

**Submission
No 123**

INQUIRY INTO IMPACT OF THE WESTCONNEX PROJECT

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Date Received: 27 August 2018

Submission to Parliamentary Enquiry about the WestConnex Project.....including the Cross Harbour Tunnel

1. Who is making the submission

I am a private citizen and resident of Rozelle. I live in close proximity to the Rozelle Goods Yards and will be impacted significantly by the construction of the WestConnex stage 3 and the Western Harbour tunnel projects. In fact, I have already been affected even though the project is not yet formally underway.

2. General

I really welcome this enquiry into a project that has been shrouded in secrecy and has seen far too many parties who have been involved in the decision making process and then re-emerge as employees or advisors or shareholders with private operators who stand to gain financially from the projects. There has been a deliberate lack of transparency in the processes and some pretty bad behavior ...especially in regard to property acquisition.

I will follow the order of the terms of reference with my subsequent comments and suggestions.

3. Re para (a) of the terms of reference concerning cost benefit ratio of the projects.

It is reasonable to expect that the business case for a massive expenditure of more than \$20 billion should have been thorough, transparent and show equally massive net benefits.

At a minimum a business case should have covered the elements outlined in the table below.

Basic elements of a business plan and how WestConnex sits re Rozelle

Element	Sub elements	Mentioned in business plan?	Issues arising
1. Defining the issues requiring action	Traffic congestion in Western Sydney	Yes	Radial freeways bringing increased traffic to CBD will always increase congestion.
	Moving goods to and from Port Botany	Yes	The Port Botany extension has been an afterthought.
	Improving access for vehicles to Sydney airport	Yes	The Airport extension has been an afterthought.
2. Direct cost to community	Homes and business acquisition; Noise, dust, construction traffic, congestion during construction, heritage issues,	Yes	Acquisition process has been mean (rather than generous), insensitive, and ham fisted. Other elements handled better.
	Pollution from 4 unfiltered ventilator shafts	Partly	The claim that there will be negligible impact from 4 unfiltered stacks venting 15km of tunnels into Rozelle has not really been demonstrated or proven.
3. Indirect costs to community	Loss of community	No	This is a real community cost which has not been factored into cost-benefit.
	Increased travel times for	No	Rozelle residents face up to probably

	local people	No	more than 10 years of construction with disruption to roads and community. This has not been factored into the cost-benefit.
	Pollution and health issues		Increased deaths and cost of respiratory problems have not been included in cost-benefit.
	Potentially 12 years of construction		The impact on the community of "construction-fatigue" with continuous noise, dust, disruption have not been costed.
	More congestion in our area with WestConnex completed than without WestConnex.		The fact that the Rozelle Community will have more congested connecting roads after WestConnex than without it.....has not been included in the cost benefit analysis.
4. Direct benefits to the community	Connectivity to other parts of Sydney	Yes	This should be a benefit but it comes at the cost of increased congestion on all the main exit roads out of Rozelle. Plus massive increases of traffic flowing through/under Rozelle and venting all their exhaust in Rozelle.
5. Indirect benefits to the community	Increased parkland	Yes	Though it remains to be demonstrated that the parkland can actually be used with 3 large ventilator shafts exhausting carcinogens and respiratory causing particles within the park.
	Less through traffic on Victoria Road	Yes	This should be a benefit, though actual traffic flows, induced because of tolls, may be different to what is predicted.
	Potential for bike lanes	Yes	This should be a real benefit.
6. Opportunity cost of WestConnex	What other public projects could have been funded with \$20 billion	No	The fact that \$20 billion could have been invested in other projects such as: rail, education, hospitals, research, power supplies, communications was not considered. The cost benefit from some of these might have been greater than WestConnex. (And, in the case of rail, might have solved the congestion issues in the long term)
7. Alternatives to WestConnex	Massive increase in rail linkages	No	The consideration of rail as an alternative was apparently deliberately excluded under instruction from the Minister's office. This would seem to be irresponsible at best...and certainly not in the best interests of the travelling public.

The WestConnex Updated Strategic Business Case (Sydney Motorway Corporation 2015) appraised the economic benefits of WestConnex by considering the following parameters:

- Direct costs to the community
- Direct benefits to the community
- Indirect benefits to the community

However, there are some glaringly obvious omissions from this list as shown in the table above and that is that:

- Indirect costs to the community.

- The opportunity cost of WestConnex
- And Alternatives to WestConnex

were not taken into account.

It was simply **assumed** that building more freeways would reduce congestion. Whereas international experience (such as in Los Angeles) plus the David Kirby enquiry published in 1081 (The Kyeemagh-Chullora Road Inquiry), concluded that radial freeways into the CBD inevitably led to increased congestion on the roads. The business case for WestConnex was completed, more or less after the decision to proceed had been taken and only then was it appreciated that it would cause unacceptable levels of congestion at Anzac bridge, Sydney airport and Port Botany.

So further freeway/tunnels are being built to try and reduce the congestion actually generated by WestConnex. (The Western Harbour tunnel, The Iron Cove tunnel, The Northern Beaches tunnel, the southern extension of the M5 to Port Botany and Sydney Airport.

4. Re: Para (b) of the terms of reference: the cost of WestConnex project, including the size and reasons for overruns

The main issue that I have with the cost of the WestConnex project is that it is huge by (Around \$20 billion and likely to increase to much more than this), and the opportunity cost of this huge investment was not taken into consideration. Investment of this amount of money into a more intensive, networked, public rail might have given much better public outcomes.

5. Re Para (c) of the terms of reference: consideration of the governance and structure of the WestConnex project including the relationship between Sydney Motorway Corporation, Roads and Maritime Services, the Treasury and its shareholding Ministers

Governance of the WestConnex project has really been an exercise in obfuscation. Creating entities which are supposedly at arms length from the Minister to shield the project from rigid scrutiny and put it beyond the reach of freedom of information requests is really a dereliction of duty by the government. It's a mean and tricky approach to government and the opposite of transparency which should be the hallmark of good governance.

In addition, the current arrangements don't seem to be working very well anyway. As has been obvious with the eastern light rail project, the local utilities such as water, electricity, gas, telecommunications, can be a cause of great delay and disruption to a project and WestConnex is beholden to these same Utilities in completing it's work.

In addition, whilst it makes eminent sense to utilise White Bay for the removal of spoil and for a staging ground for heavy vehicles, WestConnex had no jurisdiction to do this....at least initially. The cross-portfolio issues do not seem to be managed well.

So it seems to me that there would be a lot of sense in having some over-riding authority (maybe in the Premier's Department) that could actually cut-through these sort of jurisdictional disputes and squabbling and ensure that sensible decisions are taken rapidly and acted on. And there should be some obligations on utilities to respond to needs in a timely way.

6. Re Para (d) of the terms of reference: the compulsory acquisition of property for the project

The compensation process is basically unfair. Initially, it seemed that my own home was in the firing line to be resumed so I have an intense interest in the acquisition process. Prices of houses that appeared to be affected dropped by approximately 15% simply through the announcement of the proposed interchange. The subsequent valuation was made on these reduced values.

Residents who have homes resumed, not only lose their home but their neighbours, their local support networks and basically, their community. Their children probably have to change schools, there is psychological trauma and stress as well as financial stress. In addition there is the time and cost involved in packing and unpacking, the time spent looking for alternative accommodation, alternative schools, re-building networks etc.. These are real, indirect-costs to the community and borne by individuals, that were never taken into account in the business case.

When I looked at what I might get by way of official compensation it was insufficient for me to be able to buy back into Rozelle. Being paid market value (in a depreciated market) does not compensate for this loss nor the inability to buy elsewhere in Rozelle.

Residents were unable to buy elsewhere in Rozelle not only because of the devalued price paid for acquisition of their own home but, because of increased competition for housing and prices elsewhere in the suburb where prices continued to rise unimpacted by WestConnex. The \$15,000 (maximum) solatium payment was patently inadequate.

My son, would be uprooted from his friends and school and be forced to re-start somewhere else. Not easy!

A fairer system would be to increase the compensation for displaced residents by paying the valuer's price plus, say, 15%. This would go a long way to offsetting the perceived unfairness of the compulsory acquisition and the costs associated with the upheaval. In the total scheme of things, the additional cost would be relatively modest (Say 500 homes @ \$1M average price.....total compensation under the current system would be \$500M and an additional 15% would only be \$75M yet would it totally defuse most of the angst surrounding compulsory acquisition. More to the point it would generally be perceived as fairer). For Rozelle, if say 100 homes were demolished, the additional payment would only be about \$15 M. (Probably less than the legal costs of defending the Valuer General's decisions). One may argue about the 15% ...maybe 20% would be more realistic compensation. I think I would have needed the valuer's price plus 15% to be able to buy back into the suburb at a similar level ...and that

leaves no compensation for inconvenience and disturbance and moving. Anyway, it is doubtful that a valuer can estimate the market value (at auction for example) to an accuracy greater than 10-15%. Hence the unfairness of the current process. It has been both unfair and seen to be unfair and has been administered in a cruel and ruthless manner.

Nor was the process of handling the compulsory acquisition well handled from a personal relations perspective. To be told that your home is to be destroyed (via a pro-forma letter addressed to "Dear resident") is probably one of the most distressing events that can happen. As Mike Baird, the Premier, noted, "the process has not been well handled to date". WestConnex might do well to employ some human relations experts to improve the whole process.

This unfair process has generated much of the opposition to WestConnex and a more generous approach could have made the whole process much smoother for all concerned. It might have even been cheaper. Surely NSW can do better.

7. Re Para (e) of the terms of reference: the recommendations of the Audit Office of New South Wales and the Australian National Audit Office in regards to WestConnex

The NSW audit specifically did not examine the merit of the project or whether it represented value-for-money which seems to be a major shortcoming.

But with the things that it did review such as the business case and governance it found significant shortcomings. In particular they reflect that the Major Projects Assurance Framework was not implemented effectively nor as designed.

The Commonwealth audit said a decision in May 2014 by the then Abbott government to pay the \$500 million in advance led to the motorway project being approved without "any documented analysis and advice to ministers that the statutory criteria for giving such approvals has been met".

Thus, both official auditing bodies have found major deficiencies in the governance of the project.

8. Re Para (f) of the terms of reference: the extent to which the project is meeting the original goals of the project as articulated in 2012

The NSW Government's objectives for WestConnex were:

1. Support Sydney's long-term economic growth through improved motorway access and connections linking Sydney's international gateways and Western Sydney and places of business across the city;
2. Relieve road congestion so as to improve the speed, reliability and safety of travel in the M4 and M5 corridors, including parallel arterial roads;
3. Cater for the diverse travel demands on these corridors that are best met by road infrastructure;
4. Create opportunities for urban renewal, improved liveability, public and active transport improvements along and around Parramatta Road;

5. Enhance the productivity of commercial and freight generating land uses strategically located near transport infrastructure;
6. Fit within the financial capacity of the State and Federal Government, in partnership with the private sector; and
7. Optimise user pays contribution to support funding in a way that is affordable and equitable.

Objectives 1 and 3 are really outcomes of achieving goal 2. That is, reducing congestion. However, from the perspective of a Rozelle resident such as myself it is disappointing to note from the *M5-M5 Link Environmental Impact Statement* (Page xii) that congestion on;

- Anzac Bridge,
- On Johnson Street in Annandale,
- on the Western Distributor
- and in Drummoyne

will actually be worse on completion of the project than it would have been without any of the WestConnex infrastructure. These are all routes that are utilized by resident and by students in getting to and from the three campuses of Sydney Secondary College.

So, from our perspective, the objective of reducing congestion will not be met. It will actually make life more difficult.

And, as the David Kirby enquiry in 1981 reported, building freeways will not solve congestion problems; it will just defer them and/or relocate them.

I have no comments on the other objectives apart from observing that, at it's first test about objective 7 (user pays....presumably via tolls), the Government removed the toll from the first stage of the M4 because of drastically reduced usage due to the tolls).

9. Re Para (g) of the terms of reference: the relationship between WestConnex and other toll road projects including the Sydney Gateway, Western Harbour Tunnel, F6 and Beaches Link

One has to seriously question the quality of the thinking behind WestConnex when it has to be supplemented by a whole host of extensions to try and reduce the congestion that the original plan will deliver.

So, for example, the Western Harbour tunnel is an addition to try and reduce the congestion that will result on Anzac bridge from the additional vehicles brought to the city by WestConnex.

And the Sydney Gateway is an addition to try and reduce the congestion caused by WestConnex around the airport but also to deliver on the original objectives of providing better links with Port Botany and the airport.

The Iron Cove tunnel...relatively short....does make sense in that it should reduce the through traffic via Rozelle but, for traffic travelling North West, congestion

will simply move to Drummoyne. Hence, we can expect an RMS solution to extend a tunnel under Drummoyne.

Why was extensive rail not the first priority? This could have massively reduced Commuter traffic by providing a sensible and economic alternative to driving. And it could have moved vast volumes of freight from Port Botany and airport to the warehouses and distribution centres in the mid west of the city.

And why are we proposing a freeway to the northern beaches but no rail link. Surely a northern beaches rail link would be more viable than a freeway which will simply induce at least 80,000 new residences in the area leading to increased congestion on the very same freeway.

Why is it impossible to get to any beach from the western suburbs by rail (with the exception of Cronulla)? So any family wanting to spend a day at the beach is forced to drive.....pay tolls and add to road congestion.

As I live in Rozelle, I anticipate that we will be subject to the collective exhausts from a huge number of vehicles per day travelling from the Hills district, the Northern beaches, the Blue Mountains/Penrith area, Liverpool, Port Botany, Wollongong, the Eastern Suburbs, the Sydney Airport. All are now being set up to pass via Rozelle as they move from one area of the city to another. WestConnex, estimates 100,000 vehicles per day but predictions on tunnel usage have notoriously been very wrong in the past. Maybe, it might rise to 250,000 per day. And all the inbound tunnels (to Rozelle) will vent their exhausts into Rozelle.

And one thing is certain, all these exhaust fumes plus rubber particles etc. will not improve the air quality in Rozelle....which is already among the worst in Sydney.

WestConnex and all its extensions does nothing to reduce the number of vehicles actually on the road. Public transport systems would do this.

10. Re Para (h) of the terms of reference: the circumstances by which WestConnex and the Sydney Gateway were declared to be separate projects in 2017

The project evaluation by Infrastructure Australia in April 2016 suggested that "the problems sought to be addressed by the project have changed in scope. As a consequence, the scope of the project has evolved. Scope additions since 2012 include greater connectivity to Port Botany and future connections to the proposed Southern Connector and across the harbour.

The evolution of the project's scope emphasises the importance of comprehensive problem definition and long-term planning in order to mitigate cost, scope and stakeholder engagement risk.

The business case for WestConnex, released in November 2015, stated quite clearly that that the gateway "falls as part of the stage two project" and will open "at the latest" by 2023. Yet in August 2017, the WestConnex Minister, Stuart Ayres, told Parliament that the gateway was not part of WestConnex, and that

the \$16.8 billion for the toll road included an "allocation" of \$800 million for the connection to the airport. Though there appeared to be obfuscation over whether the \$800 million was additional monies needed for construction or was part of the \$16.8 billion. It seems likely that it is additional funding.

In other words, the WestConnex project was not scoped or planned properly or effectively from the start.

11. Re Para (i) of the terms of reference: the cost of the project against its current valuation as determined through the sale of the Sydney Motorway Corporation and whether it represents a good investment for NSW taxpayers

Of the 99 kilometres of toll roads in Sydney, 95 kilometres are either majority or half-owned by Transurban. These include the M2, the M7, the M5 South West, the Eastern Distributor, and the Lane Cove and Cross City tunnels. The Harbour Bridge and Tunnel remain the only ones Transurban does not have its hands on. By late next year, Transurban will be operating Sydney's next toll road, NorthConnex, a nine-kilometre tunnel between the M2 and the M1.

Australian Competition and Consumer Commission chairman Rod Sims says there has been concern expressed that, if Transurban buys WestConnex, it "will get the inside running on other projects, particularly those self-initiated projects (such as NorthConnex). which are being increasingly accepted by governments".

Effectively, if Transurban is allowed to control WestConnex, then they are in a monopoly position as far as motorways in Sydney are concerned. Their rather glib denial that because they don't have the power to determine tolls they are not a monopoly, should not be taken at face value. We should take a lesson from the privatisation of the electricity grid where private bidders "gold-plated" the poles and networks and then bid up the price of power. The same sort of behaviour can be expected from a monopolist controller of toll roads. No matter how inefficient they are they can claim that they need to charge higher tolls.

So at a cost of around \$20 billion, plus tolls per km travelled, the motor ways are going to be very expensive and the greatest real issue is that we will never know whether investment in something else might have been a better deal for the public.

12. Re Para (j) of the terms of reference: any other related matter.

12.1 Ventilator shafts

I live less than 300m, from the three huge ventilator shafts proposed for Rozelle goods yards and about 1000m from the Iron Cove ventilator shaft. These vents will be pumping nitrous oxide, sulphur dioxide, carbon monoxide, benzene, xylene, toluene, and other organic compounds, and small particles into air above the Rozelle and my home will be exposed to an increase in ambient toxic gases. In still days we may be exposed to spot levels of toxic pollutants that are well above ambient average levels. All of these pollutants can contribute to respiratory problems and some to cardiovascular problems and some are known

carcinogens. There is no safe lower level for exposure to small particles (PM_{2.5}) which are a known carcinogen or for the even smaller microparticles which can enter the bloodstream via the lungs.

These ventilator shafts are not going to **improve** air quality. They are concentrating pollution and pumping it from elsewhere, into Rozelle. They can only make air quality worse. Perhaps much worse. This is fairly obviously an INDIRECT COST from the WestConnex project.

At a bare minimum the **absolute** levels of pollutants in the playing fields and the area around my home needs to be monitored on an on-going basis ...over a period of several years..... to take into account different wind, temperature and weather patterns and to provide data which can be used to make decisions about the risk factors involved in living locally. This does not mean calculations based on mathematical models but actual measurements. It is doubtful if, anywhere in the world, there are three co-located ventilation stacks exhausting pollutants from 15km of tunnels, so data and mathematical models from elsewhere are irrelevant.

12.2 Timing of the Western Harbour tunnel and Rozelle dive site

It is currently proposed to have a dive site where the Tigers Club used to be on Victoria Road, Rozelle. The proposal is to drive a tunnel north east along the Balmain peninsular from this dive site and to remove spoil from this site in the heart of Rozelle which is only 50 m from Rozelle Primary School and 300 m from the Balmain Campus of Sydney Secondary College.

It is also proposed to commence the Rozelle Goods Yards interchange before commencing on the Western Harbour tunnel. (Presumably because planning and approvals are much further advanced for the interchange). This construction methodology and timing leaves a lot to be desired. It will bring huge numbers of double B trucks into the heart of Rozelle...which is already a traffic bottleneck. It will bring additional dust and noise to a sensitive receptor site. And spoil will have to be lifted some 85 m from the tunnel level to the surface for disposal. (This will require massive amounts of energy).

It seems to me that a simple alternative would be to complete the (already approved) stub tunnels for the Western Harbour tunnel as a first step from the Rozelle interchange instead of leaving them to the very end.

These stub tunnels could then be used for access and spoil removal for the Western Harbour tunnel. The spoil could just be driven out via very low gradients to Rozelle Goods Yards. (With the consequent savings in energy).

This would avoid all the problems of having a dive site next to a primary school and large vehicle movements in the narrow streets of Rozelle.

It is true that there are likely to be a number of projects all exiting spoil via the Rozelle Goods Yards (The M4-M5 tunnel, the Rozelle interchange, the Iron Cove tunnel and the Western Harbour tunnel) so there is potential for some messy

traffic movements in Rozelle Goods Yards. But this really just requires some management organisation to manage traffic flows for the three or four main contractors who will be using White Bay as a holding yard anyway.

12.3 Consultation and planning by WestConnex

Given the brief that WestConnex were allocated by the government; viz:

- Build stage 3 of Westconnex with connections between the M4 and M5 and connections to Anzac Bridge and Victoria Road.
- Add-in the stub tunnels for future connections to an under the harbour tunnel to Artarmon and Northern Beaches
- Add-in an additional tunnel from Iron Cove Bridge to the Rozelle Goods yards
- Provide interconnections between all of these
- Turn Rozelle Goods Yard into recreation space

Then the Concept Design was both responsive to community input and thoughtful and seems to deliver on most of the requests that I personally included in my wish list. It is certainly a complex set of projects with massive engineering and social challenges.

IMPORTANT THINGS THAT WERE INCLUDED IN THE CONCEPT DESIGN

- Easton Park is left intact.
- Rozelle Goods Yards is converted into park and recreation areas.
- No new residential areas are slated for resumption and demolition and it seems to minimize destruction of residences (except on Victoria Road near Iron Cove Bridge).
- The main roads and most of the connecting roads have been placed underground.
- Some cut and cover techniques are to be employed for some roads within the space of the Rozelle Goods Yards.
- The tunnel layout takes advantage of the local topography and sandstone and has been moved further south and west from some of the original proposals.
- Rozelle Goods Yard has largely been preserved as public space by placing much of the intersection underground. This is a very significant improvement.
- A commitment was given to control work hours and consequent noise levels to reasonable times. Plus, recognition is given to reducing the impact of noise and dust on residents during the construction phase and to preserving various parts of the heritage and environment.
- Acoustic sheds to help minimize noise from tunneling.
- The Rozelle Goods Yard will be used as the main construction site.
- Provision is to be made for some level of coordination with utility providers
- A commitment has been given that Lilyfield Road will not be used as a haulage route for trucks.

- Access is supposed to be provided for haulage trucks direct to the Western Distributor from Rozelle Goods Yard and this is sensible.
- Attention has been paid to drainage from the Rozelle goods yards and to minimize uncontrolled discharge into Rozelle Bay.
- Pedestrian connections have been provided between Rozelle and Annandale/Lilyfield.
- Provision is made for a dedicated bike route through the Rozelle Goods Yards to Anzac Bridge.
- Some provision has been made to retain interesting historical remnants of the Rozelle railways.
- Properties close to tunnels will be given the opportunity of having before and after property surveys.
- At Iron Cove, the Bay Run has been preserved.
- Traffic through Rozelle, via Victoria Road should be reduced by the tunnel to Iron Cove.

There have since been some further commitments that:

- Spoil would not be transported along the Balmain Peninsular
- White Bay would be utilized as a staging post for heavy trucks
- Transport by water would be utilized for the cross harbour construction activity.

So good marks for all of the above.....provided that this is translated into reality by the various sub contractors as the plans and proposals are varied. (And this is a serious concern if contractors are given much leeway to change the concept design).

12.4 Construction of concrete tunnel sections in White Bay

One recent development that seems to be a serious fault is the proposal to dredge White Bay of around 500,000 tonnes of (polluted) sediment; dry it on the pavement areas of White Bay, (with the consequent issues of stench and dioxin laden dust) then load it onto barges and dump it at sea. This is to allow for the construction of the large concrete tunnel sections which will later be floated into another trench dredged in the harbour sediment and joined up to make the cross harbour section of the tunnel.

There will be serious problems with pollution from dioxin contaminated sediments being stirred up.....marine life and seagrass will be disturbed and the Dawn Fraser pool is likely to be forced to close.

A simpler solution would be to adopt the procedure used for the existing cross harbour tunnel and that is to construct the sections in Port Kembla and bring them by barge to be dropped into the trench. At one stroke all the issues of dredging and disposing of 500,000 tonnes of polluted sediment are eliminated. I understand that Port Kembla would welcome the work and are already equipped to handle it.

This still leaves the problem of dredging the trench. It is suggested that sediments should be pumped wet (not dried-out locally) onto barges and taken to sea and dumped at an approved location.

Pollution levels in the water, and atmospheric stench must be continuously monitored by a third party and the data made available online to all interested parties. When guidelines are exceeded, work must cease until remedial action is taken. But who is going to police this?

12.5 Access for traffic from Drummoyne to cross harbour tunnel.

There appears to be no provision for traffic coming from Drummoyne to access the Western Harbour tunnel directly. I understand that access to the Western Harbour tunnel for traffic from Drummoyne will be via Victoria Road and the Western Distributor? This seems crazy. I can understand the imperative to encourage vehicles from the west to travel to the north shore via Burns Bay Road etc. But many (especially those in Drummoyne) will not want this option. It is not an attractive option with many traffic lights to negotiate. By not providing direct access to traffic from Drummoyne to the Western Harbour tunnel, traffic will be forced to crawl through Rozelle and about 8 sets of traffic lights to access the Western Harbour tunnel.

This negates to a significant extent the benefit of having a tunnel to Iron Cove Bridge and reducing through traffic in Rozelle from Drummoyne and further west.

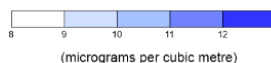
Presumably user pressure will emerge to provide tunnel access to the Western Harbour tunnel from Iron Cove Bridge so why not provide for it now (when the tunneling equipment and logistics are on site) instead of re-engineering the project in five year's time?

12.6 Air Quality

12.6.1 Air pollution maps and the concentration of pollution

According to the Senior Environment Specialist (Air Quality) Roads and Maritime Services², the following diagram is indicative of the current levels of pollution in the inner city and is concentrated along the major roads. Pollution due to particles PM_{2.5} are indicated below as a proxy for all the types of pollution.

Modelled annual average PM_{2.5} concentrations 2015



Very high concentrations are noted around Strathfield and in Rozelle around Victoria Road and the Western Distributor.

Unfortunately, the Concept Design is proposing four unfiltered stacks to be placed in Rozelle which, potentially, will exhaust the fumes and pollutants from;

- the whole of the tunnel from St Peters to Rozelle, (approx. 4.2 km)
- the cross-harbour tunnel travelling south, (approx. 5 km)
- the tunnel from Haberfield to Rozelle (approx. 3.3 Km)
- and the tunnel from Iron Cove to Rozelle goods yards (approx. 1.1 Km)
- Plus the tunnel from Rozelle goods yard to Iron Cove (1.1 km) will be exhausted via the vent in Rozelle near Iron Cove

This represents something like the concentrated pollution from some 15 km of freeway (much of it 4 lanes) all being poured into Rozelle. Think about all of the the blue areas in the map above being forced into the Rozelle goods yard....that's more or less what we are facing.

And, add in the pollution from cruise ships running their engines continuously in White Bay. Even with low sulphur fuel, this is probably as bad as one of the vent shafts. This is a cross-portfolio issue which Ministers seem to dodge. It impacts on the WestConnex project...and on residents who are exposed to these multiple, known, sources of human-made pollution.

12.6.2 There are a number of concerning aspects about the design of the ventilation system:

- These are very long tunnels by world standards
- There are complex off-takes and linkages underground

- Are the engineering models good enough to safely predict what is going to happen? (They were clearly not good enough for the M5 tunnel which was much more straightforward).
- With longitudinal ventilation over the length of those tunnels, I assume, that friction with the forced air flow will become a major factor....thus forcing up the size and cost of the jet fans. Are we going to see a drive for economies in running these jet fans in the short term or when a private buyer takes over? What protection or assurances do we residents have?
- Has some form of transverse ventilation been considered? This would also seem to offer some safety measures where there is mechanical failure with a section of the fans.
- What level of redundancy is going to be built into the ventilation systems. What safety features? What happens when there is a fire or a bomb deep in one of the tunnels? What happens when there is an accident near one of the exits and there is 3 km x 4 lanes of traffic banked up underground?
- I assume that there is some level of redundancy built into the ventilation shaft system but it hasn't been publicised. It should be publicised.

12.6.3 What happens on calm days?

EPA data show relatively low average wind speeds in Rozelle of 1.8 m per second and a 14.6% incidence of calms. That is, on the equivalent of 54 days a year the air is still and you cannot rely on atmospheric turbulence to mix and disperse the air from the ventilation stacks. This means that this toxic mix will spill out into a very localised area around the stacks.

12.6.4 Where does the pollution go?

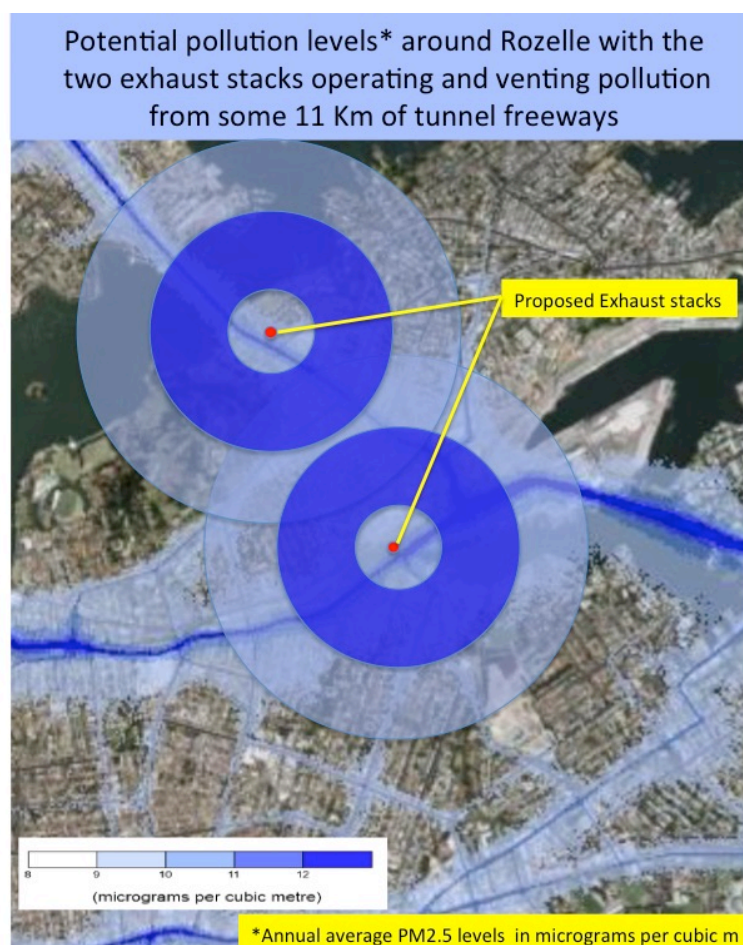
Longley and Gustavo Olivares (2010)¹ in a research report on tunnel ventilation in New Zealand conclude: *However, stack and especially portal emissions can lead to highly localised 'hotspots' of increased concentrations. It is quite possible that road tunnel emissions can lead to localised breaches of the National Environmental Standards for PM₁₀ and NO₂ around stacks and portals, as well as exceedences of Regional Air Quality Guidelines.*

This is critically important if these locations coincide with residences, businesses or any other land-use in which people are likely to be exposed.

In such locations where venting of internal tunnel air may compromise external air quality in an exposure-sensitive environment great care needs to be taken over the rate of tunnel ventilation. In these locations we recommend that dispersion modelling is first employed to identify potential problems and locations of possible 'hotspots'. We also recommend that post-opening, air quality monitoring should be conducted in the identified locations for at least a year. After that period sufficient data should have been collated to a) identify and implement any necessary mitigation options, b) validate (and adjust if necessary) the dispersion modelling such that modelling can henceforth replace the monitoring, or c) satisfy all parties that there is no external air quality issue related to the tunnel.

I understand that when particulate matter or other pollutants are discharged through the exhaust shafts that the majority of the pollutants descend in a radius

of about 300-600 m. At least, this was the case for PM₁₀ and NO_x with the M5 stack. There is still significant fallout over a much greater radius than this. Thus we will have something like the following situation in Rozelle after the exhaust systems are operating.



I live about 300 m from the proposed Rozelle goods yard's stack and about 150 m from the Victoria Rd intersection with the Western Distributor. The impact of the two sources of pollution are cumulative so that I and my neighbours may be exposed to pollution level of about 12 (from surface roads) + 12 (from the ventilation stacks) = 24 $\mu\text{g}/\text{m}^3$ PM_{2.5} especially on calm days. And because these are averages they say nothing about PEAK levels of exposure around peak hours and when there might also be atmospheric pollution from fires, dust storms or temperature inversions. Clearly peak levels will be much higher than the averages. Perhaps 10 times higher.

There is no safe level of exposure to PM_{2.5} particles or smaller particles. To claim that the exhausts meet international standards is dissembling. To protect our health the levels should be zero. International standard levels have been dropping continuously for 20 plus years and are likely to continue to drop as knowledge increases.

The UN's World Health Organisation has current guidelines recommending that annual exposure be limited to 10 $\mu\text{g}/\text{m}^3$ for PM_{2.5}. Australia has opted for 8

µg/m³. However, we should not be patting ourselves on the back for having tighter standards than other countries or because Paris has higher background pollution than Sydney. European studies show that each 5 microgram per cubic metre increase in PM_{2.5} concentration was associated with a 7% increase in mortality risk (hazard ratio [HR] 1.07, 95% confidence interval). Every increase of five micrograms per cubic metre of PM_{2.5} drove the risk of lung cancer up by 18 per cent.

"We found no threshold below which there was no risk," said Ole Raaschou-Nielsen from the Danish Cancer Society Research Centre in Copenhagen. "The more the worse".

Short term exposure is also bad. Pope et al., 2016³, has shown that even in healthy individuals, short episodic exposure to PM_{2.5} induces endothelial injury and inflammation which are likely precursors to cardiovascular events. The use of averages hides the damage done by peak events. On average, the hotplate on my stove is a modest 20 degrees C. However, many times it's running at 250 degrees and that's when you can get burnt.

So accepting a level of 24 µg/m³, or anything like it, for the residents around Rozelle Goods Yards and maybe around the other ventilation stacks is clearly unacceptable with today's knowledge. If the majority of the pollution is due to "natural" factors such as dust, sea salt and bush fires, it is still not acceptable to increase the PM_{2.5} load by about 50% from roads. In fact, any level above 8 µg/m³ would contravene the existing guide lines.

12.6.5 Ultra fine particles

None of these standards addresses the issue of ultra-fine particles. It is known that these have even more damaging health impacts than PM_{2.5} particles and above. However, they are not being measured so there is a high level of ignorance about what ultrafine particles will be contributing to the mix of exhaust gases descending on me and my neighbours in Rozelle. This is not good enough and steps must be taken to measure and monitor the levels of such particles on a long term basis around the ventilator stacks and where people are exposed.

WestConnex should start baseline measurement of ultrafine particles now. It would be nice to see WestConnex demonstrating world leadership in this respect.

12.6.6 Risk to residents and to government and tunnel operators

Clearly, I and my neighbours, are likely to be exposed to life threatening levels of pollution, on a long term basis, simply by living where we are. Compared to people living away from Victoria Road and the Rozelle exhaust stack, we have a 22% increase in mortality risk and more than a 54% increased likelihood of lung cancer.

Someone is going to successfully sue the State Government or the owners/operators of the exhaust stacks for illness, or for the premature death of a loved one due to these increased levels of pollution. It could be a re-run of the mesothelioma cases that will open the flood-gates for compensation both for

premature death and for illness. (Maybe 500 people x \$5m per case or about \$2.5 billion..initially and much more as the claims for damages spreads to other ventilator shafts). Filtration looks cheap in comparison.

12.6.7 Transverse ventilation

Noel Child of engineering and environmental consultancy NG Child & Associates says that the longitudinal ventilation system slated for installation in the NorthConnex project may not be the best option available, and could result in severe air quality problems for the project. What he says about NorthConnex applies equally to the WestConnex ventilation systems.

The longitudinal ventilation system currently planned employs the force produced by fans in tandem with the “piston” effect created by vehicle traffic to expel any polluted or contaminated air at the end of the tunnel. According to Child, longitudinal ventilation is a “simple and effective” method for tunnels under certain circumstances – specifically those that are not too long and are subject to comparatively low levels of traffic.

He points out, however, that the method is not well suited to longer tunnels greater than two kilometres in distance or tunnels that are subject to higher traffic levels – particularly trucks. And the WestConnex tunnels and the, planned, under the harbour tunnels are not short tunnels and they are specifically designed to take trucks off surface roads.

Child suggests that a transverse ventilation system would be far better. A transverse ventilation system involves the progressive introduction of fresh air along the full length of the tunnel. This means that fresh air within the tunnel is continuously refreshed, while contaminants and polluted air are subject to continuous removal, instead of only being discharged at one end. Has this been considered for WestConnex? It should be.

12.6.8 Filtration of air from the stacks and other measures

Filtration of these four stacks should be **re-considered**. And even if filtration is ruled out then every other possible measure should be employed to reduce the emissions, such as:

- Tree plantings. (I understand that vegetation and trees are among the best atmospheric filters....but it will be a long while before they can make any contribution). Vegetation with hairy and sticky surfaces is apparently better for filtration purposes¹. But there may be a trade off between having trees near the ventilator stacks and interfering with the natural air flows essential to get dispersion from the stacks.
- Ruthless enforcement of more stringent pollution standards on vehicles.
- A publicity campaign about the emission problems caused by wood fires, followed up by the introduction of stricter standards.
- Introduction of smaller vents along the route of the main tunnels so that the whole 15 km of exhaust is not all concentrated in Rozelle.
- Possibly the introduction of transverse ventilation for at least some of the tunnel sections.

- Differential charging for vehicles (diesel) which contribute more particles
- Legislative requirements for lower polluting vehicles and standards to enforce these.
- Real time monitoring of vehicle's exhausts in the tunnels...and inspections and fines for exceeding the standards.
- We should have tougher standards than current world's best practice because that "best practice" is just not good enough. WestConnex should be setting the best practice not cravenly shielding behind some other country's standard.
- Measures to encourage the use of electric or other non polluting vehicles. (Perhaps subsidised charging stations to allow people to travel without concern about being able to recharge).
- Monitoring levels of pollution on a real time basis and shutting down the tunnels or reducing traffic flows if pollution rises too high either in the tunnels or in the area around the ventilation stacks.
- Research into new particle eliminating technology..such as the earth air filtration systems in use on tunnels in Kyoto, Japan.
- Monitoring systems around all the exhaust stacks with continuous reports online of the pollution status so that residents can at least monitor their exposure.
- Why is the data from the WestConnex air quality monitoring station located in Rozelle Goods Yards not already being publically available online (in the same way as the EPA do)? I want to see this data.
- It would help the case for "non-filtration" if a clear document was produced which,rather than the dogmatic and blasé claim that the increase in pollution around a stack is "negligible"made a factual case. It needs to show something like: levels of background pollution, levels at the start of existing tunnels, levels in the exhaust stacks, and levels 10m, 50m, 100m, 200m, 500m, 750m, 1km, 1.5km and 2 km from the ventilation stack . It needs to show these as daily plots; as averages and as maximums attained over the year. It needs to explain how the dispersal from a stack works (with and without assisted ventilation) and be honest about situations where stacks don't perform well. I have not seen this case made clearly in existing documents. The measurements for say, at least PM_{2.5} and NO_x need to be given.
- If, as RMS, claim, pollution from tyre and brake wear etc., are going to become more significant sources of pollution in the future then WestConnex should be monitoring this pollution now to set a benchmark and should also be monitoring the levels around the stacks and in the tunnels when operating. It may be feasible to filter out some of this sort of pollution.

12.6.9 Other measures to manage exposure to tunnel pollution

A major education campaign is required to alert drivers to their likely level of exposure to pollutants in the tunnels and preventive measures they can take...such as winding up the windows of their vehicles. And discouraging motor bike riders to use the tunnels in peak periods.

Educating drivers about the cumulative effects of carbon monoxide poisoning and other exposure such as to nitrous oxides. This is important for people who might use successive tunnels ...for example the M5 then the Western Harbour tunnel.....then the Northern Beaches tunnel. Also, a delivery driver may then have to turn around and drive the same route in reverse. It takes a long time for the body to process the carbon monoxide.

12.6.10 A comment on the M5 trial filtration plant

NSW has actually installed and trialed a tunnel exhaust filtration system within the M5 East tunnel. This was installed and trialed from March 2010 to September 2011. The system was installed with the intention of improving the air quality at the western end of the westbound tunnel by reducing haze caused by particulate pollution.

The results of this trial were summarized in: *TP08: Options for treating road tunnel emissions. Author: Roads and Maritime Services. July 2014.* They conclude that: "The results of the trial indicated that the ESP removed around 65% of the PM from the extracted tunnel air at the location of the filtration plant. The Denox system removed approximately 55% of the NO₂ from the air".

Clearly there were both design and engineering operating issues experienced with the trial system. These should have been fixed and it is not legitimate to use figures obtained in what was really a "commissioning" phase to damn filtration.

However the most damning conclusion, which has been very widely cited as the main reason not to filter exhaust stacks in Sydney, was that: *PAEHolmes estimated the **health benefit** of removing one tonne of PM_{2.5} in Sydney to be \$280,000. Nearly all of the particles removed in the M5 East trial would be PM_{2.5}. Hence, the M5 East filtration trial had operational costs of more than ten times the health benefit. All the measures examined by SKM (Consultants) cost more than ten times less, and would remove substantially more PM, delivering a much greater health benefit to the people of Sydney than tunnel filtration.*

However the logic is flawed. If you are going to filter exhausts from tunnel ventilation stacks it is because you wish to reduce the dangerous pollutants both in the tunnel and in the area immediately surrounding the vents. So the trial plant actually reduced the PM by 65% and the Nitrous Oxide by 55% at the exit from the tunnel and it cost \$3.8 million (operating costs only), to achieve this. But it removed 200kg of cancer-causing and respiratory-disease-causing particles from the tunnel and immediate surrounds. Ok this sounds expensive.

But the flaw in the logic is that this cost is then compared with other preventive measures such as national emission standards on wood burning stoves. Such measures obviously have a national impact and will be very cost effective in terms of the total reduction in PM over the whole nation (or State, or, for the whole of the people of Sydney). But this is of no consolation whatever to the residents who live next to tunnel exhaust vents. How much will national standards for wood stoves reduce the PM from the tunnels? Virtually, nil. It is

confounding a debate about reduction in a localised situation (tunnel emissions) with **national** air quality.

The air in the tunnel was not being filtered to lower the background levels of pollution in Sydney's atmosphere. It was being filtered for a very localised reason.

They compare the health benefit of removing one tonne of PM_{2.5}, spread out over the whole of Sydney. The health benefit is relatively low because the (hypothetical) one tonne would be dispersed over the whole of Sydney and maybe 200m into the atmosphere. They then assume that this health benefit will be the same as removing that tonne of PM_{2.5} from a tunnel and from the concentrated area surrounding a ventilation stack. The concentration around the ventilation stack is liable to be at least 5 times greater than the average for the Sydney basin (say 25 µg/m³ compared with 5 µg/m³ but maybe 10x higher). And the health risk is 22-54 times greater for people exposed to the higher levels of pollution around the ventilation stack. The cost of one person contracting cancer is well over \$US100,000 ...maybe more than \$US300,000⁵ so if 20 people around the ventilation stacks **do not** contract cancer because of filtration then the health benefit is immediately \$A7.5million...or the twice the cost of operating the trial plant.

One has to wonder whether this flawed logic was simply mis-applied logic or was it a deliberate attempt to obscure the facts and sway the debate. Most likely it was simply looking at the data as national air quality rather than what it should bea localized measure.

The bottom line is that the trial of filtration on the M5 has **NOT** demonstrated that filtration doesn't work. Nor has it demonstrated that the costs in terms of health benefits, to the people who live near stacks, are unreasonable. Nor has it shown that other (national etc.,) measures are more cost effective. The facts have been misused and the management of the plant during the trial was obviously bumbling.

12.6.11 Background levels of pollution are no consolation.

The RMS have published data¹ which project that in the year 2031 whilst background levels of PM_{2.5} will be hovering around 8 µg/m³ the contribution from road tunnels will be miniscule.....probably less than 4%. And the maximum levels recorded will be 10.4 µg/m³. However, my understanding is that this will be overall air quality (averages) measured at various locations in the community and not in proximity to tunnel ventilation stacks or portals. For the sake of this discussion this RMS data is meaningless. It also assumes a continuing decline in auto pollution due to electric vehicles. Well, this may come ...but it may also be delayed.

13. References

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