon

The T2 lanes currently on the Gore Hill Freeway are proposed to be replaced with general purpose lanes. This is supported given the lack of evidence that these T2 lanes are leading to vehicle occupancy changes and because the benefits of this change of entry and exit capacity of Beaches Link and the Warringah Freeway outweigh the impacts of keeping them.

The upgrades in this area allow more traffic demand to be realised within the area while average speeds also increase, suggesting network benefits associated with the project. Major route travel times do not change substantially, and it is difficult to reveal from the EIS documentation what happens westbound at the western end of the modelled area where the 'released' demand flows into the existing two lanes of the Lane Cove tunnel at a higher flow rate. When WHT is considered in the cumulative scenario, the additional attractiveness of the corridor significantly increases congestion in the PM peak with extra traffic 'flooding' this end of the project area and its connecting streets. For example, the total number of stops increases by 30%, average speeds drop, and the number of unreleased vehicles increases. Travel times on Longueville Road to Gore Hill Freeway also increase significantly and a number of intersections get pushed to LoS F. The PM peak impacts on the local road system under the cumulative scenario are unresolved in this area and should be considered further in the RtS to determine what mitigation works are possible.

The RtS should specify exactly what measures will be put in place to mitigate the major congestion increases at local roads at the western end of the project under the Cumulative Scenario.

The changes to Dickson Avenue west of Reserve Road are unclear but it seems that the eastern end of Dickson Avenue at Reserve Road is to be converted to one-way westbound (which should be confirmed). Presumably, this has been done to remove one signal phase at this intersection given that it will be operating at capacity. The implications of this are more right turns out of Carlotta Street, which is not expected to be a significant issue, and the reversal of Curry Lane to one way eastbound.

The RtS should confirm if Dickson Avenue is to be converted to one-way westbound, and if so, to present the assessment of the traffic diversion impacts of this change.

Parking loss impacts are focussed on Lambs Road and Punch Street which appears to be overflow parking from the adjacent industrial businesses that traditionally have insufficient on-site parking and rely on street parking. These parking areas are practically 100% occupied. The EIS simply states that this parking can be undertaken elsewhere however there is no available parking in proximity to the removed parking.

The RtS should identify surplus land to its requirements from the project to provide the parking lost or mitigate the lost parking some other way.

There are no public or active transport impacts of significance in this area.

6.5 Interface Area: Balgowlah and Surrounds

It is clear and expected that one of the major benefits of the project is network and corridor travel time reductions in the Balgowlah area, which is heavily congested in the future Do Minimum cases. The key intersection in the area of Sydney Road/Manly Road/Burnt Bridge Creek Deviation is substantially improved in the AM peak, as expected but remains congested in the PM peak. It is understandable that there will be essentially no change to the demand patterns at the Frenchs Forest Road/Sydney Road roundabout and that its queues could push back eastwards towards Manly Road. This effect is unrelated to the project.

The intersection of the tunnel portal double right turn, Burnt Bridge Creek Deviation and the new access from the Golf Course is shown as a two-phase signal with LoS A/B in 2037. This is expected given the simple two-phase arrangement and would be highly unlikely that the queue from the double right turn would push back into the tunnel or that there would be significant delay impacts on Burnt Bridge Creek Deviation southbound.

The cumulative scenario with WHT makes little difference to the performance of the project because most of its demand is generated by local travel time benefits.

Public transport and active transport are not impacted significantly. Some of the bus travel time improvements under the cumulative scenario compared to the Do Something scenario are difficult to rationalise given no additional bus priority measures are being introduced on the travel time routes assessed.

The RtS should explain how the significant additional bus travel time benefits that are claimed are realised on the routes assessed under the Cumulative Scenario compared to the Do Something Scenario.

6.6 Interface Area: Frenchs Forest and Surrounds

The EIS identifies that the localised impacts of the 'drawing in' of traffic to the project are significant. Whilst the users of the project will benefit, the results show that users of the network that do not use the Beaches Link will be significantly impacted with longer travel times and more stops. Also, the volumes of unreleased vehicles in the VISSIM models increases with the project (i.e. the Do Something case) meaning that there is less demand able to feed into the network at peak times.

Morning peak southbound travel times on Wakehurst Parkway will increase substantially as traffic draws into the corridor to access the tunnel. A more substantial upgrade to the Wakehurst Parkway / Warringah Freeway intersection should be considered to separate out movements to/from the south from other movements in order to minimise these impacts to 'non-project' traffic. This could include longer double right turn lanes from south to east and a longer free left turn lane (or a double left turn) from east to south. Under the cumulative scenario, the WHT attracts even more traffic demand to Wakehurst Parkway exacerbating these issues to the point where travel speeds are more than 20% slower compared to Do Minimum.

More broadly in 2037, there are two full lanes-worth of traffic entering the tunnel southbound from Wakehurst Parkway and a further two lanes worth of traffic entering southbound at Balgowlah. It is inevitable, based on the modelling, that a three lane tunnel (southbound) at the Seaforth junction will be at capacity. This has not been contemplated in the EIS. These issues would be exacerbated under the 'cumulative' scenario because there would be even more demand using Beaches Link. The VISSIM models may demonstrate these issues and how they could be managed but no evidence of this has been provided in the EIS.

The RtS should demonstrate how in the 2037 AM peak, the Seaforth tunnel junction southbound operates without congestion or flow breakdown. The VISSIM model screenshots should be used to demonstrate this.

There are significant congestion issues by 2037 at the northern end of the project which are shown to affect movements unrelated to the project. Further consideration should be given on how to mitigate traffic impacts on these movement markets.

The RtS should identify what additional upgrades are required at the Wakehurst Parkway/Warringah Road intersection to ensure that under the Cumulative Scenario in 2037 what additional works are required so that there is no worsening of queues or delays to any movements unrelated to access to/from the project, compared to the 2037 Do Minimum Scenario.

The public transport impacts are minimal in this area and a number of active transport improvements have been included as part of the project.

6.7 Environmental Management Measures

The measures in the EIS to address operational impacts are minimal and generic. They provide no principles or guidance in addressing the localised congestion issues on local government roads and intersections identified in the EIS. There would be benefit in doing so to provide some certainty to the community and stakeholders on what minimum commitments will be put in place.

The RtS should present a traffic congestion monitoring program and clear process for local government roads within (say) 2-3km of the project's connection points to the existing network. The monitoring program and process should clearly articulate the mechanisms for identifying and addressing excessive local congestion due to the project which would then be mitigated in consultation with the relevant local government.

7. CONCLUSIONS

7.1 Project Need and Assessment Methodologies

Key conclusions for the review of the EIS are:

- The EIS makes a strong claim that a road project is needed for this corridor and the grounds for such a project are well substantiated
- The strategic options assessment logically results in a road tunnel being the preferred strategic option for the Northern Beaches
- The preferred tunnel alignment and connections are also logical in that they cater for the largest trip markets, although the limitation of access points to one in the north and one in east does introduce local congestion impacts. The scale of the catchment and the volume of traffic demanding to use the project to/from its northern end is a key capacity concern and suggests that the planning for an additional east-west connection (i.e. M2 to Warringah Road) may need future consideration so that the BL can focus its utilisation on north-south demand
- The project is generally well described. Further information that would clarify the design includes:
  - The integration of the southbound bus lane at Warringah Freeway connection
  - Whether Dickson Avenue is intended to be one-way westbound at its eastern end and converted to a single traffic lane with parking either side.
- The hierarchical modelling approach is consistent with similar previous EIS's and is supported in principle as is the 'capacity capping' techniques employed to move demand between the SMPM and the localised VISSIM models. However, publication of the VISSIM model outputs, particularly screen captures of queues, or delay plots would allow the reader to interpret some of the impacts of the 'Do Something' scenario, such as major AM peak southbound pinch point at the harbour crossing which is inferred from the outputs presented in the EIS
- It is unclear if the SIDRA models used in the EIS were calibrated to recent data as they should have been.

7.2 Construction Period Impacts

Key conclusions for the review of the EIS are:

- Guiding principles, criteria and / or metrics to address the construction period issues identified at specific sites should have been published rather than simply leaving the scope of these mitigation measures to be dealt with in a future CTMP. This provides the community and stakeholders some assurance as the minimum standards which must be met to address the identified impacts
- Where intersection performance has a DoS >1, queue length >500m or LoS of F, the EIS does not publish the differences between the Do Minimum and Do Something scenarios which does not allow stakeholders and the community to understand the scale of the change expected. If these results are unable to be extracted from SIDRA (because of over-capacity operations), then they should have been extracted from VISSIM
- There are minimal traffic impacts associated with the specific construction sites primarily due to the relatively low volumes of construction traffic forecast at their mostly main road access points. Issues include:
  - Construction traffic adds about 10% more traffic to the Gore Hill Freeway / Reserve Road interchange and pushes it from LoS E to F in the 2024 AM peak. Consideration could be given to building the Reserve Road bridge modification and approach work upgrades early in the construction process to provide some additional early capacity to absorb some of the impacts of construction traffic

- The closure of the shared use path south of the Gore Hill Freeway between Station Street and Reserve Road is a significant impact
- A specific parking management plan, or at least requirements to include in the CTMP would have been beneficial.

- Maritime impacts are most significant near the Spit West Reserve. This key construction site is also a key recreational boating area and the Mosman Rowing Club is immediately adjacent to the site and safety issues with constrictions in the bay, particularly with early morning rowers (before sunrise)
- Overall traffic network impacts during construction are relatively small. There are specific localised impacts at the Willoughby Road/Gore Hill Freeway interchange, at Brook Street/Merrenburn Avenue and at Brook Street/Warringah Freeway; all due to the scale of increased movements at the Cammeray Golf Course Construction Site.

7.3 Operational Period Impacts

Key conclusions for the review of the EIS are:

- While not explicitly stated or shown in the EIS, the interpretation of the modelling results clearly shows a significant pinch point issue under the 2027 and 2037 Do Something scenario for AM peak traffic southbound, and the insufficient release of traffic into the project area in the PM peak northbound. The reason is most likely insufficient capacity at and south of the harbour crossing because the WHT is not in the Do Something scenario and because of the induced higher flow rates into this area due to the project
- In terms of rational road network planning, there are limited to no benefits in approving and constructing the Beaches Link project's connections to the Warringah Freeway until the WHT project is approved and constructed. In consideration of this, it is impractical to contemplate a scenario where the Beaches Link existed without the WHT. This means that the published 'Do something' intersection results are academic and the further conclusions drawn below are based on the Cumulative Scenario
- The EIS should have clarified the reasons the Gore Hill Freeway diverge to the Beaches Link is at LoS E and whether this was a purposeful strategy to manage flows approaching the project or whether it could be resolved through works to the west of the diverge to address potential weave issues
- Under the Cumulative scenario:
  - The attractiveness of the project in both directions of travel, certainly improves conditions in the Northern Beaches but exacerbates issues in North Sydney, which are mostly created by the increased arrival flows and induced demand due to the WHT
  - The scale of the change/impact along Amherst Street suggests that upgrades should be identified now to relieve intersection pinch points created by the project
  - The removal of the T2 lanes on the Gore Hill Freeway is supported as the benefits of doing so significantly outweigh the disbenefits, particularly considering the increased arrival flow rates due to the combination of the project and the WHT
  - There are significant local traffic and parking impacts in Artarmon that have not been sufficiently addressed as part of the project. Further and more widespread upgrades should have been considered to dissipate congestion due to the increased traffic using this area because of the project
  - The parking loss impacts on Lambs Road and Punch Street are significant because these bays, and all other street parking nearby is practically 100% occupied. The EIS simply states that this parking can be undertaken elsewhere however there is no available parking in proximity to the removed parking

- No unresolved operational period issues have been identified in the Balgowlah area
- There is a high risk that the volume of traffic demanding to use the Wakehurst Parkway entry to the project will be greater than the project's capacity to absorb this traffic on Wakehurst Parkway or on its intersection with Warringah Road. A more substantial upgrade to the Wakehurst Parkway / Warringah Freeway intersection should have been considered to separate out movements to / from the south from other movements, to minimise impacts to 'non-project' traffic. This could include longer double right turn lanes from south to east and a longer free left turn lane (or a double left turn) from east to south. Under the cumulative scenario, Wakehurst Parkway travel speeds are more than 20% slower compared to Do Minimum, suggesting over-capacity conditions and the need for TfNSW to contemplate other (east-west) relief routes for this traffic.

- A significant project capacity issue is that there are at least two lanes worth of traffic entering the tunnel southbound from Wakehurst Parkway and a further two lanes worth of traffic entering southbound at Balgowlah. It is inevitable, based on the modelling, that a three lane tunnel (southbound) just from Seaforth to the south will be at capacity, or the merge queues for southbound entry near Balgowlah will extend back into the surface street system. This has not been contemplated in the EIS.

7.4 Recommended Further Assessments and Clarifications in the RtS

It is recommended that the RtS:

- Update Figure 5-1 to show how bus priority works with the southbound bus lane included in the WHT-WFU project
- Clarify the configuration changes associated with Dickson Avenue, Curry Lane and Carlotta Street and describe the impacts of these changes
- Document the volume and percentage of suppressed strategic model traffic demand compared to what was used in the future year microsimulation models
- Provide microsimulation model outputs for intersection delays, queue lengths and LoS for comparison to SIDRA results where SIDRA results 'cut out' at maximum values (e.g. 'DoS >1', or 'queue >500m')
- Identify if the SIDRA intersection models have been suitably calibrated and validated, and if not, why not
- Publish typical queue length screen captures from the microsimulation models in future years under each scenario for midway through each peak period
- Publish exactly what metrics and principles will be used to form the basis of the CTMPs
- BL2: Specify exactly how light vehicle parking will be accommodated or managed on site to prevent overflow into the adjacent public car park
- BL3: confirm the retention of on-street parking along the northern side of Punch Street and identify if a road link between Punch Street and Cleg Street can be maintained with a smaller BL3. The method of replacement of the 'lost' 25 bays along Lambs Road and the 20 bays along Hampden Road should also be identified as this is critically needed parking
- BL5: address how the removal of parking along Barton Road and Butchers Lane will be mitigated as it is a significant impact
- BL6: Address the left shoulder merge sight lines and limited acceleration lane length issues when leaving the site eastbound for further consideration in the CTMP

- Determine if the Reserve Road bridge modification can be built as early works to cater for subsequent construction traffic
- BL9: Identify how the 10P parking area adjacent to the site will be managed to ensure that construction workers do not park in this area
- BL10: Assess the new signalised intersection of the BL10 access and the Burnt Bridge Creek Deviation
- Calculate peak construction worker parking demand at BL9, BL10 and BL10 and determine if it can be accommodated in the areas marked for parking in BL10. If it can't, specific and pragmatic mitigation measures should be recommended for carriage through to the CTMP
- BL11: Show an on-site parking area for site BL11 which is sufficient to accommodate workforce demands
- BL12: Analyse the intersection of Judith Street/Wakehurst Parkway and the safety of the short distance from it to the BL12 site access points
- Recommend an objective for the construction staging strategy that aims to re-instate the Station Street to Reserve Road shared path south of the Gore Hill Freeway as soon as possible
- Specify the management measures that will be put in place to ensure the safety of Mosman Rowing Club rowers near BL9
- Further consider measures to mitigate southbound AM peak impacts to bus travel times during the construction phase when entering the Warringah Freeway, including the possible extension of the WHT-WFU bus lane further to the north
- Define, for each site, peak construction worker parking demand, parking supply, truck queuing demand and storage areas, and truck manoeuvring areas in order to demonstrate a 'Reference Case' that does not generate external impacts
- Clearly state that the Beaches Link project should not proceed before the WFU-WHT and M4-M5 Link projects
- Use VISSIM model outputs to show the operational phase issues in the Gore Hill Freeway diverge area and their impacts, including for areas further to the west
- Acknowledge the scale of impact at the intersections of Amherst Street with Miller Street and with West Street and recommend mitigation works to be included as part of the project
- Confirm that the Do Something results are now superseded by the approval of the WHT-WFU project and the evaluation of impacts should rely on the Cumulative Scenario, or, re-run the Do Something scenario and re-write it with WHT-WFU and M4-M5 Link as part of that scenario
- Specify exactly what measures will be put in place to mitigate the major congestion increases at local roads at the western end of the project under the Cumulative Scenario
- Explain how significant additional bus travel time benefits are realised on the routes assessed under the Cumulative Scenario compared to the Do Something Scenario
- Demonstrate how in the 2037 AM peak, the Seaforth tunnel junction southbound operates without congestion or flow breakdown. The VISSIM model screenshots should be used to demonstrate this

- Identify what additional upgrades are required at the Wakehurst Parkway/Warringah Road intersection to ensure that under the Cumulative Scenario in 2037 what additional works are required so that there is no worsening of queues or delays to any movements unrelated to access to/from the project, compared to the 2037 Do Minimum Scenario
- Present a traffic congestion monitoring program and clear process for local government roads within (say) 2-3km of the project's connection points to the existing network. The monitoring program and process should clearly articulate the mechanisms for identifying and addressing excessive local congestion due to the project which would then be mitigated in consultation with the relevant local government.

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consulting
traffic engineering • transport planning

18th February 2021

Ref: WRL2018014 BMM L20210218

Belinda Scott
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Transport Assessments
Department of Planning, Industry and Environment
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Parramatta NSW 2150

UNSW SYDNEY
Water Research Laboratory
School of Civil and Environmental Engineering

By Email: Belinda.Scott@planning.nsw.gov.au

Dear Belinda,

Review Surface Water aspects of the Beaches Link and the Gore Hill Freeway Connection Environmental Impact Assessment

This document summarises my expert review of the surface water aspects of the above-mentioned Environmental Impact Statement (EIS) as engaged by the Department of Planning, Industry and Environment (DPIE).

I (Mr Brett Miller) have undertaken this review with particular attention paid to:

- Chapter 17 – Hydrodynamics and Water Quality
- Appendix O – Surface Water Quality and Hydrology
- Appendix P – Hydrodynamic and Dredge Plume Modelling
- Appendix Q – Marine Water Quality

In parallel, Dr Kevin Hayley of Groundwater Solutions was engaged as a subconsultant to WRL to provide DPIE with an expert review of groundwater aspects. This groundwater review is provided in a separate letter.

A previous WRL letter (3rd November 2020) provided a consistency review of groundwater and surface water aspects against the SEARS. This letter provides a review of the content in the EIS and provides recommendations.

The surface water and marine water aspects of the EIS that I have concerns about are summarised as:

1. Assessment and monitoring of potentially impacted waterways.
2. Potential changes to waterway baseflows resulting from groundwater changes.
3. Treatment plant and detention basin designs and overflows during larger rainfall events.
4. The depth of contaminated sediment to be dredged using the backhoe clamshell.
5. Monitoring of background conditions within Middle Harbour.
6. Assessment of Middle Harbour long term water quality changes.

1. Assessment and monitoring of potentially impacted waterways.

Appendix O (Surface water quality and hydrology) has a summary statement that "The project construction is therefore likely to have a negligible impact on the water quality objectives (WQOs), which are currently not being met". While this statement may be accurate for some of the waterways, there is inadequate data to conclude that the WQO's are not currently being met for all waterways or to determine the relative impact during and after construction.

The EIS presents only six water quality monitoring samples in each of the waterways. Only one of these samples was during a wet weather event. All samples were undertaken over a five month period from October 2017 to February 2018. This is an inadequate sample set for determining the existing condition of each waterway. *A baseline water quality monitoring program should commence immediately upon approval to sample regularly, under a range of weather conditions and over an extended period of time including both summer and winter.*

The EIS makes reference to historical reports on water quality stating that various catchments are influenced by sewer overflows. Many of these reports are over ten years old. Sydney Water has spent much of this time undertaking an overflow reduction program and therefore it is uncertain whether these sewer overflows still exist. Council water quality monitoring has not been included in the water quality analysis (particularly relevant for Manly Dam). Reference is made to a 2004 UWS report stating that the Manly Dam catchment includes three sewer overflows and suffers from blue-green algae blooms. I am aware of catchment management improvements (including water management on the Wakehurst golf course) and I am not aware of an algae bloom in Manly Dam for at least a decade. *The assessment of water quality in each catchment should use all available historical data and include recent publications. Where possible assessment should include the long term improvements (or degradation) of water quality. The Response to Submissions Report is required to provide an updated assessment on existing water quality taking into consideration improvements implemented by Sydney Water and/or Council (i.e. as part of overflow reduction or other water quality programs).*

The EIS does not discuss or analyse any impacts directly to Bantry Bay that may result from discharges to the westward flowing steep creeks draining from Wakehurst Parkway. This should be included in the analysis. It is also unclear if these creeks have been included as sensitive environments. *Bantry Bay and these above mentioned creeks should be included in the waterway assessment. Further information to address this deficiency is required to be provided in the Response to Submissions Report.*

Appendix O lists the groundwater water quality sampling. However the table only presents median values, does not specify the range and does not provide the number of samples. *Additional information on the groundwater water quality monitoring should be provided.*

Construction wastewater treatment plants are proposed to reduce the discharge quality to ANZG 2018 standards. In most instances this should protect waterway health. *However, should the longer term monitoring program identify that a waterway presently has quality significantly better than ANZG, then treatment to a higher level will be required.*

Uncertainty exists in the contaminants, concentrations and volumes of groundwater flow and the treatment methods proposed. No discussion as to the technology, space, capacity or energy use of the water treatment plants could be identified in the EIS. *Information on the treatment plant technology and how these treatment methods could be expanded if so required is required to be provided in the Response to Submissions Report.*

2. Potential changes to waterway baseflows resulting from groundwater changes.

Catchment runoff will potentially decrease due to groundwater infiltration, which will in-turn effect the hydrology (in particular base flows) of the catchment streams. This is particularly important for the more natural catchments. The EIS provides inadequate estimates of reduced baseflow based on the groundwater model's prediction of groundwater drawdown.

The EIS does not provide predictions of baseflow reductions during extended dry periods or drought. *For the sensitive, natural waterways, predictions of baseflow reduction should be based on extended timeseries modelling so that flow frequency curves pre and post construction can be assessed on an ecological impact basis for all of the relevant flow facets. Further information on potential impacts from baseflow reductions during periods of extended dry weather or drought conditions are required to be provided in the Response to Submissions Report.*

Statements such "reductions in flow are unlikely to results in a complete loss of aquatic habitat" (for Burnt Bridge Creek) are unacceptable and further modelling and assessment is required.

The groundwater model states that it provides a conservative estimate of groundwater drawdown, however as discussed in the report by Dr Kevin Hayley fractured Sydney Sandstone can result in local areas of higher drawdown. The proponent has committed to limiting groundwater drawdown by constructing the tunnel lining to meet a 1 L/s/km inflow rate. Should this specification be averaged over the full length (or sections) of the tunnel, groundwater drawdown, and hence reduction in surface water baseflows, could be greater than predicted in localised areas. *The 1 L/s/km criteria should be conditioned as being for any point along the tunnel.*

Water balances are provided during the construction stages. However only average daily values have been presented. *The detailed groundwater and surface water balance should address the range of ratios of usage, harbour discharge and groundwater extraction through both dry weather and wet weather periods, with particular emphasis on dry weather and baseflow conditions.*

3. Treatment plant and detention basin designs and overflows during larger rainfall events.

Treatment plants and detention basins will have a particular rainfall frequency or annual exceedance probability (AEP) that will generate inflows beyond the capability of the treatment plants or sediment detention basins to effectively treat or contain. The EIS does not state this AEP nor does it contain any analysis of the water quality impacts of discharges or bypasses during these larger events.

The Response to Submissions should state the design AEP of the treatment plants and the detention basins. The predicted quality of bypass flows should be provided. Any environmental impacts of bypass flows should be assessed.

In many instances, construction and operational discharges during larger events do not have a significant impact because of the additional dilution with other catchment runoff. This may not be the case with Manly Dam where the total mass of sediments and constituents is captured within the dam.

Modelling should be undertaken to assess the cumulative water quality impacts including regular conditions and larger AEP wet weather events.

Sediment detention basins and treatment plants should be designed and operated so that previously captured materials cannot be released or scoured during these wet weather events. *The Response to Submissions Report is required to explicitly state that this will be the case.*

4. The depth of contaminated sediment to be dredged using the backhoe clamshell.

The backhoe dredge with environmental clamshell for removal of the top contaminated sediment will minimise the movement and escape of contaminated materials.

The EIS states that the top 0.5m is contaminated. It is unlikely that testing of materials would be taking place during dredging, so it is imperative that the depths of contaminated materials are accurately known before work commences. *The Response to Submissions Report should clarify what factor of safety would be used for the dredge depth. If the existing knowledge is insufficient, additional bed sediment sampling must be undertaken.*

Continuous real-time turbidity monitoring outside the "moon pool" should be undertaken for the entire period of contaminated material backhoe dredging. Cease-to-dredge operational rules based on this real-time data should be prescribed in advance.

5. Monitoring of background conditions within Middle Harbour.

The EIS is lacking adequate monitoring of the background water quality and physio-chemical conditions within Middle Harbour.

The EIS states that there is limited data for turbidity during wet weather events in Middle Harbour. Collection of this background data should commence immediately for inclusion into operational limit rules.

The physio-chemical conditions of Middle Harbour were only observed twice. This is inadequate for determining the stratification and oxygen levels within the estuary. *I recommend that a minimum one continuously profiling data logging buoy be deployed at the crossing site to monitor temperature, salinity and dissolved oxygen throughout the water column for a period of at least twelve months before any construction commences. This dataset should be combined with additional monthly transects of the estuary similar to those presented in the EIS.*

6. Assessment of Middle Harbour long term water quality changes.

The potential ongoing impact on marine waters in Middle Harbour resulting from the introduction of a sill at the tunnel crossing has not been adequately assessed. Numerical modelling presented in the EIS has shown that the flushing time increases in the bottom of the estuary upstream of the sill and periods of low dissolved oxygen (DO) are extended. The EIS concludes that this increase in minor, however there has been inadequate data to calibrate or verify the model for this condition.

The original current metering program appears to have been designed for calibration and verification of dredge plume modelling. Only later were two water quality transects undertaken to gather information on the potential stratification and flushing. Numerical modelling of mixing in slow moving, stratified water bodies requires appropriate verification data and (due to the inherent uncertainties) should be accompanied by modelling sensitivity analysis. The modelling presented in the EIS has not provided this verification or sensitivity analysis.

The EIS states that flows in Middle Harbour are constricted by the shallow, narrow channel at the Spit Bridge. The argument is made that since Middle Harbour is already constricted, the addition of the sill will not have an impact on flows. However, the tidal range upstream of the Spit Bridge is the same as the tidal range downstream indicating that there is no constraint to flows into and out of Middle Harbour. It is the size of the tidal prism within Middle Harbour relative to the water depths which result in slow water velocities. As such, accurate modelling of slow moving velocities and internal mixing processes is important.

The EIS does not provide any information on the vertical mixing and turbulence methods used in the numerical modelling of Middle Harbour. *This information should be provided for review. Additional sensitivity analysis of vertical mixing and turbulence parameters should be modelled and included in the Response to Submissions Report.*

The EIS states that low DO can occur at the bed while vertical mixing maintains high DO throughout the water column. The presence of any stratification of temperature or salinity will inhibit this vertical mixing of oxygen from the surface towards the bed. Subtle changes in flow patterns may change the amount of energy available to de-stratify the water column, which in turn may result in extended periods of reduced DO near the bed.

The EIS states that based on average rainfall patterns the DO depletion near the bed of middle harbour occurs "a few times per year". However, adequate monitoring of DO within Middle Harbour has not been undertaken to support this statement. The EIS states that this would be rapidly vertically mixed but no measurements of this mixing rate have been made and numerical model sensitivity analysis on the mixing parameters has not been provided. Further the EIS has not addressed potential changes in lowest DO concentrations and duration of periods when DO levels are below particular thresholds.

The EIS has not adequately addressed the potential for the tunnel sill to change flow conditions to the detriment of water quality in Middle Harbour. Monitoring (discussed at Section 5) should commence immediately upon approval and data used for additional model calibration and verification. Model predictions should include both wet weather and dry weather conditions and uncertainty analysis.

The recommended baseline data of the physio-chemical conditions in Middle Harbour will be suitable for both verification of predictive models and comparison with post construction monitoring. Should either the predictive modelling or the post construction observations indicate deteriorated water quality, *the proponent may need to consider artificial mixing devices (for example mechanical propellors or bubble plumes) to overcome the influence of the sill.* The extended baseline data and the verified numerical modelling would be crucial in the design and optimisation of such a device.

Should any of the points made in this review require clarification, please contact me on
on

Yours sincerely,

Brett Miller
Principal Engineer – Hydraulics and Modelling

Traffic & Transport Survey 2020

ZaliSteggall OAM MP
FEDERAL MEMBER FOR WARRINGAH

In the 2019 Warringah Community Survey conducted by my team, it was established that one of the issues of most concern to the Warringah electorate was traffic & congestion.

As a follow-up, we conducted a study to understand:

- What most concerns people about traffic congestion?
- How has COVID-19 affected their use of and attitude towards public transport?
- What are the main modes of transport and reasons for driving?
- What are the traffic hotspots?
- What would help people use public transport, ride bikes or undertake other behaviours to reduce traffic congestion?

Warringah Traffic Survey: Killarney/Forestville

Before CV-19,

51%

used public transport weekly+

Biggest concern about traffic congestion in Warringah:

Waste of time

41%

Intended travel modes:

77%

57%

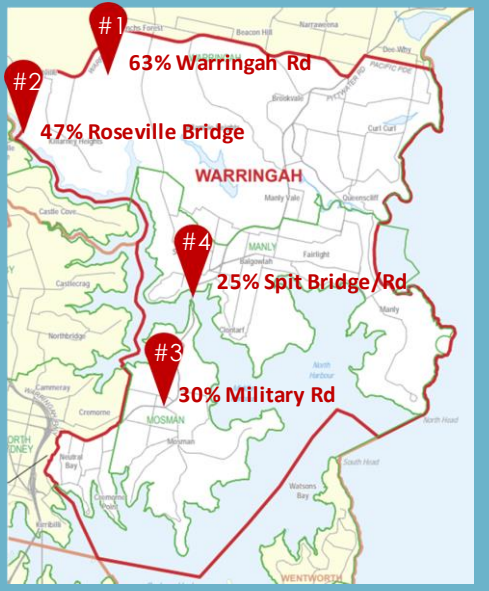
23%

10%

Why drive?

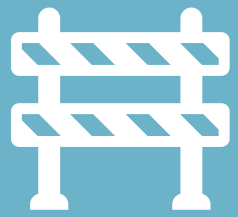
- More convenient 60%
- Faster 54%
- Kids drop/pickup 18%
- Need car after work 12%
- Safer with CV-19 12%

Traffic Hotspots



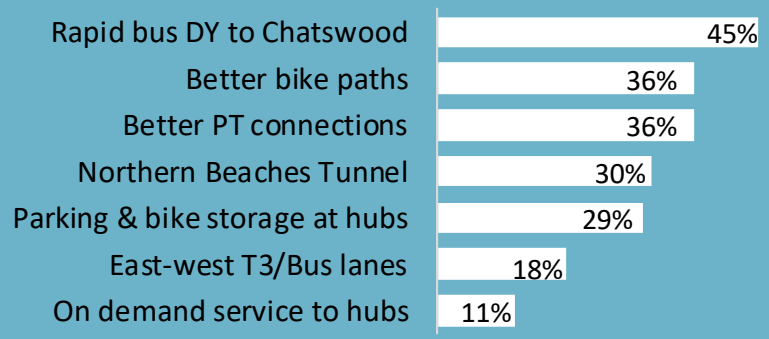
Residents in **Killarney/Forestville intend to use their car** when things get back to normal, mainly because it's more convenient, faster or they need the car for kids/other activities. These residents differ from the rest of Warringah because their **top traffic hotspots are Warringah Road and Roseville Bridge** and they are more likely to travel to **Chatswood.** A **rapid bus service between Dee Why and Chatswood** would help address their barriers, is likely to be used and is what they would prioritise to reduce congestion. **Better bike paths** would also help.

Reducing barriers to PT:

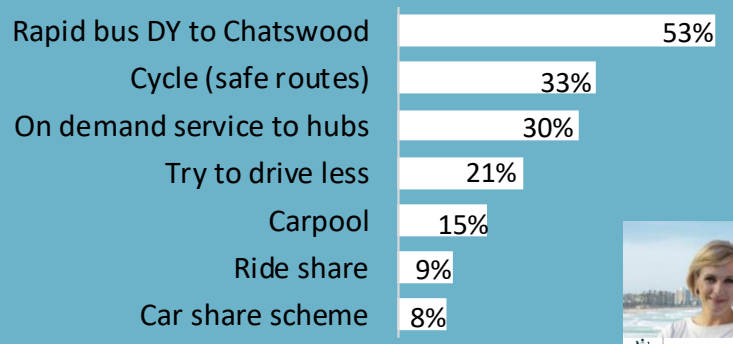


- **44%** Better connections
- **36%** More frequent buses
- **34%** If it was faster
- **28%** If easier to get to
- **17%** Parking at hubs

Priority should be given to:



Likely to use:



Warringah Traffic Survey: Seaforth/Balgowlah

Before CV-19,

55%

used public transport weekly+

Biggest concern about traffic congestion in Warringah:

Waste of time

39%

Intended travel modes:

71%

56%

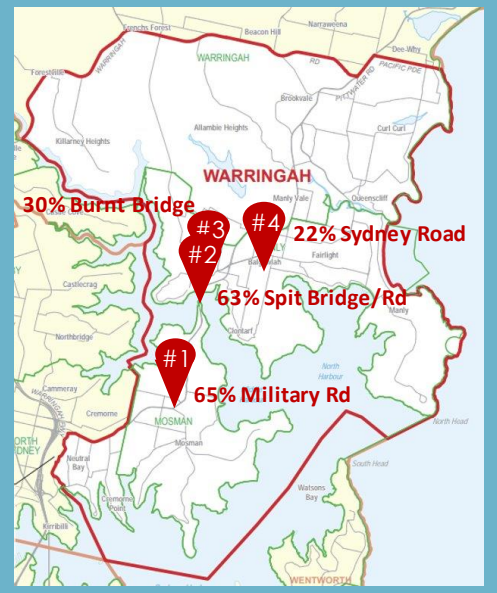
22%

18%

Why drive?

- More convenient 51%
- Faster 29%
- Kids drop/pickup 18%
- Safer with CV-19 13%
- Need car after work 11%

Traffic Hotspots



Residents in **Seaforth/Balgowlah intend to use their car** when things get back to normal, mainly because it's more convenient, faster, and they need to transport their kids or go somewhere after work. About two thirds say their top traffic hotspots are Military Rd and Spit Bridge, although for some, traffic starts earlier in their journey on Sydney Road or Burnt Bridge Deviation. **Better connections** would help this area use PT more – they need connections to PT and 39% say they are likely to use an **on-demand service**. Another opportunity for this area is **bike paths** – one of the top priorities and likely to be used by 36%.

Reducing barriers to PT:

37% Better connections

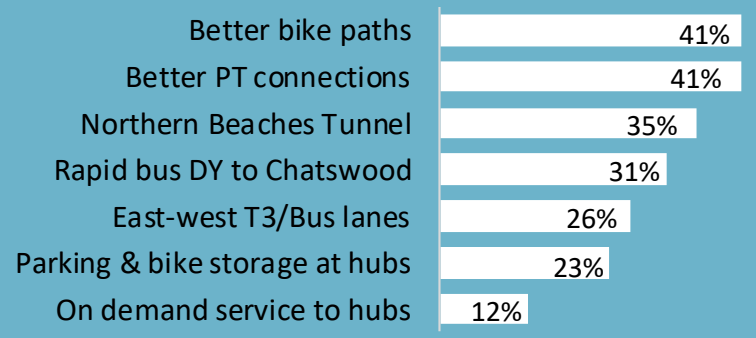
36% If it was faster

35% More frequent buses

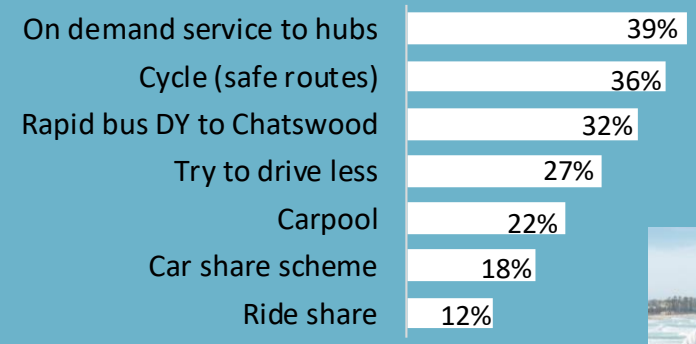
20% If easier to get to

17% Parking at hubs

Priority should be given to:



Likely to use:



Warringah Traffic Survey: Manly/Fairlight

Before CV-19,

73%

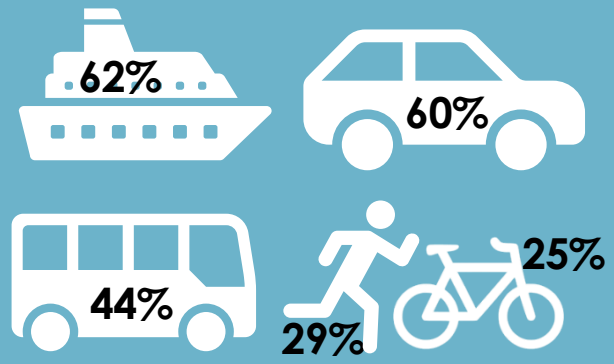
used public transport weekly+

Biggest concern about traffic congestion in Warringah:

Waste of time

40%

Intended travel modes:



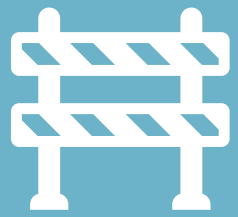
Why drive?

- More convenient 51%
- Faster 32%
- Safer with CV-19 25%
- After work activities 19%
- Kids drop/pickup 12%

Traffic Hotspots

Residents in **Manly/Fairlight intend to use ferries and their car** when things get back to normal. They are the highest users of PT before CV-19 and the top intending users of ferries & cycling. Their main reason for driving is convenience. Their top traffic hotspots are Military Rd and Spit Bridge, although for some, traffic starts earlier in their journey on Sydney Road or Pittwater Road. This group is the second strongest supporter for prioritising the **Northern Beaches Tunnel**. Better connections would help this area use PT more – 37% say they are likely to use an **on-demand service to hubs**. Another opportunity for this area is **bike paths** – it's their top priority and likely to be used by 37%.

Reducing barriers to PT:



34% Better connections

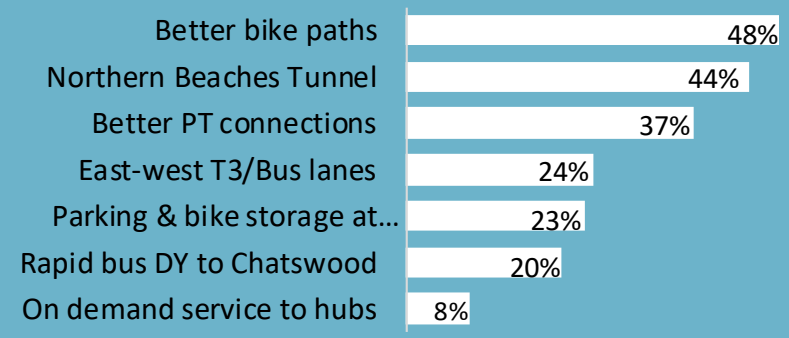
33% If it was faster

21% More frequent buses

13% Parking at hubs

10% If easier to get to

Priority should be given to:



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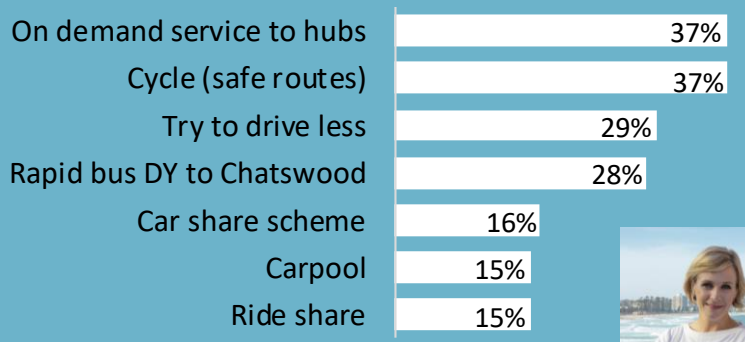
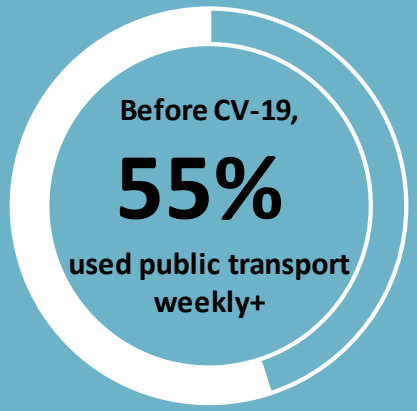
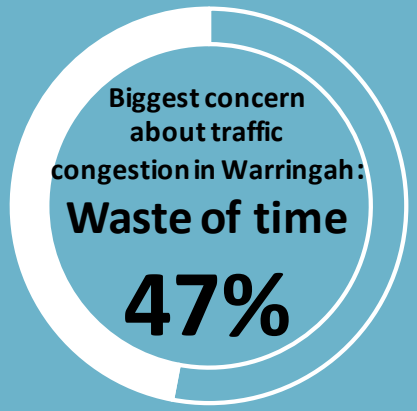
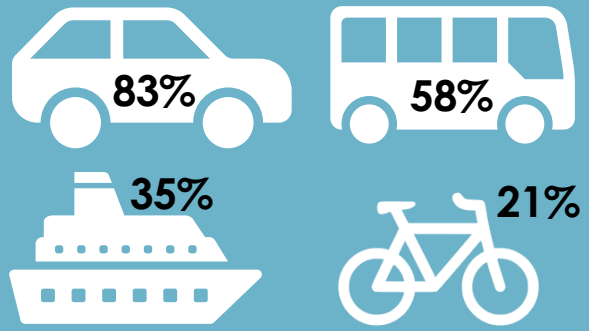


Warringah Traffic Survey: Beaches (Queenscliff to Dee Why)





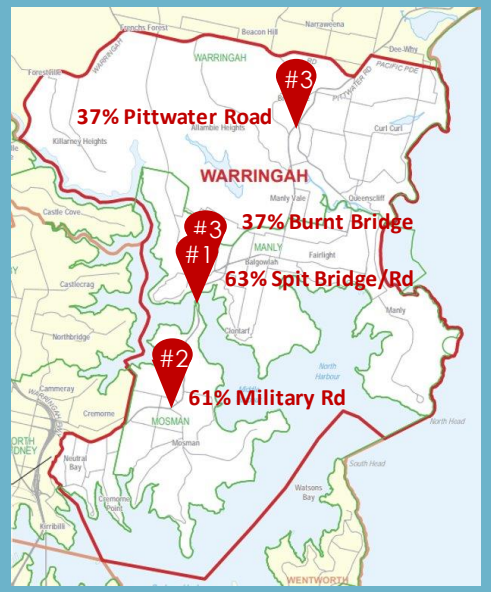
Intended travel modes:



Why drive?

- More convenient 55%
- Faster 38%
- Kids drop/pickup 17%
- After work activities 13%
- Safer with CV-19 12%

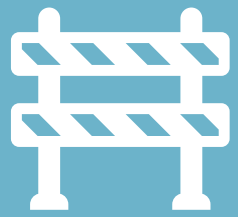
Traffic Hotspots



83% of residents from Queenscliff to Dee Why **intend to use their car** when things get back to normal, the highest in Warringah. Their top traffic hotspots are Spit Bridge and Military Road, although for some, traffic starts earlier in their journey on Pittwater Road or Burnt Bridge Deviation.

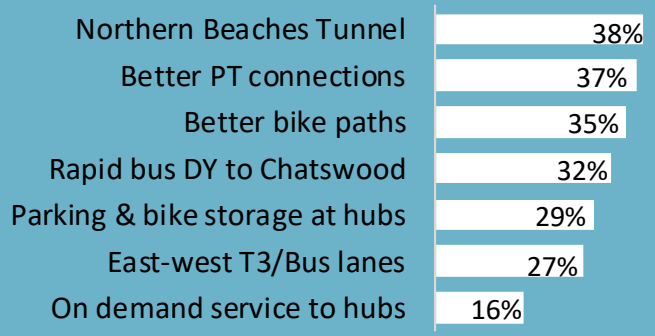
Beaches residents are most likely to use a **rapid bus service from Dee Why to Chatswood** of all Warringah areas and are most likely to use an **on-demand service to hubs**. However, they prioritise the Northern Beaches Tunnel (a long term solution) over the rapid bus or on-demand service. Likelihood to use and priority for better bike paths lines up at #3 for this area.

Reducing barriers to PT:

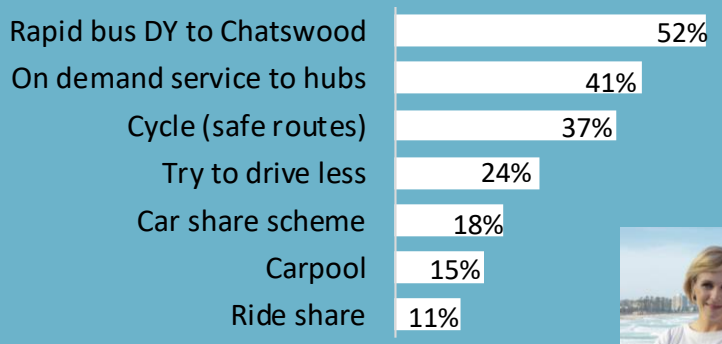


43% If it was faster
40% Better connections
27% More frequent buses
26% If easier to get to
25% Parking at hubs

Priority should be given to:



Likely to use:



Warringah Traffic Survey: Allambie/Manly Vale

Before CV-19,

46%

used public transport weekly+

Biggest concern about traffic congestion in Warringah:

Waste of time

47%

Intended travel modes:

78%

52%

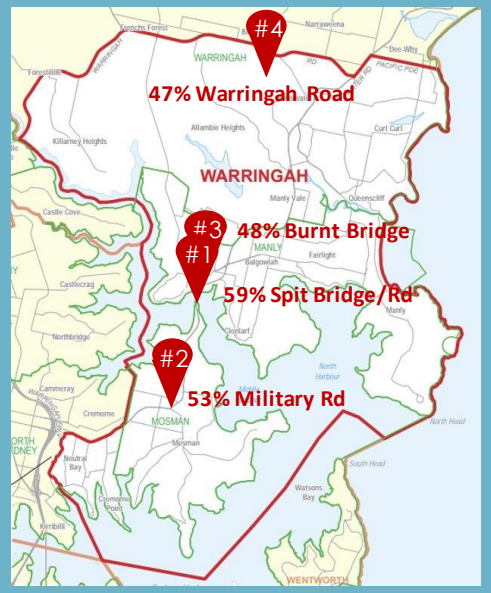
22%

18%

Why drive?

- More convenient 54%
- Faster 44%
- Kids drop/pickup 26%
- After work activities 14%
- Safer with CV-19 9%

Traffic Hotspots



Residents of Allambie/Manly Vale intend **to use their cars** when they travel, mainly for convenience. This area was most likely to mention **transport of kids** as a reason for needing to drive. Their top traffic hotspots are Military Rd /Spit Bridge/Burnt Bridge, although Warringah Road is also a hotspot for nearly half.

Allambie/Manly Vale residents are most likely to use a **rapid bus service from Dee Why to Chatswood,** with cycling a strong second option. Their main priorities are better PT connections and the Tunnel, but in the short term a rapid bus service Dee Why to Chatswood and better bike paths would help reduce congestion.

Reducing barriers to PT:

44% Better connections

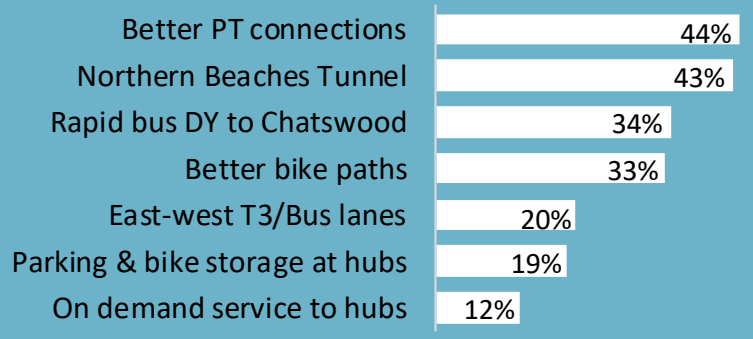
43% More frequent buses

35% If it was faster

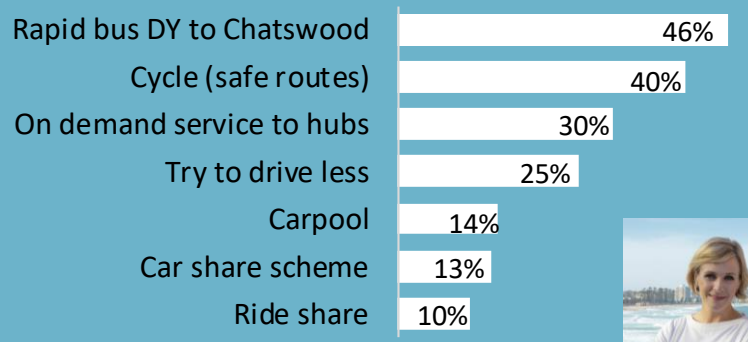
29% Parking at hubs

26% If easier to get to

Priority should be given to:



Likely to use:



Warringah Traffic Survey: Lower North Shore (LNS)

Before CV-19,

69%

used public transport weekly+

Biggest concern about traffic congestion in Warringah:

Waste of time

43%

Intended travel modes:

72%

67%

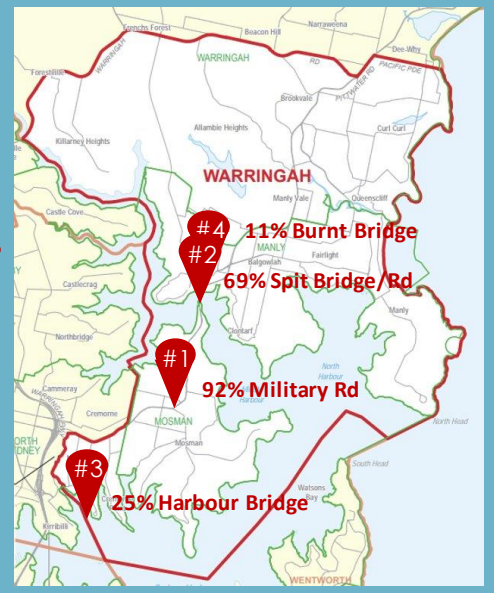
44%

32%

Why drive?

- More convenient 62%
- Faster 24%
- Safer with CV-19 17%
- Concerned won't get on PT if #pass limited 10%
- After work activities 7%
  Kids pickup/drop off 7%

Traffic Hotspots



Residents of the Lower North Shore intend **to use cars and buses** when they travel. They drive mainly because it's more convenient and some have **concerns about PT safety with CV-19**, or if the number of passengers is limited on PT due to CV-19 restrictions that they won't be able to get on. The top traffic hotspot for this group is Military Rd/Spit Bridge and they are the **strongest supporters for the Northern Beaches Tunnel.** LNS residents are less likely to use any of the suggested congestion-reducing options than other areas, with the top response being to make a concerted effort to drive less. This may be due to 32% intending to walk (highest in Warringah) and 44% intending to use ferries (second in Warringah).

Reducing barriers to PT:

32% If it was faster

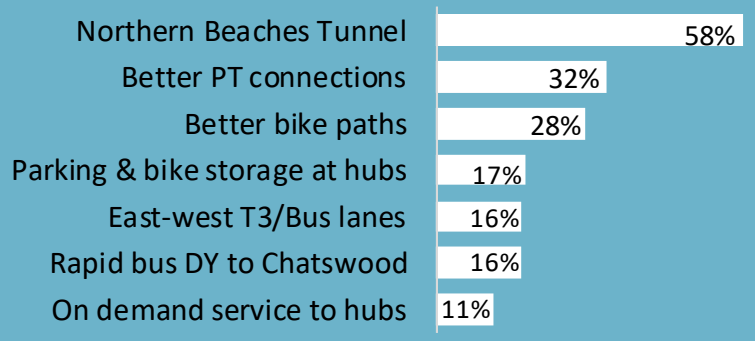
27% Better connections

25% More frequent buses

14% If easier to get to

10% If it was cheaper

Priority should be given to:



Likely to use: