SUBMISSION

NorthConnex SSI 13_6136

Community Against Polluting Stacks

CAPS group

1. INTRODUCTION 7
1.1 Background 7
1.2 About CAPS 7
1.3 Basic facts about NorthConnex 8
1.4 Major issues 9
2. PLANNING PROCESS 10
2.1 Background 10
2.2 Exhibition of the Submissions Report/Preferred Project Report 10
2.3 Revision of SSIAR 11
2.4 Provision of amended information without approval 11
2.5 Unsolicited bids should not be critical infrastructure projects 12
3. ALTERNATIVES TO THE PREFERED OPTION 13
3.1 Background 13
3.2 Criteria and weighting for preferred option selection 13
3.3 Flawed options development and assessment process 14
5. PROJECT DESCRIPTION 15
5.1 Background 15
5.2 Motorway maintenance activities 15
5.3 Regulatory measures for heavy vehicle diversion 15
5.4 Description of utility adjustments 16
6. AIR QUALITY 17
6.1 Background 17
6.2 Air quality modelling 17
6.2.1 Missing information 17
6.2.2 Terrain data 18
6.2.3 Meteorological data – years used for assessment 19
6.2.4 Failure to obtain site specific meteorological and ambient air quality 19
6.2.5 No calibration of meteorological data 19
6.2.6 Underestimation of “calm conditions” frequency 20
6.2.7 Ambient air quality data 20
6.2.8 Impact of entry portal air intake on dispersion of tunnel air at stacks 21
6.2.9 Entry portal locations and impact on tunnel air quality 22
6.2.10 Building wake effects 23
6.2.11 Assessment of air quality impacts at multistorey buildings 23
6.2.12 Breakdown scenario modelling 24
6.2.13 Modelling of air discharges during emergency situations 24
6.2.14 Air quality impacts from water treatment plant 24
6.2.15 Calibration of vehicle emission estimates 25
6.2.16 Vehicle emission estimates 25
6.2.17 Types of heavy vehicles 26

6.2.18 Construction air quality impacts 26
6.3 Air quality guidelines 27
6.3.1 New air quality guidelines 27
6.3.2 Exposure to Particulate Matter 28
6.3.3 Air quality pollutants 29
6.4 Air quality, meteorological and human health monitoring 32
6.4.1 Location of current air quality and meteorological monitoring stations 32
6.4.2 Health impact assessment monitoring 33
6.4.3 Air quality monitoring consultative groups 34
6.5 No filtration justification 34
6.6 Management of air quality 35
6.7 Portal emissions 35
6.7.1 Insufficient evidence of no portal emissions 35
6.7.2 Assessment of portal emissions 36
6.7.3 Monitoring of portals 36
6.7.4 Future portal emissions 37
6.8 Location of stacks and portals in residential areas 37
6.9 Proposed operating conditions 38
7. HUMAN HEALTH RISK ASSESSMENT 39
7.1 Background 39
7.1.1 Human health risk assessment exposure for silica dust during construction 39
7.2 Assessment of noise impacts on human health 39
7.3 Liability for human health impacts 40
8. VISUAL IMPACTS 41
8.1 Design of the north ventilation facility 41
8.2 Community involvement in urban design 41
9. NOISE & VIBRATION 42
9.1 Background 42
9.2 Noise monitoring 42
9.2.1 Calibration certificates for noise monitoring equipment 42
9.2.2 Assessment of existing peak noise levels 42
9.2.3 Attended noise monitoring 43
9.2.4 Suitability of monitoring period 43
9.3 Noise criteria 43
9.3.1 Existing industrial noise 43
9.3.2 Internal noise goals 44
9.4 Operational noise 44
9.4.1 Peak noise assessment 44
9.4.2 Reduction in noise study area 44
9.4.3 Operational noise assessment scenario 45

9.4.4 Cumulative operational impacts of multiple project noise sources....45
9.4.5 Outputs from noise modelling....46
9.4.6 Design of noise walls....46
9.4.7 Noise impacts assessment on two storey residences....46
9.4.8 Condition of existing noise walls....47
9.4.9 Assessment of maximum noise events....47
9.4.10 Accuracy of noise modelling....47
9.5 Construction impacts....48
9.5.1 Relocation of noise walls....48
9.5.2 Inadequate vibration assessment....49
9.5.3 Vibration impacts on heritage items....49
9.5.4 Out of hours noise assessment – M1 integration works....50
9.5.5 Construction traffic – spoil removal....50
9.5.6 Cumulative construction noise assessment....50
9.5.7 Incomplete tunnel noise and vibration assessment....51
10. HERITAGE IMPACTS....52
10.1 Acoustic mitigation works on heritage properties....52
10.2 Visual impact on heritage values....52
11. ABORINGAL HERITAGE....53
12. GROUNDWATER....54
13. PROPERTY IMPACTS....55
13.1 Background....55
13.2 Failure to address the operational impact of the project on property values....55
13.3 Failure to address the construction impact of the project on property values, rents and the ability to sell a property....57
13.4 NSW Government Profiteering....57
14. COMMUNITY CONSULTATION AND ENGAGEMENT....58
14.1 Background....58
14.2 Distribution of community updates....58
14.3 Misleading information in community updates/ web site letters to newspapers and other communications....59
14.3.1 Independent Tunnel Air quality committee and Chief Scientist....59
14.3.2 Location of stacks in residential areas....60
14.3.3 Misleading representation of M5 East trial....60
14.3.4 Wahroonga as an industrial suburb....61
14.4 Reliance on community updates to consult....61
14.5 Failure to inform community of critical state significant infrastructure status....62
14.6 Air quality forum....62
14.7 Incorrect letters to property owners regarding individual property noise treatment....63

15. ALTERNATIVE OPTIONS 65
15.1 Background 65
15.2 Selection of the preferred option 65
15.3 Safer Alternatives 65
15.3.1 M1 exit portal location 66
15.3.2 Pearce's Corner Portals 67
15.3.3 Location of ventilation stack 67
15.3.4 Lengthening the northbound tunnel and shortening the southbound tunnel 68
15.3.5 Zero grade tunnel 69
15.3.6 Cover tunnel 69
15.4 Filtration 70
15.5 Potential funding sources 70
16. PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT 71
16.1 Background 71
16.2 Precautionary Principle 71
16.3 Intergenerational equality 72
16.4 Conservation of biological diversity 72
16.5 Improved valuation, pricing and incentive mechanisms 73
16.6 Summary 73
17. REFERENCES 74
18. APPENDICIES 76

Executive Summary

NorthConnex will be Australia's largest road tunnel and one of the top five largest road tunnels in the world. At its ultimate 6 lane capacity it will carry 140,000 vehicles a day with 25% of these heavy vehicles. It will discharge unfiltered polluted tunnel air from 15 metre high stacks into valleys and into educational and residential precincts. The northern stack alone has over 20000 residents and 9300 school children within 1.5 kilometres of the stack. This is potentially an environmental and human health disaster in the making, which may impact future generations of residents and school children. The project in its current configuration cannot proceed unchallenged.

Community Against Polluting Stacks (CAPS) was formed in April 2014 by local residents who were concerned about the impact of the northern stack and portals on the health of the surrounding community. CAPS supports the concept of NorthConnex, however believes that there are feasible alternatives for the locations of the northern stack and portals which will minimise the health risks for all communities.

While the preferred option was announced in March 2014, it wasn't until the Environmental Impact Statement (EIS) for NorthConnex went on exhibition in July 2014, that the community was able to understand the extent of the project and for the first time, review the impact assessments that support locating portals and stack from a mega-tunnel in residential and educational precincts.

In reviewing the EIS and preparing their submission, CAPS have engaged relevant experts as well as having members with appropriate expertise. Rather than allying CAPS and the communities concerns about the project, the EIS and associated specialist studies have further increased our concerns about the project. The key concerns with the EIS include:

- Alternative identification and assessment – only a cursory assessment of alternatives is presented in the EIS – and unlike many tunnel projects, there are feasible alternatives to mitigate many of the risks of the project which have not be explored or assessed.
- The data used in the air quality assessment does not meet the standard required for locating 15 meter high unfiltered ventilation stacks in residential and education precincts for a tunnel designed ultimately to carry 140,000 vehicles a day (with 25% heavy vehicles). The air quality study over relies on computer generated data rather than actual monitored data – and because of this there are a number of major concerns about the accuracy of the data. Also the pollutant contribution from polluted intake air and heavy vehicles appears to have been under-estimated.
- Groundwater – there is no assessment of the tunnels' potential impact on groundwater levels and settlement. This is a major omission considering the tunnel is unlined, beneath the groundwater table and its size.
- The noise and vibration assessment did not address many of the potential impacts of the project and additional assessment is required.
- The Aboriginal heritage assessment does not comply with relevant guidelines and policies.
- Property value impacts were not addressed in the EIS.
- Aspects of the community information, engagement and consultation program have been disappointing and a long way from best practice.

There are also a number of other environmental aspects that CAPS believes that further information or assessment is required.

CAPS believes that there are alternative locations for the M1 exit portal and northern stack which will protect all communities from human health impacts. One possible alternative is presented our submission which is:

- Locating the northern exit portal on the M1 in line with Stokes Avenue in Asquith.
- Locating the northern stack further northeast from the new portal location in bushland.
- Creating an essentially zero grade northbound tunnel between the M2 and the M1.
- Shortening the southbound tunnel to Pearce's Corner.

This is only one potential alternative – there are others in the community that have different alternatives. What needs to be undertaken is a transparent and full options identification, assessment and selection process to identify a preferred option that benefits everyone. The current preferred configuration of NorthConnex primary objective is to maximise the returns to its shareholders/investors – and this is at the expense of the community which is lumbered with a high risk substandard preferred option because it is the cheapest – not because it is the best solution for the community or the NSW Government.

1. INTRODUCTION

1.1 Background

This document presents the Community Against Polluting Stacks (CAPS) submission on the Environmental Impact Statement (EIS) for NorthConnex (SSI 13_6136) exhibited between the 15 July and 12 September 2014.

Overall CAPS objects to NorthConnex in its current configuration and the reasons for our objection are detailed in the following sections. As well as objecting to the project, we believe that some of the information and impact assessments presented in the EIS are inadequate, and do not provide sufficient justification for the Department of Planning to approve the project.

1.2 About CAPS

CAPS was formed in March 2014 in response to the release of the preferred option for NorthConnex. CAPS' president Dr Elizabeth Johnson initially established CAPS and by the end of the exhibition period CAPS had over 500 direct supporters in the community and many indirect supporters.

CAPS aims and objectives include:

- We support the building of the NorthConnex tunnel, and acknowledge the benefits it will provide for the community. However we object to project as presented in the NorthConnex EIS
- We support relocating the northern tunnel exit (portal) and pollution stack to a location that minimises the health risks- both in the short and long term, to all communities
- We acknowledge that there are several viable alternative locations for the northern portals and pollution stack. Moving the portals and associated pollution stack at least 2km further north may be one solution. CAPS is supportive of other designs that provide a safe alternative to the community
- We will inform and engage with the community about the health risks from vehicle emissions, portal emissions and tunnel stack emissions
- We represent the community who are opposed to the proposed location of northern tunnel portals and pollution stack
- We will lobby and work with politicians, NSW Government agencies, NorthConnex and other relevant groups to achieve our outcomes
- We support a rigorous and inclusive planning assessment and approval process for the NorthConnex Project

Activities undertaken by CAPS to achieve these aims and objectives include:

- Meeting and lobbying local State and Federal politicians to express our concern about the project and promote alternative options
- Meetings with State Government Minister's to discuss issues with the project and EIS
- Meetings with Government stakeholder agencies to provide them briefings about our concerns with the project and to raise issues with the EIS and consultation process
- Liaising with Ku ring gai and Hornsby local government councillors and staff to inform them of resident's concerns about the project
- Organising a number of community meetings for concerned residents and CAPS supporters to provide them with information on the planning process, issues with the EIS and to answer any questions or queries

- Assisting residents and other community members in dealing with NorthConnex project team
- Organising expert reviews of the EIS and associated specialist studies
- Organising a submission writing workshop attended by about 100 people and presented by the EDO

CAPS was originally only concerned about the air quality and associated human health issues, however, as time has progressed further concerns on a number of other environmental aspects and the project delivery have arisen. Consequently CAPS submission covers most of the environmental aspects in the EIS and the planning and consultation process to date.

The CAPS submission focuses on the northern end of the project as this is where the vast majority of its supporters are located, however many of the issues that CAPS raise are relevant to other areas or elements of the project.

The key authors of the CAPS submission were:

- Dr Elizabeth Johnson – President of CAPS, local GP and local resident
- Jonas Ball – Technical Adviser, Environmental Scientist and local resident.
- Judy Bennett – local residents
- Phil Bennett - local resident
- Ashlee Ball – local resident
- Tom McCormack – local resident
- Paula McCormack – local resident
- Joe Nagy – local resident
- Doris Hill – local resident
- Graeme Hill– local resident
- Fiona Schweers – local resident
- Graeme Foley – local resident
- Wendy Foley – local resident

1.3 Basic facts about NorthConnex

Some basic facts about NorthConnex which provide context for the CAPS submission:

- When completed NorthConnex will be the largest tunnel in Australia and one of the top five largest road tunnels in the world.
- Both the southern and northern ventilation stacks are unfiltered, only 15 metres high (relative to adjacent streets) and are located in a valley.
- The northern ventilation stack is located in the middle of a residential and educational precinct – with over 20000 residents and 9300 school children within 1.5km of the stack.
- NorthConnex will eventually carry over 140000 vehicles per day with over 25% of them heavy vehicles.
- NorthConnex refuses to rule out future portal emissions – and the claim that the current proposed design will have absolutely no portal emission is not supported by any evidence.
- NorthConnex will be longitudinally ventilated – which makes it more difficult to manage, capture and disperse polluted air effectively (in comparison to a transverse ventilated tunnel).

- NorthConnex will draw "fresh air" from the M2/Pennant Hills interchange – one of Australia's busiest interchanges with currently over 180,000 daily vehicle movements
- The project is being delivered via the NSW Government unsolicited bid process. This is first piece of public infrastructure that has been delivered via this mechanism. Because of this project delivery process, many of the typical project development and consultation processes used in similar tunnel projects have not been undertaken and there is no public scrutiny of the project processes due to the commercial-in-confidence provisions.
- The progression from the announcement of the preferred option to EIS for a project of this scale has been one of the most rapid in NSW planning history.

Ultimately CAPS believes that the preferred option for the NorthConnex tunnel is an extremely radical and risky proposal which has the potential to cause significant health impacts for residents and school children. It ignores one of the most basic design premises that many international guidelines and reports recommend – that locating ventilation stacks and portals in residential areas should be avoided – especially for mega-tunnels where the 25% of the traffic will be heavy vehicles. The EIS does not adequately address the air quality and human health impacts as well as many other aspects of the project. And most importantly, unlike other Sydney tunnel projects, there are cost effective and feasible alternatives to make the project safer and mitigate its risks – which have not been fully explored or assessed.

1.4 Major issues

In the following sections, CAPS have identified specific issues with the EIS and the planning and consultation process to date. For each of the issues CAPS have proposed solutions to address their concerns. The key issues that the CAPS' submission covers include:

- The planning and approval process – including suggestions to improve the process in the future.
- Alternative identification and assessment – only a cursory assessment of alternatives is presented in the EIS – and unlike many tunnel projects, there are feasible alternatives to mitigate many of the risks of the project.
- The air quality assessment does not meet the standard required for locating 15 meter high (relative to adjacent streets) unfiltered ventilation stacks in a residential and education precincts for a tunnel designed ultimately to carry 140,000 vehicles a day (with 25% heavy vehicles).
- Groundwater – there is no assessment of the tunnels' potential impact on groundwater levels and settlement. This is a major omission considering the tunnel is unlined, beneath the groundwater table and its size.
- The noise and vibration assessment did not address many of the potential impacts of the project and additional assessment is required.
- The Aboriginal heritage assessment does not comply with relevant guidelines and policies.
- Property value impacts were not addressed in the EIS.
- Aspects of the community information, engagement and consultation program have been disappointing and a long way from best practice.

Other issues that the CAPS submission provides comment on include:

- Project description.
- Non-Aboriginal heritage.
- Human health impacts.
- Visual impact.

Major issues that CAPS believes require further investigation are presented in red.

2. PLANNING PROCESS

2.1 Background

Overall CAPS supports the current NSW planning and assessment legislation and processes. It is generally a robust and fair system which allows community and stakeholder input into development assessment and approval process. While CAPS in its submission is not providing an overall commentary on the system, there are a number of aspects of the planning system relating to the NorthConnex project which could be improved for the current and future projects.

2.2 Exhibition of the Submissions Report/Preferred Project Report

Issue: There are still many unanswered questions about the project – and the EIS does not contain a comprehensive and adequate assessment of all project impacts.

As will be detailed in the following sections, there are many details of the project that are uncertain or not have been sufficiently detailed to provide a clear understanding of the project to the community. There are also a number of key issues whose impacts and mitigation measures have not been adequately assessed – and will require substantial additional information and modelling/assessment to prove that the project is safe for the community and the environment. This includes the following key issues:

- Air quality
- Human health
- Groundwater
- Noise and vibration
- Non-Aboriginal heritage
- Aboriginal heritage
- Socio-economic
- Visual appearance and urban design

NorthConnex will have the opportunity to address these concerns in the Submissions Report/Preferred Project Report and we look forward to being provided a comprehensive and substantive response to CAPS and all other groups/individuals that have lodged a submission on the NorthConnex EIS.

Given the considerable amount of additional information that is likely to be presented by NorthConnex and the significant public interest in the project, it would be appropriate to exhibit the Submissions Report/Preferred Project Report to allow the community to re-assess their position in regard to the project.

Solution: The Submissions Report/Preferred Project Report should be exhibited and additional public submissions on the new information and impact assessments presented in the report allowed.

2.3 Revision of SSIAR

Issue: The State Significant Infrastructure Assessment Report (SSIAR) is misleading as it doesn't reflect the actual project.

The SSIAR lodged with the DP&E in October 2013 had a number of figures showing the portals and ventilation stack in an area south of North Shore rail line – and in potential locations that were considerably different compared to the final location presented in the EIS. The preliminary impact assessment in the SSIAR was also based upon the portals and ventilation stack being located in an area south of North Shore rail line.

When the preferred option was announced in March 2014 and a supplementary SSIAR for the M2 integration works was lodged, the original SSIAR was not updated to reflect the remainder of the preferred option. As the EIS did not go on exhibition until July 2014, the only information to the community on the project, apart from the misleading information-poor NorthConnex website, was the SSIAR which was inaccurate as it had not been updated to reflect the preferred option. This is not satisfactory situation for the community and given the scale and budget of the project this should have been updated.

More importantly any person reviewing the SSIARs would logically conclude that the DGRs for the project had been developed on an incorrect project description as the original SSIAR did not reflect the preferred project – and this misleading project description was not updated in April 2014 with the supplementary SSIAR.

Solution:

1) RMS commits for all future projects to updating the SSIAR to reflect the preferred option for a project.

2) DP&E requires all applicants to update their SSIARs to reflect the actual project if significant changes occur.

2.4 Provision of amended information without approval

Issue: NorthConnex have publically provided amended impact and mitigation measures without approval of the Director-General

On the 2/9/14, NorthConnex sent an email to all registered stakeholders and community contacts notifying them that

"To address potential misconceptions and ensure the community is informed correctly as part of the EIS public exhibition phase, we have updated the website. Please view the new information available under 'Your thoughts - Addressing misconceptions about the project'.

The number of registered stakeholders and community contacts would basically consist of the vast majority of people that had shown an interest with the project

This web page as well as containing appropriate references to sections of the EIS, also contained new impact assessment information (which had not undergone any adequacy assessment by DP&E) as well as additional mitigation measures that were not presented in the EIS. As the EIS, is effectively the development application for the project, and the new impact assessment information and mitigation measures are clearly an amendment to the EIS, the requirements of the EP&A Regulation should be applied.

Clause 192(2) of the EP&A Regulation applies when an application is amended – which requires the proponent or applicant to gain approval from the Director-General for an amendment. From CAPS investigations it appears that the approval from DP&E has not been obtained to amend the application.

The additional items on the web page include:

- Suggesting that there is a commitment to monitor air quality for at least 12 months. This apparent commitment is contained in the project overview document – which is not part of the EIS and is a community consultation document.

- An incomplete, speculative and highly misleading assessment of the impact of the project on property values. If NorthConnex were serious about assessing the impact of project on property values they would recognize that this is a community concern and undertake an appropriate study for inclusion in the EIS. However instead they have cherry-picked a few results and used this as their amended assessment of impact.

There are a number of other examples of where new impact assessment information has been presented in communications materials. Again not all potentially interested community stakeholders may receive this information and the information has not undergone any adequacy assessment by DP&E.

Solution: DP&E needs to develop guidelines or practice notes for proponents regarding acceptable material in community information and to clarify the requirements for presenting new information in relation to Clause 192(2).

2.5 Unsolicited bids should not be critical infrastructure projects

Issue: Public infrastructure which will be delivered via an unsolicited bid process should never be critical infrastructure.

While it is accepted that private investors and industry have an important role in funding and delivering public infrastructure, there needs to be mechanisms to protect the community and stakeholders and to also ensure that the projects are delivered in a transparent and equable manner.

One of the features of the unsolicited bid process for NorthConnex is the commercial in confidence provisions, which significantly limit information on certain aspects of the project development, funding and impact assessment process. The prime example is the preferred option development and assessment process – where the community does not know the options considered and the selection criteria, weighting and assessment process to identify the preferred option.

The ability of the community to further investigate aspects of the project through GIPA requests and other means is severely restricted for unsolicited projects as private entities are not covered by GIPA and any dealings between the NSW Government and the private entities are often deemed commercial in confidence.

These significant restrictions on project information in combination with a project being deemed critical infrastructure means that large high impact unsolicited bid projects can be assessed and approved under a cloak of secrecy, with little chance of the community successfully challenging the outcomes in the Land and Environment Court.

Solution:

1) Unsolicited bid projects should never be deemed critical infrastructure projects.
2) The unsolicited bid process needs to have a higher degree of transparency for issues of public importance.

3. ALTERNATIVES TO THE PREFERED OPTION

3.1 Background

The EIS adequately summarised the route options and selection process preceding the development of the preferred option – but only provide minimal discussion of potential alternative configurations for the preferred option, especially in relation to the location of portals and tunnels. As presented in Section 14, there are many feasible alternative options for the location of the north stack and portals.

Also there was insufficient information presented on the selection of the preferred option by NorthConnex – and based upon the information provided in the EIS, this does not clearly meet the DGRs.

3.2 Criteria and weighting for preferred option selection

Issue: The weighting of criteria and the system used for the assessment of tenders received by NorthConnex for the preferred option are not presented

Section 4.4 of the EIS lists the criteria used by NorthConnex to select a preferred option from the three tenders submitted. It lists a suite of environmental criteria that were supposedly used in the assessment process. However this section is essentially meaningless as it doesn't provide any details of the weighting of individual criteria or the system used to determine the preferred option. For example the environmental criteria may have had an overall weighting of 5% of the total score – which clearly would be unacceptable to the community. The vague discussion about selection of the preferred option clearly does not meet the requirements of the DGRs.

NorthConnex claims commercial-in-confidence provisions for not revealing the criteria, however this claim is not supported by any document or common sense. Publishing the criteria would not reveal any details of the three tenders submitted – and NorthConnex has the choice to publish the criteria and yet refuses. On other RMS projects, the options development, selection and assessment activities are generally public processes with clearly defined systems for weighting and scoring different criteria.

This is one of the significant issues with the unsolicited bid process especially for public infrastructure such as road tunnels. The commercial-in-confidence provisions that are claimed to be required to protect the company submitting the unsolicited bid over ride the public interest. For NorthConnex this is even more concerning as approximately $1 billion of tax payers money is being contributed to the project. The public have a right to know if their money is being spent effectively and on a preferred option which provides value for money as well as protecting the health of the community and the environment.

Until the weighting criteria and system used to assess the tenders submitted to NorthConnex become publically available the community can never have confidence the preferred option provides value for money as well as protecting the health of the community and the environment.

Solution:

1) NorthConnex publishes the detailed criteria, weightings and system used to assess the tenders submitted for the preferred option

2) RMS ensures that in the future all unsolicited bids for public infrastructure are required to make publicly available the system, weighting and criteria used to assess potential options.

3.3 Flawed options development and assessment process

Issue: Alternatives and options for preferred configuration of NorthConnex were not seriously investigated or assessed.

While it is recognised that route options development and assessment process (SKM 2004 and Pearlman 2007) was a comprehensive process with public consultation and input, the same can not be said for the identification, assessment and selection process for the preferred configuration of NorthConnex. While this might be appropriate for a project that is totally privately funded, it is not appropriate for a project that is receiving approximately $1 billon of tax payers money.

There is no evidence that NorthConnex seriously considered any alternative configurations apart from the 3 tenders submitted - and the scant and minimal discussion in the EIS on other alternative configurations is evidence of this. In comparison to any the existing and proposed tunnels in Sydney, NorthConnex has many potential alternative configurations because of the relatively undeveloped land uses north of Edgeworth David Avenus. There are many opportunities to locate the stack and portals in locations where the impacts of noise, air quality and visual appearance can be minimised. Instead an option that significantly increases the construction and operational noise, air quality and visual impacts on residents of Wahroonga has been selected.

This is essentially the major problem with the unsolicited bid process for the delivery of public infrastructure. The primary aim of the design of NorthConnex is to maximise the returns to its shareholders/investors – and this is at the expense of the community which is lumbered with a high risk substandard preferred option because it is the cheapest – not because it is the best solution for the community or the NSW Government.

We do not believe that the NorthConnex EIS meets with the requirements of the DGRs as it has not effectively identified or assessed any of the alternative configurations of the preferred option.

Solution: An independent identification and assessment of alternative configurations for the project needs to be provided – focusing on the relocation of the ventilation stacks and the portals in non-residential areas.

5. PROJECT DESCRIPTION

5.1 Background

There were a number of issues with the project description chapter primarily in relation to an incomplete description of the activities covered by the EIS.

5.2 Motorway maintenance activities

Issue: Motorway maintenance activities have been excluded from the EIS. There is no justification why they should be excluded

The EIS states that:

> *"The project does not include ongoing motorway maintenance activities during operation. These would be subject to separate assessment and approval as appropriate."*

The EIS provides no details on when or how these activities are proposed to be addressed.

There is no justification for the exclusion of the maintenance activities from the EIS. As many residents near the M1 know these activities can cause significant disruptions such as noise and local traffic impacts. As the tunnel and support facilities would result in additional maintenance activities these need to be addressed in EIS.

Solution: The impact and associated mitigation measures for maintenance activities need to be addressed in the Submissions Report.

5.3 Regulatory measures for heavy vehicle diversion

Issue: The commitment to implement regulatory measures to require heavy vehicles to use NorthConnex is weak and lacks details.

The EIS states that:

> *Measures may also be implemented to achieve the objectives of the project. The may take the form of regulatory measures on the surrounding road network, including introducing, or changing the operation of existing, traffic control facilities, advisory and / or regulatory signage, route designations, notices, application of permits, or other traffic measures. Any regulatory measures that have the effect of regulating heavy vehicles would need to be consistent with the objectives of the National Heavy Vehicle Law, where applicable.*
>
> *Measures may also be implemented to achieve the objectives of the project. These may take the form of regulatory measures on the surrounding road network, including introducing, or changing the operation of existing, traffic control facilities, advisory and / or regulatory signage, route designations, notices, application of permits, or other traffic measures. Any regulatory measures that have the effect of regulating heavy vehicles would need to be consistent with the objectives of the National Heavy Vehicle Law, where applicable.*

There is no rock solid commitment to implement any measures – and the possible measures are extremely vague and therefore it is impossible to assess whether they are feasible or practical.

Also the traffic assessment states:

> *Some trucks would be exempt from any requirement to use the tunnel, such as:*
>
> *- Those prohibited by law from using tunnels, such as trucks carrying dangerous goods or over-size trucks.*
>
> *- Public passenger vehicles and emergency vehicles.*
>
> *- Those that have a genuine destination or commencement point that could only be reasonably reached by Pennant Hills Road.*
>
> *The exact approach to enforcing this is still to be confirmed, but the strategic model has assumed that all heavy vehicles, aside from those listed above, do not travel on Pennant Hills Road.*

However there is no information presented on the proportion of heavy vehicles that would be exempt from using the tunnel or how this proportion was estimated or monitored. As the proportion of heavy vehicles using the tunnel are key inputs into the air quality assessment, accurate and transparent estimates of this factor is required.

Solution:

1) A stronger commitment to regulatory measures and details of the regulatory scheme needs to be provided.
2) Information on the proportion of heavy vehicles that would be exempt from using the tunnel and how this proportion was estimated or monitored needs to be provided.

5.4 Description of utility adjustments

Issue: There is no information on scale and impact of service relocations

Service locations relocations can have significant amenity impacts on sensitive receivers as:

- They often involve works outside the main construction sites – and in residential areas.
- Often significant night works are required due to the location of the services in busy road corridors – or cutover times are at night when there is the lowest demand for services.
- Many service relocations take a long time to complete.
- Service relocations such as major stormwater works are substantial works and can have significant impacts.

For projects such as the Cross City Tunnel and the Eastern Distributor, service relocations generated a high proportion of complaints. The information presented in the EIS on service relocation is minimal, namely:

> *A number of utilities are located within or near the project including electricity, telecommunications (including optic fibre cables), sewer and water mains. Utilities would need to be relocated, adjusted or protected where they may be affected by the construction of the project. Further work would be carried out during detailed design to confirm the exact impacts on utilities, and permanent relocations that may be required.*

The design of the preferred contractor for the construction of NorthCOnnex will have identified the major service relocations and new services for the pricing of their tender.

Solution: Major service relocations and additional new services need to be detailed and the impact of their construction and operation assessed.

6. AIR QUALITY

6.1 Background

The air quality impact assessment is the key document which addresses CAPS major concerns about the project. Also the results of the air quality assessment are key inputs into the human health impact assessment.

Overall the air quality assessment would be suitable for assessing regional impacts from a high stack in a non-residential area. However, it does not have the required scientific rigor for locating 15 metre high unfiltered ventilation stacks from a 140000 vehicle a day (with 25% heavy vehicles) tunnel in residential and education precincts. Some of the key concerns regarding the air quality assessment include:

- The use of poor quality data as inputs into the modelling – such as the meteorological, ambient air quality and terrain data.
- The over-reliance on computer generated data, rather than actual monitored data.
- Under-estimation of the frequency of calm conditions by computer generated meteorological data.
- Under-estimation of the relative project contribution to pollutant concentrations through not including the polluted intake air from the Pennant Hills/M2 interchange as a project contribution.
- Failure to assess the potential impacts of the close proximity of ventilation stacks to entry portals.
- The claim that there will be no portal emissions is not justified by the information presented.

6.2 Air quality modelling

6.2.1 Missing information

Issue: The air quality assessment did not contain sufficient information to allow a full expert review of the modelling to be undertaken.

While the air quality assessment was a reasonably comprehensive document, it did not contain critical information that would allow a full expert review of the modelling and assumptions. This includes information such as the emissions calculation worksheets, model configuration files and other relevant technical outputs. Consequently many of the assumptions or model configurations could not be verified.

Solution: The emissions calculation worksheets, model configuration files and other relevant technical information should be provided to allow a comprehensive technical review of the modelling.

6.2.2 Terrain data

Issue: The data used the develop the Digital Elevation Model (DEM) was not sufficiently accurate to be used in air quality modelling around the ventilation stacks

NorthConnex used Shuttle Radar Topography Mission (SRTM) data to develop the Digital Elevation Model. While this dataset may be appropriate for assessing far field modelling impacts, it is unsuitable for assessing near field impacts especially given its significant limitations such as absolute and relative height errors of 6 metres and 4.7 metres. This is especially of concern as the stacks are only 15m high and the topography either side of the northern pollution stack is relatively steep. Therefore the inaccuracy in the DEM could be 40% of the stack height. An inaccurate DEM may affect both the estimated site specific meteorological conditions at the stack locations using the CALMET and TAPM modules as well as affecting the CALPUFF modelling - so it can have a compounding impact.

Some other limitations include:

> *"Man-made objects, such as large buildings, roads, towers, and bridges are often problematic targets for radar imaging. Reflections, shadows, and smooth surfaces in built-up areas can often lead to severe layover, shadowing, and multipath artifacts. Given the 30-90 m posting of the SRTM data, only the largest man-made features are resolved, but the height of any urban SRTM pixel will be affected by the buildings within that pixel"*
>
> *"SRTM did not always map the true ground surface. Instead it measured an effective height determined by the phase of the complex vector sum of all the returned signals from within the pixel being imaged. If the pixel contained bare ground, the phase reflected the height of the surface. If the ground was covered with vegetation, the return was influenced by the vegetation height, structure, and density. If the vegetation was dense enough, little or no signal returned from the ground below."*

For a full discussion of the limitations of the data please go to the following link

http://www2.jpl.nasa..gov/srtm/srtmBibliography.html

The use of this data is extremely disappointing given that there are other readily available DEM data sets with relative height errors of about 0.1m and a much greater resolution than the 30m x 30m SRTM data. While it would not be reasonable to develop a more accurate DEM model for the whole of Sydney (for the CALMET and TAPM model runs), it would be reasonable to expect NorthConnex to develop more accurate DEM model especially around the stack locations and particularly at the northern stack as it is located within a valley. With such a coarse DEM the nearfield impacts can not be accurately predicted.

Solution:

1) Confirm any groundtruthing undertaken to calibrate or test DEM.
2) A more detailed DEM should be developed for the terrain around the stacks and the air quality modelling repeated.

6.2.3 Meteorological data – years used for assessment

Issue: The years selected for modelling and assessment of air quality were years when extreme climatic events occurred.

The three years used in the air quality assessment were 2009, 2010 and 2011. In 2009 an El Nino event was influencing climate, whereas in 2010 and 2011, the strongest ever La Nina event was recorded. Using these years is highly inappropriate for the modelling and they can not be considered as representative of normal conditions. No meaningful assessment was undertaken to determine whether these years were appropriate for use in modelling.

Solution: Repeat the modelling using meteorological data from years that are more representative of a range of climatic conditions including typical years.

6.2.4 Failure to obtain site specific meteorological and ambient air quality

Issue: There was ample time to install air quality and meteorological monitoring stations to collect sufficient data for the air quality assessment in the EIS, however, NorthConnex failed to undertake this activity.

Background air quality and meteorological monitoring stations were only installed in December 2013 and January 2014. Because these monitoring stations were only operational for about 3 months before the air quality modelling was completed no data from these stations was able to be used in the CALPUFF modelling. Because of the failure of NorthConnex to install the monitoring stations earlier to enable the collection of sufficient site specific data, the modelling has had to rely on computer-generated estimates of air quality and meteorological conditions from stations 10+ km from the project. This is clearly an unacceptable outcome especially given that it is Australia's largest road tunnel and it is proposed that only 15 m high stacks will be discharging polluted tunnel emissions into residential and educational areas.

There was no planning impediment to installing the stations before the DGRs. Also the air quality pollutants that were identified in the DGRs as requiring assessment were entirely predictable.

Solution: Approval of the project should not be given until there is sufficient site specific meteorological and air quality data – and this data has been used in a revised air quality assessment.

6.2.5 No calibration of meteorological data

Issue: There was attempt to assess whether the computer generated meteorological data was representative of local conditions

The meteorological monitoring stations for NorthConnex were installed in late 2013 and had collected at least 6 months of data before the EIS went on exhibition. However there was no attempt to use this data to assess whether the computer generated meteorological data was representative of the actual meteorological conditions. This could have been done simply by running the TAPM and CALMET models for the relevant period in 2014 and comparing it the actual data from the monitoring stations. However because of the unseemly haste to get the EIS on exhibition this simple test was not undertaken.

Solution: Predicted meteorological data should be compared against actual data collected to determine to validate the predictions.

6.2.6 Underestimation of "calm conditions" frequency

Issue: The frequency of "calm conditions" appears to be significantly underestimated. In calm conditions the dispersion of the pollutants from the stack is substantially reduced.

The TAPM and CALMET generated meteorological information for the northern stack location in Appendix F of the Air Quality Assessment, estimates the frequency of "calm conditions" to be about 0.5% of the time. At the southern stack, the frequency is slightly higher and generally between 1% and 3%.

Whereas at the meteorological stations that were used to derive the northern stack location meteorological data, the frequency of calm conditions were significantly higher, namely:

- Terry Hills –between 3-5%
- Lindfield and Richmond – anywhere between 10 and 60% - depending on the season and year - with an overall average around 25%
- Prospect – anywhere between 5 and 20% - depending on the season and year - with an overall average around 10%
- Sydney Airport - between 1% and 3% but consistently higher than the computer generated northern stack frequency for all seasons and all years.

So based upon the computer generated data, the northern stack location is the windiest place in Sydney, with the southern stack location not far behind!

The reality is that Wahroonga is not windier than coastal locations such as Sydney Airport – and furthermore the stack is located in a valley that is often protected from prevailing winds. Calm conditions are a common occurrence. The TAPM and CALMET generated data appears to have significantly underestimated the frequency of calm conditions. This could for a number of reasons but the most likely reason is the use of extremely coarse resolutions on the TAPM and CALMET modelling – combined with a low resolution highly inaccurate DEM.

During calm conditions the effective dispersion of pollutants from the ventilation stack is significantly reduced – and pollutants can rapidly accumulate to dangerous concentrations for prolonged periods of time. Consequently the underestimation of the frequency of calm conditions would also result in an underestimation of pollutant concentrations around the stack locations and their human health impacts.

Solution:

1) *The frequency of predicted calm conditions needs to be reviewed and the air quality and human health assessment revised.*
2) *Approval of the project should not be given until there is sufficient site specific meteorological and air quality data – and this data has been used in a revised air quality assessment.*

6.2.7 Ambient air quality data

Issue: The background air quality estimates especially at the northern portal push the boundaries of modelling, do not pass the commonsense test and cannot be trusted as representative of the air quality in the Wahroonga.

Two air quality monitoring stations were used to establish ambient air quality for the modelling, one at Lindfield and the other Prospect. These air quality monitoring stations are both south of NorthConnex and are 9.7 km and 11 km, respectively from the southern portal, and 9km and 21 km, respectively from the northern portal. The stations are also located at 60 metres AHD whereas the northern stack is at 180 metres AHD. Both monitoring stations are also located in residential areas.

While it is recognised that the methodology for the estimation of background ambient air concentrations complied with Standard Methods (EPA 2005), because of the difference in the distance, location, landuse context and height of these stations, the use of data from these air quality stations can not be considered representative of airsheds in Wahroonga and Pennant Hills – especially for pollutants emitted in high concentrations by vehicles such as NO_2 and $PM_{2.5}$.

Also $PM_{2.5}$, a WHO Class 1A carcinogen is not measured at either air quality monitoring stations and had to be estimated from the PM10 concentrations. The Lindfield air quality monitoring station also does not meet the current Australian and international standards for the siting of air quality and meteorological monitoring stations.

Due to these issues, the ambient air quality data used in the modelling can not be guaranteed to be representative of actual air quality. For a 9km longitudinally ventilated tunnel such as NorthConnex, ambient air quality at either end of a tunnel is important as the local airsheds and associated air quality can be very different.

It is truly astonishing that a $3 billion project and the largest road tunnel in Australia which proposes to locate unfiltered ventilation stacks in residential areas does not have actual air quality data in those locations and is relying on incomplete data from 10+ kms away. It is even more astonishing that the air quality assessment is not based on one actual measurement of $PM_{2.5}$ – all the $PM_{2.5}$ concentrations have been estimated or modelled.

Solution:

1) Collect sufficient site specific ambient air quality information for at least one year (as per the EPA's 2005 Standard Methods) and repeat air quality modelling.
2) Undertake longer term ambient air quality monitoring at key project locations.
3) Monitoring programs should be developed in consultation with the community to ensure their confidence in the design and implementation of the programs.

6.2.8 Impact of entry portal air intake on dispersion of tunnel air at stacks

Issue: The entry portals and the stacks are in close proximity and the extraction of air at the entry tunnel may adversely impact the dispersion of polluted tunnel from the stack.

Some entry portals are in close proximity to the ventilation stacks. This is especially the case for the M2 Northbound entry portal which is less than 20 metres away from the southern ventilation stack (Figure 5-17) and to a lesser extent the M1 southbound entry portal which is about 80 metres away from the stack.

At all entry portals there will be significant negative pressure (i.e the surrounding air will be sucked into entry portal). Based on information in the EIS the volume of air entering each of the entry portals would be large – about a maximum 350m^3 per second (assuming the maximum discharge is 700m^3 and there are two entry portals). Because of the close proximity of these high volume air intakes to the stacks, this may significantly affect the plume from the ventilation stacks – and would tend to drag the plume downwards and in the direction of the entry portals. There may also be short circuiting – where the plume is dragged into the entry portal, compounding the pollution of the tunnel air. Given that the stacks are only 15 metres high this is a very real possibly.

The NorthConnex EIS has not assessed this potential impact and is silent on the potential impacts of locating the stacks and entry in such close proximity. This has not been an issue on other Sydney tunnels because the stacks and portals have had sufficient separation – or the stacks are significantly higher and above the influence of the intake entry portal air.

Solution:

1) *Detailed near-field modelling should be undertaken to assess whether the intake air at the entry portals influence the dispersion plume behavior from the stacks. If there is shown to be an influence either design needs to modified and/or the overall dispersion modelling needs to be repeated.*

6.2.9 Entry portal locations and impact on tunnel air quality

Issue: Inadequate modelling/monitoring of the quality of "fresh" air entering the northbound entry tunnel portals at the Pennant Hills/M2 interchange

It is unclear what data or assumptions NorthConnex has used for the quality of the "fresh air" entering the tunnel at the M2/Pennant Hills entry portals for the northbound tunnel. Despite numerous requests for clarifications on this issue, NorthConnex have provided conflicting and unclear answers. Some NorthConnex project team members have stated that it was based only upon OEH data from Prospect and Lindfield – while other team members have said the data has been modified to account for the close proximity of the portals to Pennant Hills Road/M2 – but have been unable to provide any details on how the data has been modified or how this data has been used in the air quality assessment.

If the quality of "fresh air" entering the northbound tunnel at the Pennant Hills Road and M2 Interchange entry portals has been based upon purely on the air quality monitoring undertaken in residential areas in Prospect and Lindfield (See Section 6.2.7), then is clearly does not reflect reality. The reality of the situation is that both entry portals to the northbound tunnel are located in close proximity to the southern ventilation stack and in the road corridor of the Pennant Hills/M2 interchange which has currently has over 160000 Annual Average Daily Traffic (AADT) movements – and is predicted to have over 200000 AADT by 2029. The influence of these two sources of pollution are likely to significantly influence the background air quality in this location – and therefore the "fresh air" entering the tunnel. This is especially the case for pollutants that are largely vehicle generated such as NO_2 and to a lesser extent $PM_{2.5}$.

The modelling of improvements in air quality adjacent to Pennant Hills Road in the NorthConnex EIS show that by removing approximately 25% of the vehicles (by 2029), there would an improvement of 11.8 ug/m^3 in peak daily PM2.5 concentrations and about 40 ug/m^3 peak hourly NO_2 concentrations (Table 37 – Air quality assessment). Using these figures and the current AADT along Pennant Hills Road of about 4 times the traffic removed, peak contributions of road traffic to daily $PM_{2.5}$ and hourly NO_2 levels in the road corridor could be as high as 47.2 ug/m^3 and 160 ug/m^3, respectively. When background air quality is added to these road generated pollutant concentrations, peak concentrations of pollutants in the "fresh air" entering the tunnel could be extremely high. Also as one of the NO_2 guidelines is based on hourly exposure, peaks in traffic levels are likely to significantly increase the chance of exceeding guideline levels.

Clearly using the Prospect and Lindfield air quality monitoring stations to establish the "fresh air" quality entering the northbound tunnel at Pennant Hills Road/M2 interchange would significantly underestimate pollutant concentrations. The reality is that the polluted air from Pennant Hills/M2 interchange is going to be transferred to Wahroonga and with the vehicle emissions from the 9km of tunnel, be discharged via the vent stack in Wahroonga. This has not been modelled in the air quality assessment for the NorthConnex EIS.

Even if the "fresh air" data has been modified to account for the close proximity of the portals to Pennant Hills Road/M2 interchange, it does not appear that the relative increases in pollutant levels from the northern stack have included the contribution of the polluted air from the Pennant Hills Road/M2 interchange. This is a very important issue as the health impact assessment is based upon the relative increases in pollutant levels – and by just using the pollutants generated by vehicles in the tunnel and ignoring contribution of locating the portals in a highly polluted environment may significantly underestimate the health impacts especially at the northern stack.

The tunnel emissions estimates (and relative contributions to pollutant levels and the health impacts assessment) should be based upon the vehicle generated pollutants in the tunnel and relative increase in "fresh air" pollutant levels due to location of the portals in the polluted M2/ Pennant Hills road corridor. This approach is recommended by PIARC (PIARC 2012) to address the issue of discharging polluted air from a dirty airshed and a relatively clean airshed. Also the close proximity of the ventilation stacks to the entry portals need to be considered as they may be contributing to localized air pollution and impacts on "fresh air" quality (See following section).

Solution:

1) *The "fresh air" quality at Pennant Hills/M2 interchanges needs to be remodelled to include emissions from the southern vent stack and surface emissions from the M2 and Pennant Hills Road. This then should be used as the "fresh air" entering the tunnel and most importantly the project contribution and air impacts from the discharge of the ventilation stack at Wahroonga re-assessed.*
2) *The health impact assessment needs to be repeated to include the relative contributions of polluted road corridor air from the M2/Pennant Hills interchange and possibly re-entrainment of discharges from the southern stack.*

6.2.10 Building wake effects

Issue: Building wake effects do not appear to be have fully considered in the air quality modelling of the stack

While it is recognized that the building wake effects from the ventilation buildings have been modelled, there doesn't appear to have been any consideration of the wake effects from other buildings in close proximity to the pollution stacks. This is especially the case for the northern pollution stack as there are existing and proposed buildings on Woniora Avenue that are taller that the stack, and approximately 230 metres and there are large residential properties on a higher elevation immediately adjacent to the ventilation stack.

Solution: Building wake effects should be assessed and remodeled.

6.2.11 Assessment of air quality impacts at multistorey buildings

Issue: It is unclear from the information provided if the air quality impacts have been assessed at multistory buildings.

The air quality assessment does not appear to have modelled key pollutant concentrations at locations above ground level. There are many large multi-storey houses, 5+ storey apartment buildings (Woniera Apartments are approximately 230m from the northern stack) and multistorey school buildings in close proximity to the ventilation stack and concentrations of key air quality pollutants may be significantly higher at upper storeys of these buildings. This would also be compounded by the low resolution and inaccurate DEM.

Equally there doesn't appear to be any clear restrictions on future building heights, even very close to the stack. For the Lane Cove Tunnel there are significant restrictions in building heights near the stacks, whereas this issue is not mentioned in the NorthConnex EIS.

Solution:

An accurate DEM including multi-storey buildings needs to be developed and used in revised air quality modelling to determine concentrations of key air pollutants at upper storeys of buildings.

Restrictions in building heights and other development need to be clearly identified to enable a true assessment of the impact of the project.

6.2.12 Breakdown scenario modelling

Issue: the breakdown scenario modelled in the air quality assessment is not the worst case according to the PIARC guidelines

The PIARC guidelines on tunnel ventilation (PIARC 2012) suggest that worst case vehicle emissions occur during breakdowns scenarios of <20 km, but >0 km per hour.

Solution: Scenario B should be modelled to determine worst case emissions from the tunnel.

6.2.13 Modelling of air discharges during emergency situations

Issue: There is no modelling of air quality impacts from discharges from the portals, stacks and emergency discharge locations for emergency situations

The EIS does not contain any air quality and human health assessments of the impacts from the discharge of polluted tunnel air during emergency situations. This is a serious flaw in the EIS as emergency situations are likely to be relatively frequent given the 9km length of the tunnel and experience from other Sydney tunnels with a high number of heavy vehicles (ie. M5 East). As the ventilation systems will operate differently than normal during emergency situations (eg. so as not to fan a fire in the tunnel for example) it would seem essential that these situations are modelled and assessed. There are also many guidelines and example scenarios for this type of modelling so there is no justification for not undertaking this modelling.

Solution: A variety of different plausible emergency situations should be modelled and the air quality and human impacts assessed.

6.2.14 Air quality impacts from water treatment plant

Issue: The air quality impacts (odours) from the water treatment have not been assessed.

Assessment of air quality impacts from the water treatment plant, specifically amenity issues (potential malodorous emissions for example), should be assessed appropriately. The proposal currently relies on further consideration being undertaken as a result of the development of management plans. Reliance on management plans post approval is not appropriate.

Solution: Air quality impacts from the treatment plant should be assessed before project approval is given.

6.2.15 Calibration of vehicle emission estimates

Issue: There is significant information on vehicle numbers and the resultant in tunnel air quality for other tunnels in Sydney. This data has not been used to "calibrate" the vehicle emissions estimates for NorthConnex.

There is significant existing information on in-tunnel air quality and vehicle numbers and types for the Lane Cove Tunnel and the M5 East tunnel. These tunnels are managed by Transurban and RMS, respectively, and therefore both organisations have ready access to relevant air quality and traffic data. There was no attempt to use any of this data to calibrate the tunnel vehicle emission estimates.

Solution: Air quality and traffic data from the Lane Cove Tunnel and M5 East should be used to calibrate the vehicle emission estimates used by NorthConnex.

6.2.16 Vehicle emission estimates

Issue: Emissions from the Australian vehicle fleet remain high and there is no guarantee that future vehicle emissions targets will be achieved.

Vehicle emission rates are a key input into the air quality assessment – and for the air quality assessment there are some heroic assumptions about improvements in vehicle emission rates. For example the air quality assessment assumes the proposed 2019 European vehicle emission targets will be implemented, however, already there is doubt that these emissions targets can be economically achieved across the whole range of vehicles (ie. not just expensive models). There is also doubt about the historical standards and tests used by vehicle manufacturers to determine emission rates from vehicles.

http://www.drive.com.au/motor-news/global-emission-standards-too-tough-volvo-20140901-10artf.html

Also there is evidence that the reduction in vehicle emissions in Australia compared to Europe is lagging behind, with the latest National Transport Commission assessment concluding:

- *In 2012 Australia's national average carbon emissions from new passenger vehicles was 44 per cent higher than in the European Union (190 g/km compared with 132 g/km).*
- *There are many reasons why Australian light vehicle emissions are higher than in Europe and the United Kingdom. Some of the reasons include Australian consumer preferences for:*
    - *heavier vehicles with larger and more powerful engines;*
    - *a lower proportion of diesel powered engines; and*
    - *automatic transmission.*
- *Consumer preferences are influenced by government policies and regulations, availability of a range of low carbon dioxide emitting vehicles, and fuel prices. Compared with the United Kingdom, in 2013 Australia had:*
    - *fewer regulations and policies directed towards lowering the average carbon dioxide emissions*
    - *fewer low carbon dioxide emitting vehicles available for purchase*
    - *lower fuel costs, providing a weaker financial incentive to buy more fuel-efficient and lower emitting vehicles.*

Also with the current Australian Federal Government, environmental, greenhouse gas and pollution prevention policies are undergoing significant revision – with the trend towards even less regulation. Based upon the current policy environment the implementation of future vehicle emission standards are likely to be delayed or scrapped. Consequently significant improvements in vehicle emission rates can not be guaranteed.

As noted in the air quality assessment:

Diesel-engine passenger cars were shown to make up approximately eight per cent of the current Australian fleet, and this value was used in the emission calculations. It is also noted that the infiltration of diesel-powered passenger cars into the Australian market and fleet mix since 2008 has risen by over 100 per cent. While the use of diesel-powered vehicles is likely to continue to increase in future years, no assumptions regarding future trends were made for this assessment. The current ratio of petrol to diesel vehicles was, therefore, used for both 2019 and 2029.

Given that the proportion of diesel vehicles has doubled over the past 4 years and that modern diesel vehicles contribute high levels of $PM_{2.5}$ and smaller particles, it appears that the contribution of the diesel passenger vehicles has been significantly underestimated.

Solution: Vehicle emission estimates need to be revised to include more conservative future emission standards and an increased proportion of diesel passenger cars needs to be included in the estimates.

6.2.17 Types of heavy vehicles

Issue: The emission generation estimates appears to use a 23 tonnes as a standard for heavy vehicles when a high proportion of the heavy vehicles are greater than 23 tonnes.

Vehicle emission rates are a key input into the air quality assessment. A single truck generates and emits about 20 times the quantity of pollutants as a typical passenger car. Also the bigger the truck (eg. B-Double) the more pollutants it discharges – the PIARC guidelines provide mass factors to estimate emissions from large trucks.

The air quality assessment appears to have assumed that the typical truck using the tunnel will be 23 tonnes. There doesn't appear to be any justification for this assumption (such as traffic monitoring) – and many trucks on Pennant Hills Rd are B-Doubles (which are 32 tonnes +).

The heavy vehicle proportion of traffic using NorthConnex will be about 25%, which is an extremely high proportion and their emissions will dominate the vehicle emission loads. An underestimation of the weight of heavy vehicles will also result in a considerable underestimation of the pollutants generated by the tunnel.

Solution: Clarity needs to be provided around the weight and fleet types used to generate heavy vehicle emissions. Justification of the mix or average heavy vehicle weight used in the modelling needs to be provided.

6.2.18 Construction air quality impacts

Issue: No assessment of potential air quality impacts during construction has been undertaken.

Construction works of four to five years may have the potential to result in incremental impacts (particularly dust) on air quality. There are also many residential and other sensitive receivers such as schools in close proximity to major construction sites. This is a major potential impact which has not been assessed in the EIS – and it has just been assumed that the construction air quality mitigation measures will mitigate all risks. Given experience from other projects this is highly unlikely.

Solution: Air quality impacts during construction need to be comprehensively assessed and human health risks determined.

6.3 Air quality guidelines

6.3.1 New air quality guidelines

Key issues: There is no safe limit for population exposure to air pollutants and hence there is a shift in thinking towards exposure reduction for populations. This proposal contravenes the efforts of the medical and scientific community by increasing population exposure to air pollutants.

The medical and scientific community have recently revised our current national environmental measures to better reflect the growing and substantive health impacts from vehicular air pollutants in the medical literature. These changes are described in depth at:

http://www.environment.gov.au/system/files/pages/dfe7ed5d-1eaf-4ff2-bfe7-dbb7ebaf21a9/files/aaq-nepm-draft-variation-impact-statement-executive-summary.pdf

The new NEPM guidelines state:

"The need to reduce atmospheric concentrations of PM derives principally from its well-recognised and quantified effects upon human health. The recent historical trend of decreasing ambient concentrations of PM10 and PM2.5 is expected to be reversed in the future due to growth in population, economic activity and emissions, with subsequent increases in population exposure and the incidence of adverse health outcomes, and increases in the monetary costs of air pollution to society.

It is likely to be more difficult to meet the national air quality standards and goals for PM in the future without further intervention. There is an ongoing risk that Australian public health will not be sufficiently protected. Intervention is considered necessary to prompt and accelerate policies and measures to reduce population exposure to particulate air pollution. The extent to which government needs to be involved is informed by environmental and economic data. Updating the AAQ NEPM will reduce these adverse effects by highlighting potential problems and assisting jurisdictions in the formulation of air quality policies to reduce emissions from different sectors.

The WHO numerical guideline for 24-hour PM_{10} of 50 µg/m³ has been adopted in Australia and elsewhere (but not in the United States), even though the number of permitted exceedances is greater in Australia than in the WHO guideline. However, fewer exceedances of the standard are provided for in Australia than in most other countries/regions (an exception being New Zealand).

The annual advisory mean standard for $PM_{2.5}$ of 8 µg/m³ in Australia is lower than the current WHO guideline. The current 24-hr $PM_{2.5}$ advisory reporting standard of 25 µg/m³ is identical to the WHO 2005 guideline."

"Although the Australian PM standards are numerically lower than, or equivalent to, those in other countries and regions, it is not straightforward to interpret such comparisons and they do not necessarily mean that the Australian standards are more stringent. For example, to a large degree the lower standards in Australia are made possible by relatively low natural background concentrations and the absence of significant anthropogenic transboundary pollution (which is a major issue in Europe, for example). However, as noted earlier, there would still be health benefits in Australia from setting the PM standards as low as reasonably achievable. Also, there are differences in implementation; where they are applied; and there is no sanctions associated with non- compliance with the standards and goals in Australia, whereas there is in other countries and regions."

Solution:

1) The health risks from locating stacks and portals in residential areas should be sufficient reason to relocate the stacks and portals away from residential areas where there are alternatives.
2) The air quality and human health assessment need to be updated to include consideration of the new draft guidelines

6.3.2 Exposure to Particulate Matter

Issues: Particulate Matter is a non-threshold pollutant. This means that adverse health impacts occur at levels below current standards.

As stated below in the latest NEPM review:

"In Australia for non-threshold pollutants such as PM, overall health outcomes in a population are driven by large- scale exposure to the prevailing average concentrations, rather than by relatively small-scale exposure to higher concentrations. Where there are no exceedances of air quality standards there may be no impetus to implement measures to further reduce exposure to PM. This has compelled a shift in the approach to air quality management, and in some countries and regions (notably the European Union) this has taken the form of an 'exposure-reduction framework'. The scientific support for the exposure-reduction approach to managing PM has been strengthened by the latest health findings".

This reflects the current scientific thinking to ensure infrastructure projects minimize population exposure to particulate matter, to below current standards, as significant health impacts occur even below current standards, especially when large populations are exposed, as is the case with the NorthConnex design.

The NEPM provides a guideline only to assist policymakers, and these guidelines should not be used as an absolute value against which to measure the safety of NorthConnex tunnel emission levels. Rather, the NorthConnex tunnel, ventilation stacks, and portal emissions sites should be designed to ensure there is a reduction of population exposure to particulate matter, and hence safeguard the risks to health.

In addition to the scientific arguments there are strong economic arguments to mitigate health risk. The review of the NEPM guidelines states:

"Any reduction in exposure to particle pollution will have public health benefits. The health cost of particle air pollution in the NSW Greater Metropolitan is estimated to be around $4.7 billion per year (NSW DEC 2005; Jalaludin et al. 2011). The greatest proportion (>99%) of the health costs accrue from avoiding premature deaths due to long-term exposure to $PM_{2.5}$"

Health costs downstream from poorly designed infrastructure are a key motivation to ensure vehicle transport projects are well designed. Public and private sector infrastructure developers must also improve in their attitude to global citizenship. These companies should be accountable for the health effects on populations. Risk mitigation strategies should be enforced by government. For example, this may include appropriate design of surface transport infrastructure, consideration of rail freight transport options which produce less diesel emissions per tonne of freight, appropriate placement of tunnel portal emissions and ventilation stacks in non-residential areas, and installation and continuous operation of filtration in tunnel emission stacks. The complexities of economic growth need to be balanced with risks to health.

Given the substantive and emerging data on health risks posed by vehicular emissions, especially diesel vehicles, we call on policymakers to take action to promote clean air, reduce population exposure and ensure legal protection is provided under Commonwealth environmental and human rights law. Particularly as Australia is an advanced economy, cost limitations for these projects, should not affect the protection of population health.[1]

[1] http://www.aph.gov.au/~/media/Committees/Senate/committee/humanrights_ctte/resources/Guide_to_Human_Rights.pdf

6.3.3 Air quality pollutants

Key Issue: Components of vehicular and industrial air pollutants are toxic and cause serious short, medium and long term risks to health.

The types of vehicular emissions include particulate matter of different sizes (PM_{10}, $PM_{2.5}$, PM_1), ultra fine particles, sulfur dioxide, nitrogen oxides, carbon monoxide, benzene (a carcinogen), formaldehyde, ground level ozone, and volatile organic compounds from diesel emissions.

Particulate matter (PM) includes airborne solid or liquid particles including dust, pollens, soot and aerosols arising from combustion. The particles known as PM_{10} (with a diameter less than 10 um) are most commonly measured, however finer particles such as $PM_{2.5}$ and below, are of considerable concern as they can penetrate deeper into the lungs and have the potential to be more damaging. It is important to note that diesel vehicles emit higher concentrations of ultrafine particulates.[2]

Evidence from cellular or toxicological experiments, controlled animal and human exposures and human panel studies have demonstrated several mechanisms by which particle exposure may both trigger acute events as well as prompt the chronic development of cardiovascular diseases. Particulate matter inhaled into the pulmonary tree may instigate remote cardiovascular health effects via three general pathways: instigation of systemic inflammation and/or oxidative stress; alterations in autonomic balance; and potentially by direct actions upon the vasculature of particle constituents capable of reaching the systemic circulation. In turn, these responses have been shown to trigger acute arterial vasoconstriction, endothelial dysfunction, arrhythmias and pro-coagulant or thrombotic actions.[3]

Exposure to Particulate Matter < 2.5 µm

It is well known from the medical literature that long-term exposure to air pollution results in significant cardiopulmonary risk in adults, lung cancer, increased all-cause mortality, and long term respiratory decline in children.[4,5,6,7] (see Table 1). Studies also show exposure to high concentrations of particulate matter pollutants increases arrhythmias[8], acute myocardial infarcts[9], and stroke[10]. In addition, there is emerging evidence suggesting a steep risk for mortality from cardiac disease even at low levels of exposure to vehicular pollutants.[11]

On the 25 March 2014, the World Health Organisation reported latest estimates that in 2012 around 7 million people died as a result of air pollution exposure - or 1 in 8 global deaths, confirming that air pollution is now the world's largest single environmental health risk.[12] Diesel emissions have been classified by the World Health Organization as carcinogenic, and are particularly toxic as they contain higher concentrations of ultrafine particulate matter as well as polycyclic aromatic hydrocarbons.

[2] Morawska et al, 2008, Atmospheric Environment, 42: 8113-8138, 2008

[3] Nemmar A Diesel exhaust particles in lung acutely enhance experimental peripheral thrombosis. Circulation. 2003 Mar 4;107(8):1202-8.

[4] Beelen R. Effects of long-term exposure to air pollution on natural-cause mortality: an analysis of 22 European cohorts within the multi centre ESCAPE project . Lancet 2014; 383: 785–95

[5] Pope 3rd CA. Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution. JAMA 2002; 287: 1132–41.

[6] Hoffman B. Residential Exposure to Traffic Is Associated With Coronary Atherosclerosis. Cirulation 2007 Jul 31;116(5):489-96.

[7] Gaudermann WJ, Avol E, Gilliland F et al. The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age. N Engl J Med 2004;351:1057-67.

[8] Peters A. Air pollution and incidence of cardiac arrhythmia. Epidemiology 2000; 11: 11–17.

[9] Peters A. Increased particulate air pollution and the triggering of myocardial infarction. Circulation 2001; 103: 2810–15.

[10] Wellenius G. Ambient Air Pollution and the Risk of Acute Ischemic Stroke. Arch Intern Med. 2012;172(3):229-234. doi:10.1001/archinternmed.2011.732

[11] C. Arden Pope III,1 Richard T. Burnett,2 Michelle C. Turner, et al. Lung Cancer and Cardiovascular Disease Mortality Associated with Ambient Air Pollution and Cigarette Smoke: Shape of the Exposure–Response Relationships. Environ Health Perspect 119:1616–1621 (2011)

[12] Kuehn BM. WHO: More than 7 million air pollution deaths each year. JAMA 2014 Apr 16;311(15):1486.

As stated in the NorthConnex EIS:

"Particulates that are derived from specific sources, such as diesel emissions, are known to comprise other compounds such as volatile organic compounds and polycyclic aromatic hydrocarbons that are known to also be associated with adverse health effects. The presence of these other compounds has been addressed separately however the presence of these (and likely other compounds) compounds and other co-pollutants (also derived from combustion sources) adds to the complexity of utilising data from urban air epidemiological studies for assessing health effects from particulate matter."

As the epidemiological data is complex, and interactions between particulates and other compounds emitted are unknown, it is incorrect to conclude as stated in the EIS that there are negligible health impacts from such a long tunnel, with large amounts of diesel emissions, two ventilation stacks and no filtration.

The EIS also states that:

"Recently, outdoor air pollution has been classified by the International Agency for Research on Cancer (IARC 2013) as carcinogenic (Group 1) to humans based on sufficient evidence that exposure to outdoor air pollution causes lung cancer. Particulate matter, a major component of outdoor air pollution, was evaluated separately and also classified as carcinogenic to humans (Group 1).

In 2012, IARC evaluated exhaust from diesel engines (consisting mostly of particulate matter) and classified these emissions as carcinogenic (Group 1) to humans."

Our response to this statement is that the nature and severity of health risks associated with the emissions are too serious to assume negligible health risks. The Department of Planning should apply the precautionary principle, such that downstream health impacts are mitigated. The problems associated with the exposure to emissions from the placement of stacks and portals in residential areas should be considered now, and rectified to ensure harm minimisation.

Exposure to Particulate Matter - Ultrafine particles

Urban transport plays a large role in relation to 'new' pollutants, in particular ultrafine particles, with their concentrations elevated by up one or two orders of magnitude in proximity to busy roads or tunnels, respectively.[13] There is growing evidence of an association between high concentrations of ultrafine particles and mortality.[14] These particles once emitted remain in the atmosphere for a short time, after which photochemical reactions tend to convert them into larger size secondary particulates.[15] It is therefore difficult to predict the behaviour of these emissions using standard modelling methods. In addition, the health effects of secondary particles remain unknown at present and require further epidemiological study.

The health impact assessment for NorthConnex states:

"Based on the available studies, there is no evidence of a safe level of exposure or a threshold below which no adverse health effects occur (NEPC 2010; WHO 2013b).

At present, at the population level, there is not enough evidence to identify differences in the effects of particles with different chemical compositions or emanating from various sources (NEPC 2010; WHO 2013b)."

However, whilst these factors pose difficulties in the assessment and specific modeling of ultrafine particulates, our current knowledge suggests that there are reasonable scientific grounds to believe ultrafine particles impact health, and reductions in population exposure in the longer term is imperative to protect health. We cannot conclude that there is no risk from ultrafines to human health, merely because the medical research is evolving and that specific monitoring of ultrafine particles has not generally been performed in the available research to date.

[13] Morawska et al, 2008, Atmospheric Environment, 42: 8113-8138, 2008

[14] Health Effects Institute Daily Mortality and Fine and Ultrafine Particles in Erfurt, Germany. Part I: Role of Particle Number and Particle Mass, Report #: 098, Publication Type: Research Reports

[15] Morawska et al, 2008 Atmospheric Environment, 42: 8113-8138, 2008

Summary of available medical research studies on low levels of exposure to particulates, serious health consequences, and exposure –dose relationships to emissions

An important study in the American Heart Association Journal Circulation in 2010 found that even short exposures to $PM_{2.5}$ (a few hours to weeks) can trigger cardiovascular deaths and illness, while longer-term exposure (i.e. over a few years) greatly increases the risk for cardiovascular mortality and reduces life expectancy among highly exposed groups by several months to a few years.[16]

In a study examining the exposure-response functions for mortality from cardiovascular disease, a steep increase in risk was found at low-levels of exposure to $PM_{2.5}$. A linear exposure-response was found between exposure to $PM_{2.5}$ and mortality from lung cancer. [17]

An additional study assessed long-term exposure to air pollution and lung cancer in 313,000 persons from 17 cohorts in 9 European countries.[18] There were 2095 incident lung cancer cases were diagnosed over a follow-up of 12.8 years. The meta-analyses showed a statistically significant association between risk for lung cancer and PM10 with a hazard ratio of 1·22 per 10 µg/m^3. For PM2.5 the HR was 1·18 per 5 µg/m^3. An increase in road traffic of 4000 vehicle-km per day within 100 metres of the residence was associated with a risk for lung cancer of 1·09. This risk therefore exists even when the levels of particulate matter air pollution are below the current European limit values.

Recent findings also suggest long-term exposure to $PM_{2.5}$, even at low levels, is related to an increased risk of mortality attributable to diabetes. These findings have considerable public health importance given the billions of people exposed to air pollution and the worldwide growing epidemic of diabetes.[19]

The effect of air pollution on lung development in children 10 to 18 years of age was published In the New England Journal of Medicine in 2004.[20] In this Children's Health Study, 1759 children of an average age of 10 years, were monitored over 8 years using annual spirometry.

The results of this study provide robust evidence of an exposure dose relationship on impaired lung development from 10 to 18 years, with FEV1 being reduced in children exposed to higher levels of ambient air pollution. This effect was similar to those that have been reported for exposure to maternal smoking.[21] [22]

A local study conducted by Cowie, looked at the health impacts associated with the Lane Cove tunnel stacks. For the first two years following opening of the tunnel, surveys were conducted and spirometry measurements were taken from various populations living around the stack site. The study showed that residents living within 650 meters of the stack experienced an increase in upper and lower respiratory symptoms and also had a reduced lung volume (FEV1). This is of particular concern as the aforementioned study shows that the changes in lung volumes in children can be comparable to passive smoking and can have long lasting effects.

A case control study from California assessed the relationship between traffic related air pollution and autism. The study found that children with autism were more likely to live at residences that had the highest exposure to traffic-related air pollution during gestation, and the first year of life. The associations were found with exposure to nitrogen dioxide, $PM_{2.5}$, and PM_{10} during these periods. [23]

[16] Brook RD, Rajagopalan S et al. Particulate matter air pollution and cardiovascular disease: An update to the scientific statement from the American Heart Association. Circulation. 2010 Jun 1;121(21):2331-78.

[17] Pope C. Lung Cancer and Cardiovascular Disease Mortality Associated with Ambient Air Pollution and Cigarette Smoke: Shape of the Exposure–Response Relationships. Environmental Health Perspectives| November 2011 number 11 volume 119 III

[18] Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses from the European Study of Cohorts for Air Pollution Effects (ESCAPE), The Lancet Oncology, Volume 14, Issue 9, Pages 813 - 822, August 2013

[19] Brook RD, Cakmak S, Turner MC et al. Long-term fine particulate matter exposure and mortality from diabetes in Canada. Diabetes Care. 2013 Oct;36(10):3313-20.

[20] W. James Gauderman, Ph.D., Edward Avol, M.S., et al. N Engl J Med 2004; 351:1057-1067; Sept 9 2004.

[21] Bert Brunekreef, Stephen T Holgate Air pollution and health Lancet 2002; 360: p. 1239.

[22] Bert Brunekreef, Stephen T Holgate Air pollution and health Lancet 2002; 360: p. 1237.

[23] Volk, H. Traffic-Related Air Pollution, Particulate Matter, and Autism, JAMA Psychiatry. 2013;70(1):71-77.

There is increasing evidence of adverse health effects on babies and children from maternal exposure to air pollutants: exposure is associated with adverse pregnancy outcomes, risk of low birth weight, foetal growth restriction, and pre-term delivery.[24] [25] [26] [27]

Outdoor air pollution is recognised as an asthma trigger, and early childhood exposure to air pollutants may play a role in the development of asthma. A study of 3,482 children from British Columbia showed a statistically significant increase in risk of asthma with increased early life exposure to CO, NO, NO_2, and PM_{10} in addition to other pollutants.[28] Traffic-related pollutants were associated with the highest risks, for a 10 microgram/m^3 increase in NO and NO_2.

Congenital anomalies may also be of concern. [29] In a meta-analysis of several studies, NO_2 and SO_2 exposures were related to increased risks of coarctation of the aorta and tetralogy of Fallot, and PM_{10} exposure was related to an increased risk of atrial septal defects.

Populations with chronic disease such as diabetics, those with CAD, are particularly susceptible to the harmful effects triggered by PM exposure. [30] A study of 141,000 residents of Montreal found consistent increases across exposures to most types of ambient particles for persons who had cancer, acute lower respiratory diseases, any form of cardiovascular disease, chronic coronary artery diseases, and congestive heart failure.[31]

Solution: Further consideration needs to be given to medical evidence regarding the impacts of vehicle emissions on human health

6.4 Air quality, meteorological and human health monitoring

6.4.1 Location of current air quality and meteorological monitoring stations

Issue: The current NorthConnex air quality and meteorological monitoring stations are not in appropriate locations to assess the impacts of ventilation and portal discharges.

In the area around the northern stack, one monitoring station has been located at James Park which is 1.2 km distant from the proposed north ventilation stack and on top of a hill. While this monitoring station may be appropriate for monitoring regional air quality and meteorology, it is not appropriate for monitoring the potential impacts from the discharge of the northern ventilation stack as it is not located in the Wahroonga valley with its distinct meteorological conditions, is close to the Hornsby industrial area and is too distant from the northern stack to be used for validation of the modelling outcomes. There has been no attempt to either relocate the

[24] Bell ML, Belanger K, Ebisu K et al. Relationship between birth weight and Exposure to Airborne Fine Particulate Potassium and Titanium During Gestation. Environmental Research 2012. 117:83-89.

[25] M Bobak Outdoor air pollution, low birth weight, and prematurity. Environ Health Perspect. Feb 2000; 108(2): 173–176.

[26] Environ Health. 2012 Jun 18;11:40. doi: 10.1186/1476-069X-11-40.Using new satellite based exposure methods to study the association between pregnancy $PM_{2.5}$ exposure, premature birth and birth weight in Massachusetts. Kloog I1, Melly SJ, Ridgway WL, Coull BA, Schwartz J.

[27] Environ Health. 2011 Oct 7;10:89. doi: 10.1186/1476-069X-10-89. Traffic-related air toxics and preterm birth: a population-based case-control study in Los Angeles County, California. Wilhelm M1, Ghosh JK, Su J, Cockburn M, Jerrett M, Ritz B.

[28] Environ Health Perspect. 2010 Feb;118(2):284-90. doi: 10.1289/ehp.0900916. Effect of early life exposure to air pollution on development of childhood asthma.Clark NA1, Demers PA, Karr CJ, Koehoorn M, Lencar C, Tamburic L, Brauer M.

[29] Vrijheid M1, Martinez D, Manzanares S, Dadvand P, Schembari A, Rankin J, Nieuwenhuijsen M.Environ Health Perspect. 2011 May;119(5):598-606. Ambient air pollution and risk of congenital anomalies: a systematic review and meta-analysis.

[30] Eur J Intern Med. 2013 Jun;24(4):295-302. doi: 10.1016/j.ejim.2013.04.001. Epub 2013 May 4. Air particulate matter and cardiovascular disease: a narrative review**.** Martinelli N1, Olivieri O, Girelli D.

[31] Res Rep Health Eff Inst. 2000 Oct;(97):7-113; discussion 115-20. Identifying subgroups of the general population that may be susceptible to short-term increases in particulate air pollution: a time-series study in Montreal, Quebec. Goldberg MS1, Bailar JC 3rd, Burnett RT, Brook JR, Tamblyn R, Bonvalot Y, Ernst P, Flegel KM, Singh RK, Valois MF.

existing station or install a new monitoring station in an area closer to the stack and in a location which could be used to validate the modelling predictions. This is extremely concerning as until actual appropriate data is available, the modelling can not be conclusively validated. Also as construction is due to commence in early 2015 if the project is approved, the window of opportunity to collect data that will not be comprised by construction activities is decreasing. This issue has been brought up numerous times with NorthConnex, however they have provided no response nor have they installed an appropriately located monitoring station. For a $3 billion project which proposes to located ventilation stacks in the middle of residential and educational precincts, this is a major failing.

Solution: Appropriately located monitoring stations should be installed as soon as possible to enable the validation of the air quality modelling before construction activities comprise data collection.

6.4.2 Health impact assessment monitoring

Issue: No human health monitoring has been proposed.

The EIS does not proposed to undertake any human health monitoring to assess the impacts of ventilation stack and portal discharges. While it is recognised that on opening, there are unlikely to be any human health risks due to the low number of vehicle using the tunnel, in the future as vehicle numbers increase to its maximum ultimate capacity of about 140000 vehicles per day there is the real potential to be human health impacts.

Also as discussed, there is increasing evidence that airborne ultrafine and nanoparticles from modern combustion engines have a significant impact on human health and may react and disperse differently than PM2.5 or greater particles. As airborne ultrafine and nanoparticles are not assessed in the EIS, they may have health impacts despite the NorthConnex claim that there will be no impacts.

The only way to conclusively determine whether there are health impacts from NorthConnex to undertake a long term health study of sensitive receivers in potentially impacted areas. This includes schools in close proximity of the ventilation stacks and portals.

Properly designed and started before the operation of the NorthConnex, this study would not cost a huge amount of money and would provide a definitive assessment of the impacts of the tunnels. Wahroonga is also an ideal location to undertake the study as there are many long term residents, there are over 13 educational facilities within 1.5km of the stack and there are no other major local sources of pollution.

A suitable study would a large scale prospective cohort study to be performed. This study would particularly look at the health consequences of exposure to air pollutants on 9,300 school children. As found by Gaudermann et al, in a study of school children in California, we anticipate reduced lung growth in this susceptible group. In a similar prospective cohort analysis we would enroll children in Grade 4 at all the local schools in Wahroonga in the year prior to the NorthConnex tunnel opening. Baseline pulmonary function values would be recorded for these children. Once the tunnel opens, these children would be followed up for a period of 8 years, with annual spirometric testing, and recording of symptoms. A comparison cohort in Grade 4 from schools outside the 2 km radius of the stack would also be enrolled. If there is any decline in the exposed children's lung development, the government and Transurban would be liable for the long term health costs, opportunity costs to the economy and reduced productivity, and liable for impairment to the daily functioning of these children.

Solution: A long term health study should be designed and implemented by relevant health professionals to assess the impacts of the tunnel air discharges.

6.4.3 Air quality monitoring consultative groups

Issue: NorthConnex has not proposed community involvement in the development of appropriate monitoring programs.

If NorthConnex was genuine about addressing community concerns about air quality and human health impacts, they would propose that the community be involved in the development of monitoring programs for these aspects. This has been successfully undertaken on other Sydney tunnel projects via an Air Quality Consultative Group and it seems surprising that NorthConnex has ignored this despite claiming they have learnt from other tunnel projects.

Solution: An Air Quality Consultative Group should be formed consisting of representatives from the community (including schools and health professionals). The consultative group should be involved in the developing the long term monitoring program as well as assessing the results of monitoring.

6.5 No filtration justification

Issue: The use of the M5 East filtration trial as a justification for not installing filtration is flawed

NorthConnex used the costs and performance of the M5 East filtration trial as its main justification for not considering filtration of the polluted tunnel air before discharge into residential and educational precinicts. A further justification was a quote from a French government international assessment of the air in road tunnels (CETU, 2010), which concluded that filtration systems are:

'bulky and less cost-effective than conventional ventilation systems, both in terms of investment and operation. Generally-speaking, these systems are also energy-intensive given the surplus ventilation requirements.'

While quote from the CETU report is certainly correct- there are a number of other statements in the report that are of relevance to any discussion about filtration and the M5 East filtration trial. The CETU report also says specifically in regard of the M5 East trial –

"The high cost (of installing filtration) reflect the fact that the tunnel was not originally designed to accommodate such systems."

So NorthConnex's use of the M5 Filtration trial as a basis for dismissing the costs of installing filtration for a new tunnel are flawed based upon the same CETU report. Furthermore in relation to the M5 East trial:

1) The M5 East filtration trial involved a retrofit of an in-tunnel air treatment system. To do this additional tunnels, a underground cavern for the filtration equipment, additional auxiliary infrastructure (such power supply) and additional jet fans were required to be installed and operated. This bears little resemblance to the costs and works required to install a filtration system for NorthConnex – as the filtration system could be designed and installed in the proposed ventilation buildings avoiding the need for additional tunnels or ventilation fans. The power supply and other auxillary features of the ventilation buildings could easy be upgraded to include the requirements for a filtration system.
2) The ESPs were significantly under capacity for the volume of air delivered to them. The AMOG report recognizes this issue and suggests that this was the reason for the relatively poor efficiency of the ESP in removing particulates and the reliability issues of the ESPs. The poor efficiency and reliability of the ESPs were also a major factor in relatively high operating costs of the M5 Filtration trial.

Actual and realistic costs of installing and operating a ventilation stack filtration system for NorthConnex have been requested numerous times, however NorthConnex has declined to provide these – and there is no mention of these potential costs in the EIS. Every time this information has been requested NorthConnex has referred back to the M5 East filtration trial – which as discussed above is not a realistic example to use as a basis for costing the provision of filtration to a new road tunnel.

As NorthConnex has refused repeatedly to consider filtration and to provide realistic cost estimates for installing filtration, it can not be trusted to complete this task. An independent study on the life cycle costs and advantages/disadvantages of filtration specifically needs to be undertaken for NorthConnex as recommended in the CETU 2010 report.

Solution: An independent study on the life cycle costs and advantages/disadvantages of filtration for NorthConnex needs to be undertaken.

6.6 Management of air quality

Issue: There are no systems or management measures proposed in the EIS to manage tunnel air if NorthConnex does not perform as modelled.

As noted in previous sections, the air quality and human health impacts of NorthConnex is based purely upon computer modelling with no actual data to validate the claims of no impact on human health. Based upon this assumption of no human health impacts, the EIS does not propose any mitigation strategies or other measures that could be implemented if the modelling was found to under-predict human health impacts.

As simple and cost effective measure that could be implemented – and which has been implemented on other Sydney tunnel projects such as the Cross City Tunnel and Lane Cove Tunnel – is to design and construct the project so that filtration can be retro-fitted at minimal cost. This would also avoid the issue that arose for the M5 East Filtration trial, where the cost of retrofitting filtration led to excessive costs and relatively poor performance of the filtration system.

Solution:

The ventilation stacks and other components of the tunnel should be designed and constructed to allow filtration to be installed at a later date at minimal cost.

Other potential management strategies and infrastructure modifications should be clearly identified to mitigate air quality impacts if the tunnel does not perform as predicted.

6.7 Portal emissions

6.7.1 Insufficient evidence of no portal emissions

Issue: NorthConnex claims that there will be no portal emissions from the project. Based upon the current design that claim appears to be difficult to justify.

The EIS states that

"The project does not currently propose portal emissions from the main alignment tunnels"- Section 5.2.5

However makes no comment about the interchange tunnels to the M2 and M1 – so it is unclear whether there will be portal emissions from these interchange tunnels.

Other documentation claims that there will be no portal emissions from the project. However in the EIS it is stated that jet fans will be at least 300 metres from the portals and presumably these will create sufficient negative pressure to ensure that there are no emissions from the portals. Based upon discussions with independent engineers this would be impossible to achieve especially at the Pearces Corner portal as the jet fans would have to create sufficient negative pressure to overcome 300+ metres of a longitudinally ventilated tunnel as well as the piston effect from over 2000 vehicles per hour travelling in the opposite direction.

Figure 5-14 of the EIS also contradicts the assertion that jet fans will be at least 300 metres from the portals. For example the M1 portal and ventilation stack are located in same location, however the diagram shows a jet fan downstream of the ventilation out taken – which would be within 20m of the portal. Either the jet fan is in the right location (and therefore the operational noise assessment which assumed a minimum 300 distance for jet fan from the portals is incorrect) – or Figure 5-14 does not represent the actual ventilation design.

Also because of the higher air speed in longitudinal tunnels (compared to transverse ventilated tunnels such as the Lane Cove Tunnel) it is significantly harder to successfully capture all the tunnel air and discharge it via a ventilation stack – rather it is more common that a proportion of the tunnel air is not captured and escapes via the portals (eg. M5 East).

Despite all these issues, NorthConnex continues to claim that there will be no portal emissions but provide no evidence to back up this assertion.

Solution: An independent review of the ventilation design should be undertaken to verify the claim that there will be no portal emissions.

6.7.2 Assessment of portal emissions

Issue: The impact of portal emissions has not been assessed.

Given that portal emissions are highly likely due to the design of the tunnel (eg. longitudinally ventilated) a discussion of portal emissions and the effects of factors such as air flow patterns, turbulence, topography and justification that conditions are representative of full scale emission plume behaviour would assist. Effects of portal exit temperature on the fate and transport of plumes should also be discussed further.

Solution: The impact of portal emissions including their effect on the plumes from the ventilation stacks should be assessed.

6.7.3 Monitoring of portals

Issue: It is essential that all portals are monitored, at exposure-relevant locations, to ensure zero portal emissions are actually being achieved.

For the M5 East tunnel, MCoA 71 stated "The ventilation system for the main tunnel…must be designed to avoid air emissions through the portals as far as is practical." Despite this auditors found that portal emissions were a "relatively common occurrence" (NSW Planning 2005). Portal emissions were activated during "ventilation trials", "fine tuning", a malfunction not being repaired for 23 days due to a delay in the supply of spare parts, incorrect operation of jet fans and a faulty CO monitor.

Solution:

Portals must be removed from residential areas

All portals require ongoing monitoring, at exposure-relevant locations to ensure zero portal emissions.

6.7.4 Future portal emissions

Issue: NorthConnex refuses to rule out future portal emissions

In the EIS and in public forums, NorthConnex has clearly stated that portal emissions may occur in the future (albeit subject to future approvals).

This is unacceptable to the community and can not be justified due to the risks to human health – especially for those residents and schools located in close proximity to portals. NorthConnex appears not to understand that there is no safe exposure level to PM_1 and ultrafine particles, these are cumulative toxins and carcinogens. With portal emissions increased exposure of residential and educational areas to higher levels of PM_1 and ultrafine particles can not be avoided.

The only situation where portal emissions would be conceivably safe would be if all trucks and cars had zero emissions. Even if all vehicles were electric or hydrogen powered they still emit non-exhaust pollutants such as brake dust, tyre rubber and other related detritus – and therefore there would still be potential health impacts from portal emissions.

The only reason for portal emissions is to reduce the operating costs of the ventilation system and therefore increase the revenue of whoever holds the toll concession. There would be no health benefits to the Pennant Hills Road residents nor any other community. Rather the health of the residents and school children around the portals would be compromised for increased profits of whoever holds the toll concession. If NorthConnex wants to place portals in the middle of a densely populated a residential and educational precinct it must rule out future portal emissions or move the portals to another location.

Solution:

1) *NorthConnex must categorically rule out portal emissions in the future or*
2) *The Department of Planning must ban all future portal emissions from NorthConnex or*
3) *If portal emissions are to be permitted in the future, the portals must be moved from residential and educational precincts.*

6.8 Location of stacks and portals in residential areas

Issue: All the tunnel ventilation guidelines and reports recommend locating ventilation stacks and portals away from residential areas.

There are numerous guidelines and reports which recommend locating stacks and portals away from residential areas where there are alternatives. These appear to have been ignored with locating of the northern stacks and portals in a residential and educational precinct.

The CETU 2010 report that NorthConnex relies on for it's no filtration justification also states in its conclusions that:

"Others emphasize the potential benefits of first optimising the various pollution dispersion factors linked to tunnels, such as the position of portal or the location of stacks enabling the displacement and dispersion of pollutants away from residential areas"

Gerda Kurschel, the independent expert used by NorthConnex at its air quality forum was co-author of a major report that reviewed NZ tunnels (NIWA 2010). In that report it was stated:

One of the great advantages of road tunnels is the opportunity to deliberately site portals (or stacks) away from sensitive receptors so that road transport emissions can be removed from dense residential areas…

The PIARC 2008 guidelines for tunnel design recommend:

Stacks for tunnels are typically of a height of above 20 metres with the additional benefits gained by the momentum and buoyancy of the plume. In such cases unfavourable dispersion conditions can affect both street level and stack emissions at the same time. Because of the height of the stacks the emissions enjoy better dispersion conditions and thereby result in lower ground level concentrations. Stacks above the layer directly affected by buildings (this would mean in general some 2 to 3 times as high as the surrounding buildings) results in even better dispersion.

Urban areas located in regions where winds are light and stable conditions persist for extended periods, particularly if these periods overlap the times of peak traffic emissions, require more detailed analysis when formulating tunnel design or operational framework than those in windier locations where the atmosphere is unstable. This is true at least for the management of low level emissions.

Solution: As there are viable alternative locations for the northern stack and portals, these need to be assessed and the stack and portals moved to location away from residential and educational precincts.

6.9 Proposed operating conditions

Issue: The pollutant discharge concentrations and associated stack air discharge velocities need to be based upon ensuring that there are no human health impacts from the tunnel, rather than achieving guidelines.

One of the most important assurances that can provided to the community that the project will operate safely, is that the external operational air quality limits (which should be include pollutant discharge concentrations and associated stack air discharge velocities) are based the assurances of the NorthConnex. t atis, there will be negligible human health impacts on the community potentially impacted by tunnel air discharges.

If the external operational air quality limits are based upon typical guidelines values (Eg. EPA 2005) that will allow the tunnel operators to pollute up to a guideline values – and will invalidate the assurance the project will have negligible human health impacts.

Solution: The pollutant discharge concentrations and associated stack air discharge velocities need to be based upon ensuring that there are no human health impacts from the tunnel, rather than achieving guidelines.

7. HUMAN HEALTH RISK ASSESSMENT

7.1 Background

As the majority of the human health risk assessment was based upon the relative increases in air pollutant levels from the air quality assessment, it outcomes were unsurprising given the small relative increase in pollutant levels predicted.

7.1.1 Human health risk assessment exposure for silica dust during construction

Issue: The human health impacts from the inhalation of silica rich dust generated from construction has not been assessed.

The tunneling and construction of the project will be generally in sandstone geology. Sandstone and especially Sydney sandstone contains high concentrations of silica which if inhaled can cause silicosis. As construction is likely to result a significant increase in the emission of construction related dust especially around major construction sites, there is the potential for nearby sensitive receivers to be exposed to an increased risk of silicosis. This issue has not been assessed in the EIS.

Solution: An air quality and human health impact assessment for the exposure of sensitive receivers to construction related high silica dust needs to be undertaken.

7.2 Assessment of noise impacts on human health

Issue: The human health impact assessment in relation to construction and operational noise is substandard

The human health impact assessment provides a good introduction to the potential impacts on sensitive receivers from increased exposure to construction and operational noise – but then doesn't actually assess the impacts of NorthConnex. This is despite there being detailed noise modelling which estimates noise levels that will be experienced by sensitive receivers. In ignores the large number of highly affected sensitive receivers and assumes that the noise mitigation measures will be entirely successful in mitigating impacts. It also ignores the fact the in many locations existing noise walls will be removed for extended periods, exposing sensitive receivers to both unmitigated construction and traffic noise – and it also does not reflect that many sensitive receivers will be exposed to high levels of construction noise for 4+ years.

Solution: A revised and comprehensive assessment of human health impacts from prolonged and excessive exposure to high levels of noise should be undertaken.

7.3 Liability for human health impacts

Issue: The EIS does not state who would be liable if human health impacts result from NorthConnex

While NorthConnex may claim that there will be no human health impacts from the project, given that this assessment is based around computer modelling with no actual data, the reality may be very different. Also the human health impacts may not be evident decades after the tunnel opening and after the tolling concession period is over. The community needs assurance that if there are human health impacts from the tunnel, that someone will be responsible for compensation and fixing the issue. As NorthConnex is not a registered entity, there is a distinct lack of transparency of who would be responsible if human health impacts from the tunnel were to occur. The community does not want to see a situation where "buck passing" between government and private companies results in affected individuals missing out on compensation and medical treatment.

Solution: The liability and responsibility for human health impacts in all stages of the project's operation should be clearly identified.

8. VISUAL IMPACTS

8.1 Design of the north ventilation facility

Issue: The visual appearance of northern ventilation building is totally inappropriate for its location in the middle of heritage conservation areas.

It is extremely disappointing that NorthConnex has made no effort to visually integrate the northern ventilation building into its landscape context. NorthConnex claims that the building is within the motorway corridor and therefore has been designed to meet that landscape context. This ignores that fact that houses and land within a heritage conservation area have been acquired for the ventilation building – and this land has yet to re-zoned at motorway corridor.

The ventilation building is located in valley and there will be significant clearing of large trees within the road corridor and in acquired land. Also any screening vegetation planted around the ventilation stack will need to relatively small in height so as not to interfere with the dispersion from the stack and there is an extremely limited area on south and western sides of the ventilation building to plant any landscaping. Consequently the ventilation building will be highly visible from many properties. Figure 7.59 in the Visual impact assessment shows the visual catchment of the ventilation stack with significant of areas of Wahroonga able to view the stack.

The argument that motorists are the most important receivers in viewing the ventilation building and therefore this has been the basis of its design, is frankly insulting to local residents. Motorists would only view the ventilation for seconds as they drive past at 80km – while many residents will have views of the ventilation stack 24 hours a day 7 days a week.

The ventilation building presented in the EIS is concrete brutalist structure – with no consideration of its context within a heritage conservation area – and able to be viewed from the Wahroonga Heritage Conservation Area from east of the M1.

Solution: The design and visual appearance of the ventilation building and associated structures should be undertaken in consultation with the community and Council – and should reflect the landscape context of the surrounding heritage conservation zones and properties.

8.2 Community involvement in urban design

Issue: Community and local council involvement in the urban design of the project is required due to its significant visual impacts in some locations.

The EIS was unclear about whether the community and local Councils would be consulted about urban design aspects of the tunnel as NorthConnex have not committed in Chapter 9 to consulting or involving the community or Council in the urban design of these elements. However in Appendix D - Community Communications Framework, there is an apparent commitment to involve the community and local government in the Urban Design and Landscaping Plan for the project. NorthConnex were asked to clarify their commitment to involving the community and Councils in the design of the project and have confirmed that they will involve the community and council in landscaping and urban design.

Solution: An Urban Design and Landscaping Plan for surface and landscaped elements of the project should be prepared in consultation with the community and local government.

9. NOISE & VIBRATION

9.1 Background

There were numerous issues identified with both the construction and operational noise assessments. The construction noise assessment did not address many of the activities and resultant impacts - and it is not satisfactory to delay these impact assessments to the Construction Noise & Vibration Management Plan. The construction vibration assessment was particularly lacking detail and did not address many of the risks and cumulative impacts of tunneling and surface works.

9.2 Noise monitoring

9.2.1 Calibration certificates for noise monitoring equipment

Issue: Calibration certificates for noise monitoring equipment are not provided in the noise assessment.

Demonstrating that the noise loggers and other monitoring equipment have been recently and correctly calibrated is essential for determining whether the noise monitoring results are valid. Poor calibration of noise monitoring equipment is recognised in the noise assessment report as one of the major factors in incorrect noise prediction. It is also an important component in ensuring the quality and integrity of measured ambient noise profiles. These need to be viewed for all equipment used.

Solution: Calibration certificates for all noise monitoring equipment should be provided.

9.2.2 Assessment of existing peak noise levels

Issue: The assessment of the existing peak noise levels has not been undertaken.

The review of the noise monitoring data for existing conditions does not include an assessment of the diurnal peak noise levels which is important in assessing any impacts from the noise modelling and the development of appropriate mitigation measures.

Solution: A review of the of peak hour LAeq (1 hour) (AM and PM) noise levels including their diurnal fluctuations and trends in existing ambient profiles should be provided.

9.2.3 Attended noise monitoring

Issue: Attended noise monitoring results not provided

The noise assessment indicates that attended noise monitoring was undertaken and used to calibrate the noise model, however the attended noise monitoring results have not been provided. These would assist in characterising local noise environs.

Solution: Attended noise modelling results and their assessment should be provided

9.2.4 Suitability of monitoring period

Issue: There is no discussion on the suitability of the monitoring period

There was no real discussion in the noise impact assessment on the suitability of the monitoring period in terms of traffic flows recorded during the monitoring in relation to typical traffic flows. It is noted that some of the monitoring was undertaken in December – which generally does not experience typical traffic flows due to Christmas and school holidays. Also corresponding traffic monitoring was not undertaken for noise monitoring associated with the M2 integration works. Without traffic counts and more importantly vehicle types, the calibration of the noise model can not be undertaken with any confidence.

Solution:

A more detailed assessment of the suitability of the monitoring period needs to be undertaken. Where the monitoring period is not considered suitable, noise monitoring should be repeated.

Noise monitoring with associated traffic counts needs to be repeated for the M2 integration works

9.3 Noise criteria

9.3.1 Existing industrial noise

Issue: Existing industrial noise influences have not been identified

For operational noise goals, no comment on existing industrial noise influence has been provided. Amenity noise goals should be established with consideration to the presence, or otherwise, of existing industrial noise impact. This is a requirement of the NSW Industrial Noise Policy.

Solution: Comment on existing industrial noise sources needs to be provided and the assessment updated to reflect any additional contributions.

9.3.2 Internal noise goals

Issue: Relevant internal noise goals are not identified in the noise assessment

Relevant internal noise goals should be identified within the EIS and noise impact assessment. Without controls, internal noise levels (specifically relating to sleep disturbance and maximum noise events during the night time period) may still be excessive with acoustic treatment. This needs to be clearly identified and then assessed.

Solution: Relevant internal noise goals need to be identified as well as the feasibility of achieving these for specific noise affected sensitive receivers.

9.4 Operational noise

9.4.1 Peak noise assessment

Issue: There has been no noise assessment undertaken on peak traffic levels

There will be numerous days every year where the project will be operational at its peak approved capacity (eg. before certain public holidays). The noise and vibration assessment does not present an assessment of this scenario – and whether the proposed noise mitigation measures would be sufficient to achieve the relevant criteria in the Road Noise Policy.

Solution: An assessment of noise and proposed mitigation measures for peak traffic periods needs to be provided.

9.4.2 Reduction in noise study area

Issue: The requirements of the Road Noise Policy (RNP) have not been strictly complied with.

The RNP requires an assessment of operational noise impacts for a minimum of 600 metres from the subject road. The operational noise assessment indicates that on advice from RMS this minimum distance has been reduced in some locations. However the report provides no details of where this has occurred. While this may be appropriate in some locations, without knowing which areas have had a reduced envelope it is impossible to know whether all reductions are justified. For example in east Wahroonga the M1 is audible over 1 km from the road corridor – and it would not be appropriate to adjust the assessment boundary.

Solution: A map and justification for reducing the RNP assessment boundary in specific locations needs to be provided.

9.4.3 Operational noise assessment scenario

Issue: The requirement for and the design of operational noise walls it only based upon traffic numbers ten years after opening (2029). The noise walls should be designed for a higher traffic through put.

As Transurban have a concession period of longer than 10 years, it is ridiculous to base the design of noise walls on only 10 years after opening. After the 10 years it is likely that the traffic numbers will be higher than predicted - and there will be numerous peak traffic days when the tunnel and M1 is operating at maximum capacity (eg. public holidays).

While noise levels could conceivably re-assessed after 10 years and the noise walls modified appropriately, this would involve additional construction works and impacts on residences – and the destruction of adjacent landscaping only planted 10 years beforehand.

To avoid the impacts of additional works and to provide guaranteed protection to sensitive receivers for peak traffic days, the noise walls and other mitigation measures such as ensuring the tunnel portals are fitted with low road noise pavement, and minimizing the gradients at the portals) should be based upon the maximum capacity of the approved project.

Solution:

The noise walls and other mitigation measures (including fitting low road noise pavement to all portals, and minimising the gradients at the portals and dive structures) should be based upon the approved maximum capacity of the project, rather 10 years after opening.

If NorthConnex is permitted to install noise walls based upon the 10 years after opening traffic numbers the following approval condition should be provided "After opening, an operational noise assessment should be undertaken every 10 years. Based upon the outcomes of the noise assessment, operational noise mitigation measures such as noise walls and property treatments should be reviewed and updated to ensure that noise levels at sensitive receivers meet the Road Noise Policy.

9.4.4 Cumulative operational impacts of multiple project noise sources

Issue: The cumulative noise impacts from operational traffic and the operation of mechanical equipment (such as the ventilation building) has not been assessed.

Many sensitive receivers around the ventilation stacks are going to experience a noise from the operation of the ventilation building as well as increased operational traffic noise. While the impact on sensitive receivers of these two noise sources have been assessed individually, there is no cumulative assessment of the impacts. Without a cumulative assessment, the full operational noise impacts of the project on some sensitive receivers may be underestimated.

Solution: A cumulative impact assessment of all operational noise sources from the project should be undertaken especially around the ventilation stacks and noise mitigation requirements reassessed.

9.4.5 Outputs from noise modelling

Issue: No sample model output noise files have been provided.

Sample model output files have not been provided in the noise and vibration assessment. This is typically dome in most noise assessment report. Because of the lack of sample model noise outputs assumptions and outputs of the predictive calculation cannot be verified.

Solution: Sample model output files need to be provided.

9.4.6 Design of noise walls

Issue: There is little information on the design and visual appearance of noise walls.

Many of the locations of new noise walls are in or adjacent to heritage conservation areas or heritage items. The visual appearance of the noise walls in these locations are important otherwise they will result in heritage impacts. To ensure that visual impacts of noise walls are minimised consultation with property owners and the Council is required.

Solution: Noise walls are to be designed in consultation with the affected community and Council.

9.4.7 Noise impacts assessment on two storey residences

Issue: Noise impact assessments have not been undertaken for two storey residences (ie upper storey).

It is unclear from the noise assessment report whether the report has modelled the operational noise impacts at the upper storeys of two or more floored premises. It appears that in some locations with a large proportion of two storey residence this has not occurred – and insufficient ground truthing for the modelling has been undertaken. This may significantly underestimate the number of houses requiring treatment or the height of noise walls.

Solution: Additional information needs to be provided on the ground truthing of the noise model and the identification of 2+ storey houses in impacted areas. The modelling may be repeated if this has not been undertaken in sufficient detail.

9.4.8 Condition of existing noise walls

Issue: The condition and height of many of the existing noise walls along the M1 are substandard and the EIS does not contain an adequate assessment of their existing condition.

Many of the noise walls along the M1 are in poor condition, constructed of materials that provide minimal noise mitigation, are of insufficient height and/or have gaps. This results in poor noise mitigation and unacceptable noise impacts on adjacent residential areas. The EIS does not contain an assessment of the condition of these existing noise walls and assumes that the condition of the noise walls comply with relevant standards. Consequently the noise walls in these locations have not been identified for replacement when clearly in many areas they are substandard.

Solution: A condition assessment of the existing noise walls needs to be undertaken and areas where new noise walls are required due to the condition of the existing noise walls need to be identified.

9.4.9 Assessment of maximum noise events

Issue: The assessment of maximum noise events is not adequate.

While the noise and vibration assessment presents an analysis of maximum noise events, the analysis is inadequate and does not predict any changes in maximum noise events from the project. This is a significant issue as most of the maximum noise events are the result of heavy vehicle using engine breaking and the proportion of traffic that are heavy vehicles using the project will be over 25%. Also some of the data in presented analysis underestimates the frequency of maximum noise events because it has not been corrected for distance between the logger and noise source. For example the frequency of maximum noise events at Carrington Park appears to be significantly lower than other locations, however, this is because the logger was approximately 110 metres from the M1 – when at some other location it was <40 metres.

Solution: A comprehensive assessment of maximum noise events should be undertaken. Any change to current maximum noise events (noise level, duration, frequency) should be quantified within the technical study.

9.4.10 Accuracy of noise modelling

Issue: It is unclear from the EIS, whether noise modelling took into account dwellings that are to be demolished.

In certain cases, properties are relatively protected from noise, due to acoustic shielding from nearby dwellings. Where properties are to be demolished, some acoustic shielding for nearby properties may be lost, and these properties may be exposed to higher noise levels during tunnel operation. It is unclear from the EIS, whether this was taken into account when modelling noise.

Solution: Noise modelling should be repeated, if the effect of current acoustic shielding from properties to be demolished has not been taken into account.

9.5 Construction impacts

9.5.1 Relocation of noise walls

Issue: The EIS does not clearly identify which existing noise walls will need to re-located or replaced – and has not undertaken a noise assessment for sensitive receivers where their noise wall are temporarily removed.

The EIS notes that some existing noise walls may have to be temporarily removed to allow construction access – and in some cases may need to be relocated to allow for the new layout. However the EIS does not provide any information on which walls may need to relocated or removed especially around Wahroonga. This information needs to be provided to provide the community with a full picture of the potential impacts and new infrastructure. Also there may be significant periods between the removal of an existing noise wall and the replacement with an equivalent performing wall. Sensitive receivers in locations where existing noise walls are to be removed will experience significantly increase noise impacts both from construction activities and the existing road traffic. The impact on these sensitive receivers has not been assessed in the EIS.

It is unacceptable for local residents to be without noise walls. Where noise walls are to be relocated, or replaced, new permanent sound walls should be erected prior to the current ones being removed. Where this is not possible, temporary walls, of at least the same height and performance as the existing noise walls should be built prior to existing walls being removed. Under no circumstance should construction work be allowed to occur unless appropriate noise walls are in situ.

Where existing noise walls are relocated, they should be replaced with walls of at least the same height as existing. Where there is a decrease in RL between current and new noise walls (ie when new noise walls are relocated down a hill) new noise walls should be of increased height to compensate for this.

Solution:

Existing noise walls that are to be temporarily removed and or re-located need to be clearly identified

NorthConnex should commit to erecting new permanent noise walls prior to removal of existing walls where possible.

Temporary noise walls should only be used where it is not possible to immediately erect permanent noise walls. Temporary noise walls should be at least of the same height and performance of existing walls.

Under no circumstance should construction work be allowed to occur until appropriate noise walls are in situ.

Where noise walls are relocated to a lower RL (ie down a hill), the height of the noise wall should be increased by the same amount.

Where Noise walls are relocated to a higher RL (ie up a hill), the height of the new wall should still be the same height as the existing wall.

Noise walls should be replaced where there is expected to be increased noise at ultimate capacity of the tunnel, and/or where properties in the local vicinity are predicted not to meet operational noise targets.

Existing noise walls that are to be temporarily removed and or re-located need to be clearly identified

A noise impact assessment for sensitive receivers that are in locations where existing noise walls are removed and not immediately replaced with a similar performing structure need to be undertaken.

9.5.2 Inadequate vibration assessment

Issue: The construction vibration impact assessment is inadequate.

The construction vibration impact assessment is cursory and does not adequately identify and assess all impacts and especially cumulative impacts. Targeted assessment of potential impacts during tunnelling, blasting and surface construction works should be carried out. Structural damage, human comfort, vibration dose levels, and any potential impacts to sensitive locations other than residential receivers (heritage structures for example) should be undertaken. Cumulative impacts should also be considered where there are multiple road headers impacting sensitive receivers and where sensitive receivers are also affected by surface works and tunneling vibration impacts. Also as noted in following section there may be other tunneling activities such as rock bolting and rock hammering that may be generated vibration. Consideration should be made to event intensity, duration, distance to foundations and existing geotechnical conditions. Suitable control measures and management practices can then be recommended.

Solution: A comprehensive assessment of all vibration causing activities and their cumulative impact on sensitive receivers needs to be undertaken. Also mitigation measures relating to vibration need to more clearly developed.

9.5.3 Vibration impacts on heritage items

Issue: The mitigation measures for construction vibration do not specifically mention heritage items and the assessment and mention of heritage structures in the noise assessment report is rudimentary.

There are many heritage items that are potentially impacted by vibration from construction of the project. This is particularly the case for heritage items that will be both impacted by tunneling vibration and vibration from surface works. However, the noise and vibration impact assessment is virtually silent on the impacts of vibration on heritage items, with two fleeting references to heritage structures and no mitigation measures proposed. While the Non-Aboriginal heritage assessment attempts to address the impacts of vibration on heritage structures, because it uses the Noise & Vibration Assessment as it's basis (and this document does not specifically address this issue), the impact assessment is substandard and qualitative.

Solution: The Noise and Vibration Assessment needs to be updated to specifically address the impacts of vibration on heritage items and specifically where heritage items are impacted by both vibration from surface works and tunneling. Appropriate mitigation measures also need to be detailed in the Noise and Vibration Assessment.

9.5.4 Out of hours noise assessment – M1 integration works

Issue: No out of hours assessment for the M1 integration works has been undertaken.

NorthConnex claims that there will no works outside standard construction hours for the M1 integration works and the portal construction – and consequently had used this as a justification for not presenting an out of hours noise assessment in the EIS for these works.

While the community thinks this is a great outcome – they are dubious that this promise can be delivered on giving their experiences with previous works on the M1 – which have resulted in extended and noisy out of hours works.

If NorthConnex was to later decide that out of hours works are required and they could address this through the Construction Noise & Vibration Management Plan – this would totally disenfranchise the community as they would not had the opportunity to review and comment on the impacts of the works via the EID process.

Consequently to protect the community from this situation and to hold NorthConnex to their promise, it is recommended that the Department of Planning impose a condition specifically limiting any out of hours works for the M1 integration and M1 portal construction works.

Solution: A condition should be imposed similar to "All pre-construction and construction works for the M1 integration and M1 portal and stack works will be undertaken within standard construction hours."

9.5.5 Construction traffic – spoil removal

Issue: The construction traffic impacts for spoil transport have not been assessed.

The location for the disposal of spoil has not been defined in the EIS – and consequently the impacts of construction traffic noise from spoil transport on sensitive receivers near the spoil disposal locations has not been assessed. As spoil transport may involve over 2000 truck movements a day, the traffic noise from these truck movements will be significant – especially as out of hours spoil transport is proposed. The locations for spoil disposal need to be defined and a construction traffic noise assessment for affected sensitive receivers needs to be undertaken as part of the EIS process.

Solution: A construction traffic noise assessment for spoil disposal locations needs to be undertaken.

9.5.6 Cumulative construction noise assessment

Issue: Many residents will be exposed to both construction site noise and construction traffic noise however the cumulative impact of this is not assessed.

Some residential areas especially around the tunnel support sites are going to experience high levels of both construction site noise and construction traffic noise – especially outside of standard working hours. Also some receivers will experience noise impacts from multiple construction sites. While an assessment of each type of noise impacts has been undertaken, a cumulative assessment needs to be undertaken to ensure that all highly effected residences are identified and appropriate mitigation measures implemented.

Solution: A cumulative assessment of construction site noise and construction traffic noise needs to be undertaken to ensure that all highly effected residences are identified and appropriate mitigation measures implemented

9.5.7 Incomplete tunnel noise and vibration assessment

Issue: Not all sources of construction noise and vibration from tunneling have been assessed.

While the noise and vibration assessment includes an assessment of the noise from the operation of the road headers, this is not the only source of noise and vibration from tunneling activities. Based on experience from other tunneling projects, rock bolting and use of rock hammers in the tunnel (eg. To create a trough for drainage) have caused significant number of groundborne noise and vibration complaints – especially at night time. The EIS also proposes the use of surface miners (p162) and these are not assessed or even mentioned in the noise and vibration assessment. These activities have not been assessed in the EIS and given that in some locations the tunnel will only be 9 metres below the surface and residential properties this is a significant omission.

Solution: A comprehensive noise and vibration assessment of the impact of rock bolting, rock hammering and other similar activities in the tunnel needs to be undertaken.

10. HERITAGE IMPACTS

10.1 Acoustic mitigation works on heritage properties

Issue: The acoustic mitigation works on individual heritage properties are not fully defined in the EIS and therefore it is impossible to assess their impacts.

As there has been no attempt to engage a heritage architect to determine the acoustic mitigation works for individually affected heritage properties and undertake a significance assessment for these works, these works can not be considered part of the project. The heritage report also downplays the type of scale of potential acoustic mitigation works to sealing wall vents and doors/windows when in fact the works can be more significant than these simple measures. The assessment of the significance of any acoustic mitigation works through a Heritage Subplan would not comply with NSW planning and heritage laws and would not provide an opportunity for the community, local government and affected property owners to comment on the works. Also as noted in the EIS, detailed design may result in additional heritage-listed properties requiring acoustic mitigation works. I

Therefore due to the lack of identification and assessment of acoustic mitigation works on heritage properties in the EIS, these works should be excluded from the project and assessed and determined separately through Part 4 development applications to the relevant Councils.

Solution: Acoustic mitigation works on heritage properties should be excluded from the project as they are not defined and their significance have not been assessed.

10.2 Visual impact on heritage values

Issue: The assessment of visual impacts on heritage values is cursory and does not cross-reference the visual impact assessment

The assessment of visual impacts on heritage values is cursory and does not cross-reference or consider the impacts detailed in the visual assessment.

A prime example is the assessment of the impact of the project on the Wahroonga Conservation Area. The visual impact indicates that significant areas of the conservation area will be able to view the project including the northern ventilation stack (Figure 7.59 of the Visual impact Assessment). The M1 is currently is obscured by the significant road corridor vegetation – which will be removed and much of the M1 corridor and new works will become visible. It is clearly incorrect that to say this will have a negligible impact. There are many other examples of this and it does not appear the heritage specialists have reviewed or considered the visual impact assessment.

Solution: The impact on heritage values of the visual impact of the project needs to be re-assessed in consideration of the visual impact assessment report.

11. ABORINGAL HERITAGE

Issue: The Aboriginal Heritage Assessment does not meet the relevant guidelines and further work is required before the impacts of the project on Aboriginal heritage can be assessed.

The Aboriginal heritage assessment was a cursory approach to a very important issue that does not comply with the relevant guidelines and standards. It is disappointing that NorthConnex views this as sufficient especially given RMSs excellent PACHCI procedures. The issues with the Aboriginal heritage assessment include:

- As described in the Aboriginal heritage assessment report, inspections of potentially impacted areas was undertaken in September, October and December 2013. This was significantly before the preferred option was released in March 2014 – and also before the additional works along the M2 were identified in the additional April SIAR. Also the inspections in September and October 2013 were before the DGRs for the project were issued. Clearly this timing indicates that the full scale and extent of the project could not have assessed during the site inspections with the Aboriginal representatives.
- It appears that no advertising for the registration of potential Aboriginal knowledge holders has been undertaken. This directly disenfranchises Aboriginal people that have a spiritual connection to areas potentially impacted by the project and is likely to result in important cultural and archaeological resources not being identified and therefore impacted during construction.
- There was no consultation with Aboriginal representatives after the site inspections and the Aboriginal stakeholders had no opportunity to comment on the final report.
- The Aboriginal consultation and heritage assessment process has not strictly complied with RMS's PACHCI process and OEH Code of Practice and Aboriginal Cultural Heritage Consultation requirements.
- The Aboriginal heritage assessment report claims that the project is permissible without development consent (Section 2.2.1) due to the ISEPP. This is clearly incorrect as the Minister for Planning is the consent authority for the project. The lack of understanding of the development approval pathway may have affected the impact assessment.
- The transects did not cover all potential impacted areas where Aboriginal sites may occur.
- The Aboriginal heritage assessment report does not clearly identify the potential direct and indirect impacts associated with the project – without doing this it is impossible to comprehensively assess the impacts of the project and determine whether the proposed mitigation measures are appropriate.
- As required by the DGRs the assessment was to undertaken in compliance with Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, July 2005). This clearly has not been undertaken.

Solution: The Aboriginal heritage assessment requires significant revision including advertising for potential Aboriginal knowledge holders, additional site inspections, a proper identification of potential impacts and review of the final report by registered Aboriginal participants.

12. GROUNDWATER

Issue: The groundwater assessment is substandard and does not meet the Director-General's Requirements. It also does not provide sufficient assurance that significant groundwater settlement impacts and groundwater drawdown will not result from the operation and construction of the tunnel.

The groundwater assessment – or rather the lack of groundwater assessment – in the EIS was one of the most concerning issues in relation to the overall document. The groundwater assessment in the EIS would be appropriate for a surface road, however as the EIS states:

"Measured standing groundwater levels vary from about two metres to 30 metres below ground level, indicating that the main alignment tunnels would generally sit below the groundwater table."

Given that NorthConnex will be one of largest tunnels in the world (in terms of length and cross-sectional area) and will be unlined, the potential for significant inflow of groundwater and the lowering of the groundwater table is extremely high. Impacts from significant inflow and drawdown can include:

- Settlement of the ground – resulting in damage to buildings, public infrastructure (such as sewers, water reticulation networks, roads) and other structures. In some cases this settlement can result in the catastrophic failure of the ground causing sink holes to develop, similar the Lane Cove Tunnel collapse. This is particularly a risk for NorthConnex as the tunnels are predominately underneath houses and other built infrastructure.
- Loss of access to water for existing groundwater users – if the drawdown of the groundwater table results in water levels decreasing to below the bottom of existing bores.
- Loss of flow in surface waterways – if there are flow connections between surface waterways and the groundwater, the drawdown of the groundwater table can result in an equizalent decrease in flow in surface waterways.
- Impacts on groundwater dependent ecosystems (GDE) – Ecosystems which depend on groundwater may be significantly affected if groundwater levels decrease to below their root zone.

For NorthConnex a substantially more comprehensive groundwater assessment would be expected including:

- Development of models of regional and local groundwater aquifers.
- Modelling of the impacts of both construction and operation on groundwater levels.
- Site and geological specific estimates of settlement due to groundwater drawdown.
- A more detailed assessment of settlement impacts on property and infrastructure.
- A more details assessment of impacts on surface waterways flows and GDEs.

Instead the NorthConnex groundwater assessment contains:

- No conceptual model of regional and local groundwater aquifers.
- There is no specific assessment for construction and the operational assessment is cursory.
- There are no specific site or geological assessments of settlement. Potential settlements are estimated but there is no methodology or no information about how these estimates were derived. They appear to be based on existing unknown literature rather than actual data or modelling.
- No meaningful assessment of the impacts of groundwater drawdown on GDEs and surface waterways.
- No cumulative assessment of the impact of NWRL and NorthConnex on groundwater levels

Even some of the preliminary estimates of settlement due to groundwater drawdown of about 20mm are extremely concerning especially for heritage items that will be impacted by vibration from tunneling activities and surface works. The level of assessment presented in the EIS clearly does not meet the DGRs.

Solution: Before project approval, a detailed assessment of groundwater impacts needs to be undertaken and exhibited to ensure that the significant risks of this issue are quantified and appropriate mitigation measures are developed.

13. PROPERTY IMPACTS

13.1 Background

There was no assessment of the impact of the project on property values, on rental prices or the ability to sell a property for either construction or operation. This issue was brought up numerous times before the EIS exhibition – and there was an expectation that NorthConnex was going to provide an assessment.

13.2 Failure to address the operational impact of the project on property values

Issue: The EIS did not address the operational impact of the project on property values

Many property owners brought up the issue of the impact of the project on property values with the NorthConnex project team in the pre-EIS consultation phase. And many residents were shocked when reading the EIS, there was no assessment or even mention of the potential impact on property values, despite pre-EIS assurances that this would be addressed. In one conversation with NorthConnex staff, a property owner was assured that the EIS would address this issue – and Real Estate Institute was going to be consulted to obtain data from other areas where tunnel stacks and portal were located.

One of the major impacts of locating ventilation stacks in a residential area such as this Sydney suburb is the resulting decrease in property values – especially those properties that are in close proximity to the ventilation stack – or have a view of the ventilation stack. Many local property owners have first hand experience of the impacts of the project on property prices as they have sold their houses to escape the impacts of the project. One typical example of a house about 230 metres from the stack that was sold during after the announcement of the preferred option in March 2014 was:

- Approximately 35% of all potential buyers immediately said they were no longer interested in purchasing the property when informed about the project.
- Pre-auction offers being made at 20-25% below the market value with buyers directly asking for a tunnel discount.
- Final sale of 10-15% below the pre-project market value of the house.

For houses directly opposite the stack, real estate agents have been providing valuations 25-35% below pre-project market value.

As well as the property owners facing a significant loss in property value, both local government and State government revenue will be impacted in the long term – as the ratable value of properties decrease and the stamp duty revenues fall.

However despite all of this available evidence on the NorthConnex website it currently states that:

"In Sydney and elsewhere around Australia large infrastructure projects have been shown to add value and better amenity to the area in which they are built and as such property prices have increased accordingly"

While this may be a regional effect it certainly does not apply to properties in close proximity to the stack and

portals that will need to contend with construction noise for 4+ years, followed by the constant visual reminder of what is essentially an industrial chimney, spewing out 9km of vehicle pollutants. Properties in close proximity to the portals and stacks will certainly have their property values adversely affected and to suggest that property values will increase fails the common sense test.

CAPS and its supporters have asked NorthConnex to justify this statement and also their refusal to provide any meaningful assessment of the impacts of road tunnels on property values. After months of asking, one of CAPS supporters was provided the justification of NorthConnex's assertions – the following reports were provided:

- Impacts of Rail Transport on Property Values
- OVER AND UNDER - A Practical Guide to the Condemnation of Aerial Guideway Easements and Tunnel Easements (for Light Rail)
- Proposed Parramatta Rail Link – Impacts on Property Values – Independent Peer Review
- THE EFFECT OF RAIL TRANSIT ON PROPERTY VALUES: A SUMMARY OF STUDIES

The reports indeed show that property values do increase when in close proximity to "major transport infrastructure" – unfortunately for property owners in close proximity to the NorthConnex stacks and portals, it is rail infrastructure that these reports and NorthConnex are discussing. The only mention of road tunnels is buried in the Appendix of PRL report for the M5 East, where

"The RTA concluded that the M5 East has had minimal impact on property value ..... excluding those properties that are located near the portals and ventilation stacks."

The EIS makes no mention of a Government buy back scheme, such as the one offered to residents near the M5 East portals and stack. Of the 300 residents offered the initial M5 East buy back scheme, about 100 took up the offer. This provided unaffected market value, removal expenses and legal and other associated costs. Subsequently, a less generous scheme was offered to those living within 400m of the stack. If NorthConnex are correct in their assertion that there is no impact on property values, offering a property value guarantee scheme to the properties surrounding the stacks and portals will not cost any money.

While it is recognised that there is currently no compensation available for property owners due to a decrease in the value of their property because of NorthConnex, it is essential that all impacts of the project are identified and assessed to provide a true picture of the benefits and costs of the project. The impact on property prices cannot conveniently ignored – and this is likely to be an issue with other proposed tunnel projects.

NorthConnex cannot be trusted to provide a transparent and realistic assessment of this issue given that they ignored property owners concerns in the EIS and have misrepresented the available evidence. Also as this issue is likely to be a concern for future tunnel developments such as WestConnex, an independent assessment of this issue needs to be undertaken. A study such as that undertaken by the Valuer-General on CSG impacts on property values would be a suitable template for such as study.

Solution:

1) *An independent study by the Valuer-General should be undertaken to assess the impact on property values of NorthConnex project and other tunnel projects so these impacts can be adequately assessed in the EIS*
2) *If NorthConnex believes there will be no impact on property values, they should offer a guaranteed property value scheme to ally property owners concerns.*

13.3 Failure to address the construction impact of the project on property values, rents and the ability to sell a property

Issue: The EIS did not address the construction impact of the project on property values, rents and the ability to sell a property

As for operational impacts on property values, the impacts on property values, rents and the ability to sell a property during the construction period was brought up numerous times with NorthConnex, however again this issue was not addressed in the EIS.

Because of the large number and size of the construction facilities and sites required for the project, there will be a huge number of properties experiencing prolonged and significant construction amenity impacts.

Local real estate agents have advised that it would be very difficult to sell properties with large active construction sites and facilities nearby. They have also advised that properties in close proximity to construction sites would be very difficult to lease, and would typically require a 50% rental discount to attract a tenant. On this basis, some property owners may find themselves unable to sell their house, and unable to lease it without significant financial loss.

A recent article in the Australian Financial Review, by Micheal Bleby (published 25/8/14) stated "*During construction of the Burnley Tunnel…..houses within 500m of the ventilation stack at the eastern end of the tunnel grew more slowly in price then those 500m to 1 km away.*"

Solution: The impacts of construction on property values, rents and the ability to sell a property should be assessed in the EIS.

13.4 NSW Government Profiteering

Issue: The NSW Government is making significant additional tax revenue by locating the portals and ventilation stacks in residential areas. The assets of affected property owners are being devalued and used to support the profits of a private company.

Property owners and residents as well as losing money on the value of their properties are also being gouged by the NSW State Government by having to pay stamp duty on the purchase of a new property. Many residents have no choice but to move because they are unable to put up with 4+ years of construction impacts. Other residents may be legitimately concerned about the operational noise, air quality or traffic impacts resulting from the project. Consequently the sale of their property in the short term is a must rather than an option. The evidence is clear – on Woonona Avenue in close proximity to the stack – approximately 80% of the properties are on sale or have been sold since the announcement of the project.

For each of these sales and the repurchase of a new property, the NSW State Government is taking typically $50-150 thousand dollars from affected residents that have been forced to move because of a project that is supposed to be of greater good to NSW – but as well is going to pay dividends to Transurban and WestLink M7 shareholders. Based on the number of sales since the announcement of the preferred option the government has profited approximately $15 million dollars – and as the project progresses this is likely to increase significantly.

This is a clear transfer of wealth from property owners to the NSW Government and domestic and international private entities – with no real benefit to affected property owners.At a minimum they should provide stamp duty exemption for impacted owner-occupiers that sell their properties and thereafter buy a new property within a 5 year period of the lodgment of the SSIAR with DP&E.

Solution: If RMS is not prepared to give property value guarantees, then RMS needs to provide stamp duty refunds for the sale of impacted properties and the purchase of new properties for affected owners.

14. COMMUNITY CONSULTATION AND ENGAGEMENT

14.1 Background

One of the most concerning issues about the delivery of the project to date has been the community information and engagement process. The desire of NorthConnex to genuinely engage with the community appears absent, with the focus of their activities to "tick" the community consultation box and to manage any opposition to their key messages. The methods and materials they have used to engage with the community are far from best practice, have not been provided in a timely manner and are in many cases misleading or incorrect. The communities impacted by the project are going to have significant ongoing interaction with NorthConnex and their initial experiences have been far from encouraging.

14.2 Distribution of community updates

Issue: The delivery of the community updates has been beset with issues.

As noted in a following section, NorthConnex is relying on the distribution of community updates as its primary means of informing the community about the project and the EIS exhibition. There have been a number of issues with their distribution which have resulted in the community not receiving the updates in a timely manner or not at all.

- It appears that for March 2014 community update (which announced the preferred option and the timing of the EIS), there was a large area around the northern stack (west of M1) where the community update was delivered inside a carpet cleaning brochure. There were too many people to suggest that this could of occurred by the same day delivery of the two items by separate service providers. This issue was brought up with NorthConnex, with the response that they used service providers with GPS tracking to verify delivery. That response didn't address the issue obviously.
- The July 2015 community update that announced the exhibition of the EIS and the air quality forum was delivered about a week after the EIS went on exhibition and only a week before the air quality forum. This is unprecedented for a major development project, where community updates about the EIS exhibition are routinely delivered before the EIS exhibition begins. Also in providing only a weeks' notice of the air quality forum, this would have limited the community attendance as many people did not have sufficient time to organize child minding, time off work etc. What is more concerning is that NorthConnex three weeks before the exhibition date were extremely confident that the EIS would go on exhibition in mid July 2014, so there was easily sufficient time to draft and distribute the update.

Solution: All future community updates need to be provided in a timely manner – and any complaints about the distribution of community updates need to be properly investigated.

14.3 Misleading information in community updates/ web site letters to newspapers and other communications

14.3.1 Independent Tunnel Air quality committee and Chief Scientist

Issue: The initial air quality and ventilation facts sheets were misleading and implied that the Chief Scientist and Independent Tunnel Air Quality Committee were going to be directly involved in assessing and setting air quality standards for the NorthConnex tunnel

Initial Air Quality and Ventilation factsheets were issued by NorthConnex in March 2014 and copies of these are attached in Appendix B. In reading the factsheets a member of the general public would have concluded that the Independent Advisory Committee on Tunnel Air Quality and the Chief Scientist would be involved in setting tunnel emissions standards and establishing the monitoring requirements for the NorthConnex tunnel. Based upon this fact sheet, CAPS tried on numerous occasions to contact the NSW Chief Scientist without success.

CAPS also contacted the NorthConnex project team to obtain details of the Independent Advisory Committee on Tunnel Air Quality's involvement on the project. After a number of weeks waiting for a response NorthConnex project team, finally admitted that the Independent Advisory Committee on Tunnel Air Quality would not be directly involved in the project (See email). CAPS suggested that the air quality and ventilation fact sheets were therefore misleading should be removed.

Also CAPS contacted the NSW Chief Scientist's office and provided them with a copy of the Air Quality Fact Sheet. Within 2 hours of emailing the NSW Chief Scientist's office with the fact sheet, CAPS received a call from NSW Chief Scientist's office. One of CAPS members talked to NSW Chief Scientist's chief of staff regarding the issue Air Quality Fact Sheet. He stated that the air quality fact sheet misrepresented the scope and remit of Independent Advisory Committee on Tunnel Air Quality – and they were in fact only producing some general research on tunnel air quality – which may or may not be available in the time frame for the NorthConnex planning approval. They were not going to be involved as a committee in any aspect of the NorthConnex tunnel. Within 24 hours the air quality and ventilation fact sheet had removed from the NorthConnex web site – suggesting that they too agreed that it was misleading.

CAPS brought this issue up with Dr Mehreen Faruqi, a Greens member of the NSW Parliament as the Greens had identified that the Chief Scientist's office had been "promised" to be involved in groundwater monitoring for a Pilliga CSG project by the NSW Government, without consulting them. The Greens lodged a GIPA request and found that that the NSW Chief Scientist's office had demanded that NorthConnex withdraw the air quality and ventilation fact sheets (See Appendix B), obviously agreeing with the premise that they were misleading.

Whether the factsheets were deliberately misleading or the result of poor drafting, they should have never been publically released.

Solution: NorthConnex needs to publically acknowledge the original air quality and ventilation factsheets were misleading.

14.3.2 Location of stacks in residential areas

Issues: RMS claims that existing tunnel stacks are located in residential areas

One of the most disappointing aspects of the community information campaign around the EIS, were RMS' continual claims that existing tunnel stacks are located in residential areas and therefore there was a precident for NorthConnex. Two prime examples of this were:

- A letter published in Hornsby Advocate on 20 June 2014 from a senior RMS project staff member claimed that the ventilation stacks from the Lane Cove Tunnel and Cross City Tunnel were in the middle of residential areas. The EISs for both those projects directly contradict those claims, with the EISs stating that the stacks are located in industrial and commercial/ entertainment areas, respectively. For the Cross City Tunnel the nearest residential building is a minimum of 200 metres away and the majority of buildings in close proximity to the stack are commercial buildings. The Cross City tunnel also has a 40 metre high ventilation stack and is about the 15% of the size of NorthConnex, so claiming that this was similar situation is doubly disingenuous. The Lane Cove Tunnel stacks are Lane Cove West Industrial Park in Sirius Road; and one at the eastern end, in the Artarmon industrial area, between the western end of Marsden Street and the Pacific Highway. Neither of these locations are residential zoned areas.
- The RMS media release in response to the 01/09/2014 article in the Sydney Morning Herald about doctors concerns about NorthConnex. In that media release, RMS states the Eastern Distributor stack was located in a residential area. What RMS failed to mention is that stack is only used in emergency situations, only discharges a very small proportion of the tunnel air and is for a tunnel that is about 15% of the size of NorthConnex.

These statements appear to be deliberately misleading and in no way support the justification for locating the NorthConnex stacks and portals in the middle of a residential and educational precinict.

Solution: RMS and NorthConnex communication procedures should be reviewed to ensure that misleading information is not published.

14.3.3 Misleading representation of M5 East trial

Issue: The information presented in project factsheets on the M5 East Filtration Trial was not a balanced presentation of trial.

The AMOG report on the M5 East Filtration Trial was selectively quoted by NorthConnex in the facts sheets and the EIS to provide an unrealistic picture of the costs and performance of filtration. Examples of this include:

- The fact sheet did not contain details about the percentage of PM removed – which is surely of great interest to the community. The percentage removal was approximately 65%.
- The only information provided about the removal efficiency from the trial was "This is around five per cent of the particulate matter produced by the cars, trucks and other vehicles using the tunnel." However no context was provided around this figure, namely that the trial only treated about 50% of the westbound tunnel and more importantly the ESPs were only turned on 4 hours a day. With these operating parameters of course the trial was only going to remove a small proportion of the total PM.
- The fact sheet did not contain any details about other filtration systems – where the typical efficiency is 90+%.
- As discussed, the M5 East Filtration Trial was not an appropriate example to use to discuss the costs and performance of filtration as it was a poorly designed retrofitted filtration system.

Solution: NorthConnex modifies its fact sheets and other information to provide a realistic and responsible representation of the M5 East Filtration Trial.

14.3.4 Wahroonga as an industrial suburb

Issue: Many of the initial artist's impressions of the project showed Wahroonga as an industrial wasteland

A number of the artist's impressions of the project showed residential properties, many of them heritage listed, adjacent to the stack and other elements of the project as grey concrete boxes (See x.x). This gave the distinct impression that the stack was located in an industrial area, rather than the stack being located in a residential and a heritage conservation area. Eventually after weeks of complaints, revised artist impressions were provided, however, again they were obviously substandard as this time the houses were all flat and 21 Woonona Ave, and 45 Bareena Ave were featured (despite being confirmed as requiring acquisition by this stage). These drawings do not allow the scale of the northern exhaust stack to be compared to the pre-existing area, when houses are all "flattened".

When questioned on this, NorthConnex said they were only early artist's impressions and they were not intended to show the context of the stack. This answer is obviously unsatisfactory – and if the artist's impression were not supposed to show the context of the stack – the question is what were they supposed to show. It suggests that either NorthConnex deliberately displayed the surrounding residential properties as concrete boxes to give the impression that the stack was located in an industrial area – or that NorthConnex were too cheap to commission realistic artist impressions. Given this is a $3 billion project and NorthConnex proposes to put the northern ventilation stack in the middle of residential areas, this is clearly not a satisfactory occurrence.

It is also disappointing, that a NorthConnex video which remains on the website (as of 31/8/14) includes an image of the northern ventilation stack (at around 44-45 secs) with surrounding concrete boxes, and several houses which are destined to be demolished.

Solution: Only images that portray the proposed development and surrounding environment accurately should be used. Where accurate images are not available, misleading images should not be permitted as an alternative.

14.4 Reliance on community updates to consult

Issue: Over-reliance on community updates to inform the community.

NorthConnex has relied on community updates hand delivered by commercial providers as their primary mechanism for informing the community and stakeholders about the project. Issues with their delivery are discussed above. Relying on this for primary contact with residents and other stakeholders in close proximity to the stacks, portals and other major components of the project is clearly unsatisfactory as even now CAPS are encountering residents in close proximity to project infrastructure who know nothing about the project.

For a $3 billion project in a densely populated section of Sydney it would be expected that houses and businesses in close proximity to the stacks, portals and other major components of the project would have been door-knocked – which is standard practice on other RMS projects.

It would also be expected at a minimum that information about the project and EIS would have been sent via mail to the property owners. There are a large proportion of rental properties in the area – and therefore property owners that are currently renting their properties are still unlikely to know about the project

The failure to door-knock and to provide information directly to property owners are indicative of a second rate cut-price consultation program – whose objectives are to "tick the box" for undertaking community consultation – and not a genuine attempt to engage the community.

Solution:

1) *Moving forward NorthConnex commits to undertaking genuine engagement with the community.*
2) *NorthConnex updates it Community Engagement Plan to include reasonable measures to ensure all the community, property owners and other stakeholders are fully informed about the project and its impacts.*

14.5 Failure to inform community of critical state significant infrastructure status

Issue: The community were not adequately informed of NorthConnex's critical state infrastructure status, or the legal ramifications of this.

Minister for Planning and Infrastructure, under the Environmental Planning and Assessment Act 1979 designated the project as critical infrastructure in 2013. This has significant ramifications for the affected community, and the legal avenues they have to challenge the development.

Despite this, in the March/April Community Information Sessions, the project was listed as "state significant infrastructure". Again in late May, when the NorthConnex team presented at St Lucy's P&F meeting, the project was listed as "state significant infrastructure". Tim Parker (RMS Project Manager) was specifically questioned by CAPS members in attendance whether the project was in fact critical state significant infrastructure- a fact Tim Parker seemed unclear about.

Additionally, at the Air Quality Forum at Hornsby RSL on the 29/7/14, during a talk given by the Department of Planning, NorthConnex is described as a State Significant Infrastructure Project. At no time was it explained that NorthConnex had been given a CSSI status.

Solution: All future CSSI projects should be identified to the effected community as such, and the ramifications of this clearly explained.

14.6 Air quality forum

Issue: The NorthConnex air quality forum did not meet the expectations of the community and was a largely platform for NorthConnex to promote its air quality assessment, rather than a genuine opportunity to interact with the community

While CAPS supported the concept of an air quality forum, the air quality forum organized had many issues including;

- The air quality forum was held only two weeks after the start of the EIS exhibition. Because of the delay in delivering the community update to inform the community about the EIS and Air Quality Forum, many people only knew about the forum a week beforehand – and consequently found it difficult to attend (eg. To organize child minding, time off work etc)
- The details of the speakers and format of the air quality forum was only released a day before the air quality forum.
- NorthConnex advertised a panel of independent experts – and what we got was one independent expert based in New Zealand, whose name was only released the day before and who hadn't read the EIS and appeared to know little about the project. The community went there based upon NorthConnex's promotion of the event, expecting a panel of independent experts that they could ask questions specifically about the project.
- After NorthConnex's presentations only 45 minutes was allowed for questions before the event was closed down. Given that there were 500+ people there and this was their only opportunity to engage with the air quality

specialists, many left the forum unsatisfied and with their questions answered.

- Many of NorthConnex's responses to the more technical questions were lacking in rigour and they often did not directly respond to the question asked. As there was no opportunity to ask follow-up questions or demand a proper response, many questions were left answered. If NorthConnex were appropriately concerned about ensuring the community were well informed about air quality; they would have formally closed the meeting at the advertised finish time of 9pm, but invited those members of the audience with remaining questions to stay, and continue with the Q&A session.
- NorthConnex assured CAPS before and after the air quality forum that an unedited video of the forum would be uploaded to the NorthConnex web-site, yet the video was not made available until the 15/8/14, some 17 days after the actual forum.

Overall the air quality forum appeared to be a platform for NorthConnex to promote the EIS and tick a box in regard to community consultation, rather than a genuine effort to directly engage with the community and address their concerns.

Solution: All future air quality forums planned by RMS need to understand the failures of the NorthConnex air quality forum – and provide a genuine opportunity for the community to engage on this important issue.

14.7 Incorrect letters to property owners regarding individual property noise treatment

Issue: NorthConnex have sent letters to property owners regarding "potential eligibility for individual property noise treatment". A number of property owners were sent this IN ERROR.

On the 18/7/14, those properties that were identified in the EIS as predicted to exceed the NSW Government's operational noise targets were sent a letter titled "Potential eligibility for individual property noise treatment". Issues with these letters include:

- They were addressed "To the Property Owner". Given the significance of the content of this letter, it is only right that NorthConnex address the letter personally. In the case of affected properties being leased, it is unclear whether a separate letter was sent to the address of the landlords, or whether NorthConnex assumed all tenants would pass this letter on in a timely fashion.
- Paragraph 2 and 3 speak of the benefits that NorthConnex will provide for the rest of the state. Given that this letter was written to property owners that will be worse off because of this project, pointing out how others will benefit is grossly insensitive and offensive.
- The letter does not give any clear guidance regarding what mitigation measures may be available to identified property owners, or how effective this may be. There is no indication regarding specifically when property owners will be given more information, only that this will be "subject to detailed design and additional assessment".

CAPS are aware of several cases where this letter was sent IN ERROR to properties that were not in fact identified in the EIS being predicted to exceed operational noise limits. In one case CAPS were informed by NorthConnex staff that the error was because they relied on Google maps to provide addresses of identified properties. In this particular case, Google maps provided the incorrect address, meaning one property received the letter when it had not been identified in the EIS, whilst another property did not receive this letter despite having been identified in the EIS. Correction letters were not sent out to property owners that had received this letter in error until the 25/8/14- some 38 days after the first letter was sent to property owners. This is despite phone calls, emails, and direct contact with NorthConnex staff alerting them to these errors.

Solution:

1) *NorthConnex have a responsibility to ensure letters containing important and distressing information about specific properties, are sent to all affected properties, and not to any unaffected properties. Protocols and policies should be in place to ensure this occurs. Google maps should not be relied upon to receive accurate addresses.*
2) *Letters sent to individual properties should be personally addressed, rather than the ubiquitous "property owner". In the case of leased properties, separate letters should be sent to the property owner's current residential address as well.*
3) *In instances where errors occur, these errors should be corrected as soon as possible. "Internal review processes" should not take 5 weeks before distressed community members are informed of errors.*
4) *Letters should provide as specific information as possible, and should be associated with NorthConnex staff with appropriate expertise being available to meet with effected residents at the time the letters are being distributed. NorthConnex staff should be conscious of residents pre-existing work, study and social commitments, and be prepared to meet with residents in the evening, at weekends, etc where necessary. A copy of notes taken by NorthConnex team members at any meeting with residents, should be automatically provided to the resident.*

15. ALTERNATIVE OPTIONS

15.1 Background

Director General's requirements includes an analysis of alternatives/options considered having regard to the project objectives (including an assessment of the environmental costs and benefits of the project relative to alternatives and the consequences of not carrying out the process, the suitability of the chosen alignment and whether or not the project is in the public interest.

The EIS provides only minimal discussion of potential alternative configurations for the preferred option, especially with regards to the placement of the northern stacks and portals.

15.2 Selection of the preferred option

Of the three tenders submitted to NorthConnex, we know little of the unsuccessful tenders. NorthConnex claim commercial in confidence as justification for not releasing any information regarding the alternative two proposals. The community is unable to have confidence in the preferred option, until details of the two alternatives are released.

There is no evidence that NorthConnex seriously considered any alternative configurations apart from the 3 tenders submitted. Population density falls significantly within 2km of the current northern portal and stack, allowing a number of solutions for the northern portals and stacks to be situated away from residences, and thus minimizing the impact of air quality, noise and visual appearance. There is no evidence that more northern locations were seriously considered.

Detailed analysis of all alternatives with appropriate validated data comparisons of all aspects and issues needs to be provided by NorthConnex to justify their claims that their preferred alternative is superior. The whole process needs to be independently supervised including community input.

15.3 Safer Alternatives

This tunnel is a story of two communities. Those currently living close to Pennant Hills Road, will benefit from a reduction in traffic along the surface road, albeit temporary until the traffic levels quickly return to current levels. This will temporarily improve air quality, and will have a positive effect on health outcomes. Meanwhile, communities at either end of the tunnel will experience a deterioration in air quality. This submission has identified a number of issues with the air quality modelling which may have resulted in an underestimation of air quality and associated human health impacts of project.

Locating an unfiltered 15 metre high ventilation stack for mega-tunnel (with 25% heavy vehicle proportion) in a valley and in the middle of a residential and educational precinct, is a high risk option. If the tunnel doesn't operate as promised the scale of human health impacts on residents and school children will be significant. However there are safer alternatives which can remove the risk for the community and the NSW Government - and can be feasibly funded. Presented in the following sections is a description of some the alternative options which need to be considered. These are not the only alternative options that need to be considered – there are others in the community (eg. Equilibria) that have their own alternatives that may be feasible.

15.3.1 M1 exit portal location

To protect those living near the M1 exit portal, the M1 exit portal should be moved away from residential areas. Extending the tunnel beyond the industrial area of Asquith (approximately in line with Stokes Avenue) would ensure the M1 exit portal was at least 300 hundred meters from the nearest residences. The reasons why the portals need to relocated include:

- Portal emissions can adversely impact air quality for about 100-200 metres around them. By locating the M1 exit portal at least 200 metres from residential areas, this will eliminate any potential impacts from portal emissions.
- Portal emissions will occur during emergencies and potentially will involve the uncontrolled discharge of toxic smoke from burning vehicles and tunnel infrastructure into residential areas.
- Portal emissions during normal operations of the tunnel have not been ruled out in the future. If portal emissions are planned during normal operations they need to be moved away from residential areas to protect the communities health.

Also in placing exit portals away from residential areas there will be other massive benefits for the community including:

- Significant reduction in construction impacts including reduced noise, vibration, dust, amenity, traffic and visual impacts.
- Reduction in private property acquisitions.
- No loss in private property values.
- Reduction in visual impacts from surface infrastructure.

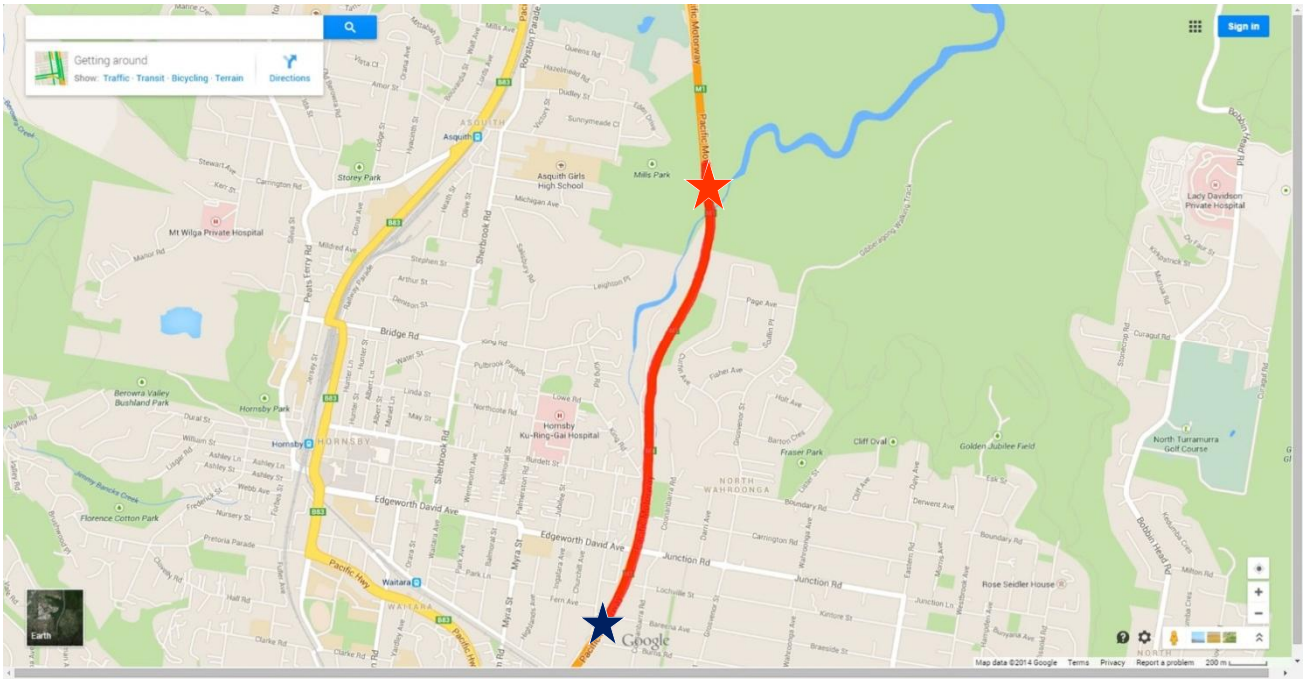


Image Courtesy of Google Maps

Figure 1: Portal placement. NorthConnex proposed portal ★ CAPS proposed portal ★

15.3.2 Pearce's Corner Portals

For the Pacific Highway/Pennant Hills exit portal located near Pearce's Corner - there are no feasible options to move the portal to an area of lower population density. At this portal, there will be an 800-850m long off ramp with no associated stack, and where jet fans will be expected to overcome the piston effect, despite there being no jet fans for the final 300m of tunnel. The alternative options for this location include:

- Revised ventilation design to ensure that there are no portal emissions – and a commitment from NorthConnex that there will be no future emissions from this portal.
- Installation and operation of inline tunnel filtration system. This system would not be large as the Pacific Highway/Pennant Hills off ramp is relatively short and only one lane wide – and could easily be installed on RMS land at the Pearce's Corner construction compound.
- RMS could offer to purchase properties within a 200m radius (at unaffected market value, plus costs eg stamp duty, removalist fees, etc).

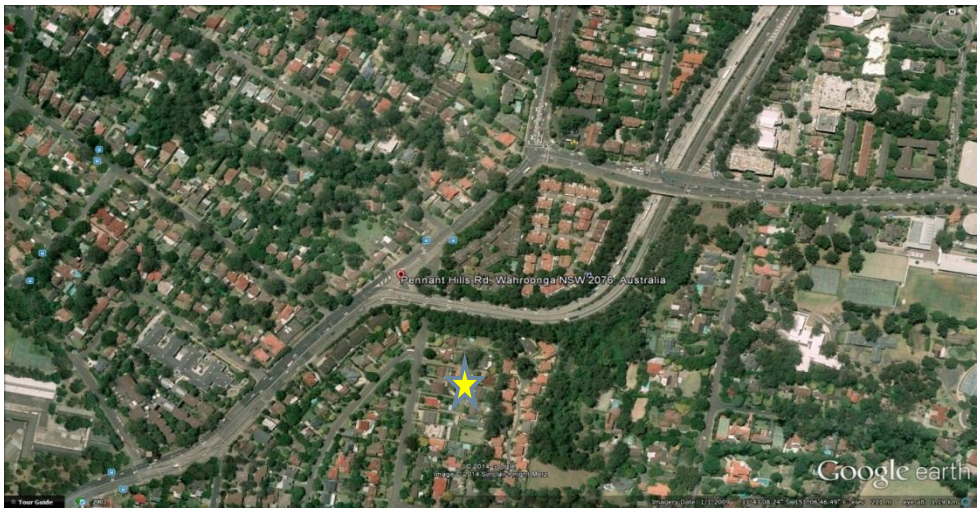


Image Courtesy of Google Earth

Figure 2: Portal located near Pearce's Corner

15.3.3 Location of ventilation stack

To protect those living near a northern exhaust stack, the northern stack should be moved away from residential areas. Of the limited number of modelled pollutants, an increased pollutant level is noted around the stack for approximately a 1km radius. There are significant concerns that the level of increased pollution is significantly underestimated in the EIS. Whilst modelling for the specific location would be required, to take into account topography, local weather conditions, current local air quality, etc; one could assume that placing the stack 1km or more from nearest residences would provide a reasonable safety buffer.

Moving the stack north east of a revised M1 exit portal location to Ku-Ring-Gai Chase National Park would provide a significant buffer to residential areas. Currently there is already a 330kV power line within the National Park and the area of disturbance associated with the stack construction would be substantially lower than a 330 kV power line.

Whilst separating the portal and stack consumes more energy, it does not alter the effectiveness of the tunnel ventilation system. As the stack would be away from residential, this may also allow construction of stack and associated services to continue out of hours.

Moving the northern tunnel portals and stack away from residential areas is in keeping with the comment made by Steve Cornish (Program Manager, Transurban) that this would be "better for the community" (April 2014).

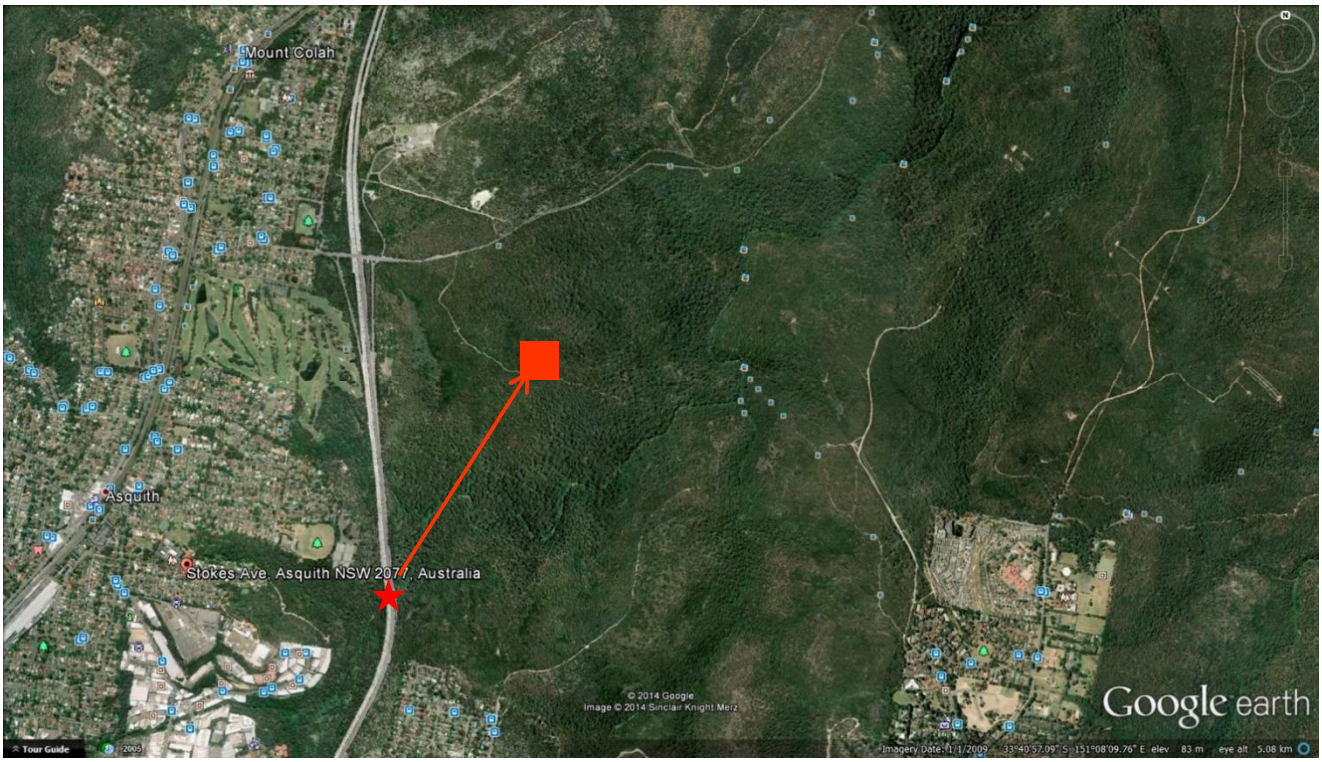


Figure 3: Position of CAPS proposed portal ★, with exhaust stack ■ vented into Ku-Ring-Gai National Park

15.3.4 Lengthening the northbound tunnel and shortening the southbound tunnel

Another feasible option is to increase the length of the northbound tunnel to locate the portals and stack in less sensitive areas – while shortening the southbound tunnel to start at Pearce's Corner. This would have numerous advantages including:

- Reduced construction costs including savings on new noise walls, property acquisition, surface road works, utility relocation and other aspects.
- The concentration of pollutants in the tunnel air discharged from the southern stack would be lower, as the southbound tunnel would be approximately 15% shorter.
- There would be sufficient space to construct the M1 portal near Pearce's Corners as only one portal would be required.
- The number of property acquisitions would be significantly lower.
- The number of residents that would be impacted by construction activities would be significantly reduced.
- The southbound and northbound tunnels could still have interlinking vehicle width cross passages at Pearce's Corner to allow emergency services access.

For the lengthened northbound tunnel, motorist evacuation facilities (eg. either a smaller tunnel or exit stairways to the surface) could easily be provided as is for many other single tube tunnels in the world.

15.3.5 Zero grade tunnel

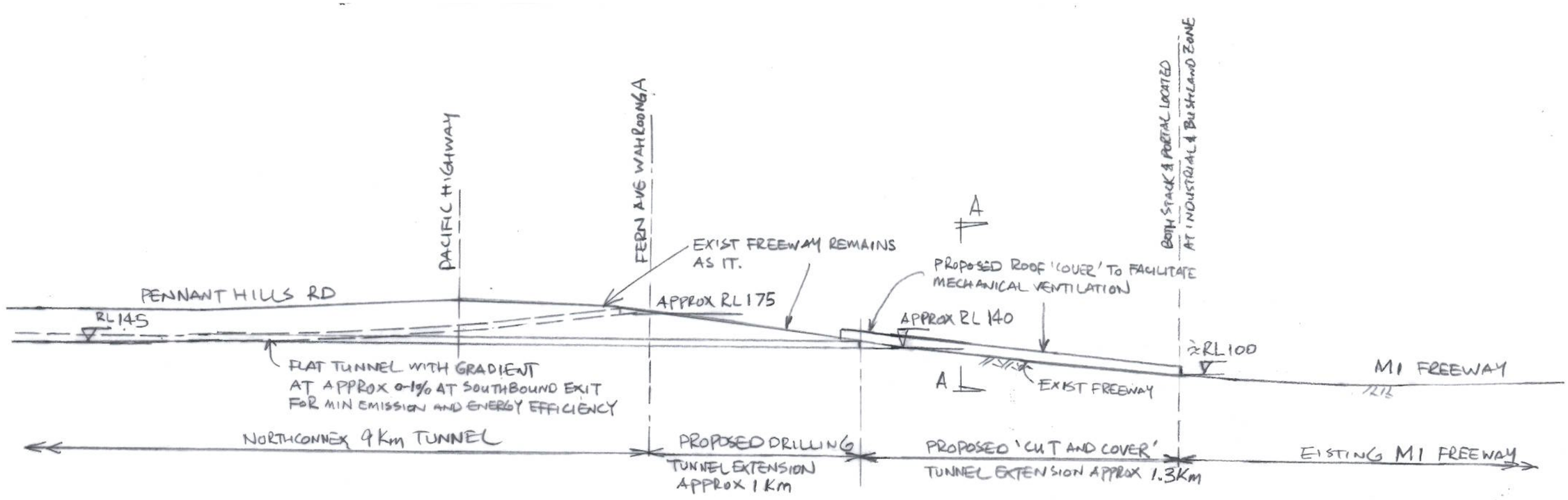
The geological long section of the tunnel presented in Appendix D of the EIS shows that the tunnel from the M2 portals (at about 123 metres RL) dips significantly below the proposed NWRL (to an RL of about 75m) before rising to about RL 175 at the M1 portals in Wahroonga. Because of this significant sag in the tunnel, both southbound and northbound vehicles experience high road grades – which result in the generation of significantly higher quantities of pollutants.

A much better solution would be to reduce the grade to as close to zero as possible. While this is not possible with the M1 portals being located in Wahroonga, however, if the portals were located on the M1 in line with Stokes Avenue in Asquith (which is about RL 121 metres), a zero grade tunnel at approximately 120 metres RL becomes a closer reality. The only issue is the interface with the NWRL and a low point just north of the M2. A more complex tunnel alignment and construction methodology would be required in this area (with NorthConnex going over the NWRL slot rather than under), however, there is no technical reason why this could be achieved. As the NWRL would not be an operational rail line (and NWRL tunneling may not have even reached this location by the time NorthConnex starts tunnel construction), the construction and safety risks are significantly reduced.

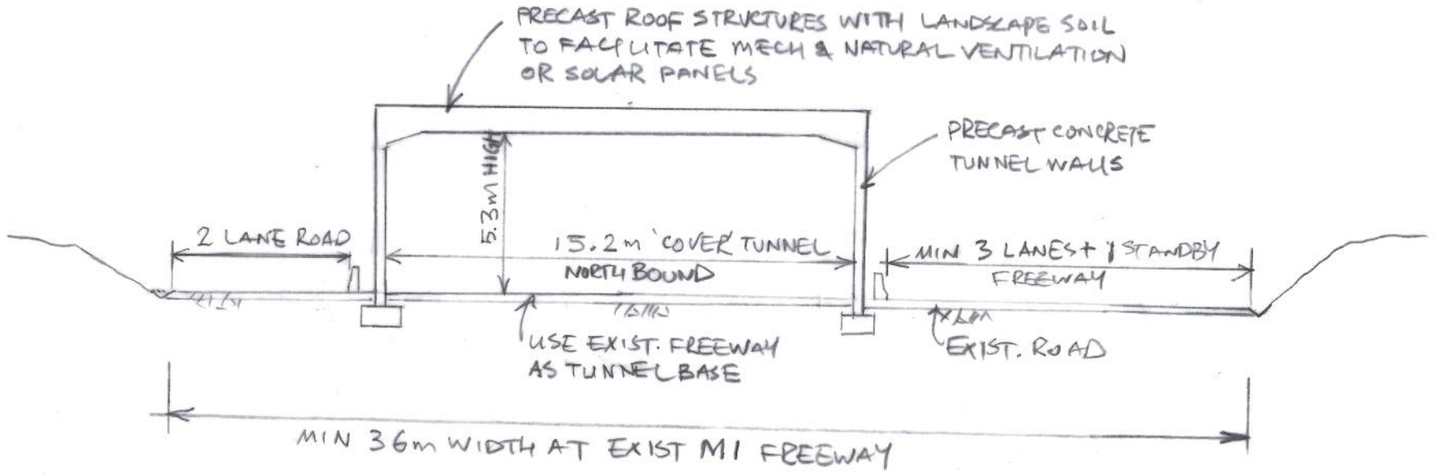
In having a zero grade tunnel, good in tunnel air quality can be achieved and it allows the extension of the northbound tunnel without human health risks for tunnel users. It also likely to result in lower emissions from both the northern and southern stacks, benefitting communities at both locations.

15.3.6 Cover tunnel

Another alternative to extend the tunnel further north would be to cover the existing M1 with a concrete structure. Basically once the tunnel reaches RL 140 metres instead of continuing to tunnel up to RL170 metres at Woonona Ave, a flat tunnel would be constructed which would exit about 1 kilometre north of the currently proposed M1 exit portal location. For another kilometre the tunnel could be extended using an above ground concrete tunnel. The cost of this type of construction would be significant lower than underground tunneling (about 75% lower) – and appropriate safety and egress requirements could be easily implemented. A diagram showing the concept is presented on the following page.



ALTERNATIVE TUNNEL LONGITUDINAL SECTION



SECTION 'A-A' AT 'CUT & COVER' TUNNEL 1:200

ALTERNATIVE 'CAPS' PROPOSAL FOR 'CUT & COVER' TUNNEL EXTENSION AT WAHROONGA

AT 21/8/14

15.4 Filtration

Filtration of tunnel air is extremely effective. CETU (2010) quotes the following removal efficiencies of particulate matter for electrostatic precipitators:

- $PM_{<2.5}$ 54-91% efficiency
- $PM_{2.5-10}$ 94-99% efficiency
- $PM_{>10}$ >99% efficiency

However, filtration of stacks is not a preferred solution to mitigating the impacts of tunnel air quality at the northern end of NorthConnex as:

- Filtration systems can be turned off – and often are on other tunnels which negates their benefits.
- Stack filtration systems don't treat portal emissions.

However filtration would be an acceptable option if:

- The filtration system was an in-tunnel system. An in-tunnel filtration system would probably negate the need for stacks and portal emissions of clean tunnel air could be considered.
- If the filtration systems were turned on all the time, rather than just during peak periods. As in-tunnel system often consist of multiple filtration systems at various locations, in non-peak periods some but not all systems could be turned off.

However, the community has no real idea of the costs and benefits of filtration system as NorthConnex defaults to the M5 East Filtration trial – which as discussed in previous sections is not truly representative of filtration systems for a new tunnel.

15.5 Potential funding sources

Issue: There are many potential funding sources for alternatives

The increase in the overall budget for the project to move the northern portals and stacks further north is less than 15% of the proposed budget based upon the NorthConnex's own cost estimates. There are many viable alternative options as presented above, that could significantly reduce this cost.

- Heavy Vehicle Toll Pennant Hills Road – A heavy vehicle toll could be imposed on Pennant Hills Road and the proceeds of the toll could be used to fund the extension of the tunnel. The toll would also encourage heavy vehicles to use NorthConnex, if it was set at an appropriate level. The tolling system could also be designed to only toll heavy vehicles that are not undertaking local deliveries or are carrying dangerous goods.
- Extending the concession period - The concession period for the operation of NorthConnex could be lengthened to allow additional investment to extend the tunnel. The basic reality is that the tunnel is always going to be tolled as the public infrastructure funding moves away from a government-funded model towards a user pays system. Whether the toll is paid to a private company or the government is a moot point with the vast majority of motorists.
- Additional government funds – The latest cost estimate from the NSW Government for WestConnex is a massive $11.5 billion. The benefits of specific major elements of this project are considerably less than NorthConnex – however it has attracted the lion's share of funding to the detriment of NorthConnex.
- Savings from shortening the southbound tunnel – As described above, by shortening the southbound tunnel to Pearce's Corner there could be significant cost saving as well as environmental benefits.

16. PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT

16.1 Background

Schedule 2 – Clause 7(1) of the EP&A Regulation list the matters the EIS must address. Subsection (f) of the same clause details with ecologically sustainable development.

Clause 7(1)f - the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4).

Clause 7(4) of the EP&A Regulation defines the principles of Ecologically Sustainable Development (ESD). Chapter 11 of the EIS contains an assessment of the project against the principles of ESD – however the assessment is fair from convincing or comprehensive. This is discussed in the following sections.

16.2 Precautionary Principle

The EP&A Regulation defines the precautionary principle as:

(a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options,

The current preferred option for NorthConnex clearly presents "a serious threat of serious or irreversible environmental damage" as:

- NorthConnex will be Australia's largest road tunnel and in the top five largest road tunnels in the world.
- The northern ventilation stack is unfiltered, only 15 metres high and is located in a valley.
- The northern ventilation stack is located in a residential and educational precinct – with over 9300 school children within 1.5km of the stack
- NorthConnex will eventually carry over 140000 vehicles per day with over 25% of them heavy vehicles
- NorthConnex refuses to rule out future portal emissions – and the claim that the current proposed design will have absolutely no portal emission is not supported by any evidence.
- There is an existing and increasing body of evidence that human exposure to particulate matter and ultrafine particles generated by vehicles can have significant health impacts as detailed in Section 6.3.3. There is no safe exposure level to cumulative toxins such as ultra-fine particles.
- Many reports and studies recommend locating stacks and portals away from residential areas where there are alternatives. This advice has clearly been ignored.

While NorthConnex may like to argue that the air quality and human assessment in the EIS provides "full scientific certainty" that the impacts of the preferred option are minimal, as detailed in this submission the air quality assessment has numerous issues and clearly does not provide "full scientific certainty" that the impacts will negligible.

There are a number of feasible alternative configurations of the portal and stack locations which could "*avoid serious or irreversible damage to the environment*" – through locating the northern stack and portals in locations with no nearby

sensitive receivers.

Also NorthConnex has not undertaken "*an assessment of the risk-weighted consequences of various options*". It has only assessed three tender designs which were extremely limited in scope and used an unknown assessment system. As discussed in Section 14, there are many other alternatives to the preferred that have not been considered or rigorously assessed.

The information presented in the EIS does not sufficiently justify that the project meets the precautionary principle.

16.3 Intergenerational equality

The EP&A Regulation defines intergenerational equality as:

(b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

The EIS, impact assessments and mitigation measures clearly do not meet the principle of intergenerational equality as they:

- Assessments and mitigation measures are only based upon traffic numbers at opening and 10 years after opening (eg. Noise) with no commitment to reassess project impacts at any time. Ten years isn't even a single generation! If actual traffic numbers are higher than predicted after 10 years many existing sensitive receivers, let alone future generations are going to experience significantly higher impacts.
- The ultimate capacity of the tunnel is not assessed - so cannot be claimed that that the project is protecting future generations if this scenario has not been assessed.
- The mitigation and monitoring measures in the EIS are mainly short-term and temporary. For example there is no period of air quality monitoring specified in the EIS and this could be as little as one year. This does not provide protection to future generations when the tunnel is at ultimate capacity.

If NorthConnex wants to claim that the project is maintaining or enhancing the environment for future generations, the EIS, impact assessment and mitigation measures need to reflect this. At this stage they are a long way from guaranteeing protection for future generations.

16.4 Conservation of biological diversity

The EP&A Regulation defines the conservation of biological diversity as:

(c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

The discussion in Chapter 11 on the project's compliance with this principle of ESD does not clearly identify that the project has been assessed as having a significant impact on the Blue Gum Forest TEC and a population of the threatened flora species *Epacris purpurascens var. purpurascens*.

The Northern Interchange Compound Site will result in the destruction of 1.14ha, of the remaining 170ha of BGHF. It is one of the largest stands of critically endangered BGHF outside of local bushland reserves. In total the NorthConnex project will be responsible for the removal of 2.81ha of BGHF. It is also noted that in Chapter 9 – Summary of Environmental Management Measures, there is no commitment to off-set the clearing of the Blue Gum TECs and the significantly impacted threatened flora species.

Therefore the claim that the project meets this principle of ESD is clearly incorrect.

16.5 Improved valuation, pricing and incentive mechanisms

The EP&A Regulation defines the final principle as:

(d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:

(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

In relation to this principle:

- Unlike other major polluters in NSW, NorthConnex will not pay load based licensing fees as it will not have EPL for operations. So the project clearly does not meet the polluter pays principle.
- The community around the stacks, portals and major construction sites are actually the ones bearing the costs of pollution as they will have the burden of increased dust, noise and traffic during construction. They will also be unable to sell or rent their properties for market value. During operations they will have the increased visual impacts, degraded air quality, reduced property values and higher noise levels – which will only be partially mitigated.
- The full life cost of the project has not been determined as ultimate capacity impacts from the project have not been assessed or quantified.
- The NorthConnex justification in Chapter 11 for compliance with this principle refers back to the commercial-in-confidence tender selection process. Without knowing the detailed criteria, their weighting and the assessment system, this reference is meaningless because the process is not transparent or open to public scrutiny.

16.6 Summary

The assessment of the project against the principles of ESD in the EIS is cursory and far from a compelling argument that the project meets these principles. As an adequate assessment of the project against these principles this is a requirement of the EP&A Regulation, it is suggested that the EIS is inadequate purely on this matter. NorthConnex needs to provide a more reasoned assessment against the principles of ESD and to address the issues raised above.

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18. APPENDICIES

Air quality

Australian ambient (outdoor) air quality is regulated according to standards set under the *National Environment Protection Measure: Ambient Air Quality* (NEPM). Australia's ambient air quality standards are among the most stringent in the world.

Monitoring air quality

The Office of Environment and Heritage (OEH) operates a comprehensive air quality monitoring network to provide the community with accurate and up-to-date information about air quality via an online database. The database provides real-time and historic information. Anyone may access the database using online search tools. (www.environment.nsw.gov.au/air/index.htm)

Impacts to air quality

An air pollutant is any substance in the air that may harm people or the environment and impact air quality[1].

Air pollution is caused by a range of activities including:

- Power stations
- Industrial activities
- Cars and trucks
- Fires, bush fires and hazard reduction burns
- Dust storms
- Construction activities

Once in the atmosphere some pollutants undergo further chemical reactions and they can be transported by air movement across regions.

In urban environments cars, trucks and other on road vehicles are a major source of air pollutants. For instance, in Sydney, they contribute around 60 percent of nitrogen oxide (NO_x) emissions and around 25 percent of volatile organic compound (VOC) emissions. In tunnels, almost all air pollution comes from vehicles.

Improving air quality

Air quality in Sydney is generally very good by international standards. Air quality has steadily improved since the 1980s with initiatives to reduce emissions implemented across industry, business, within homes and to motor vehicles.

In Sydney carbon monoxide, nitrogen dioxide, sulphur dioxide and lead concentrations are consistently well below national standards.

Emissions from motor vehicles have fallen dramatically in the past few decades and will continue to improve as a result of improved vehicle and fuel technology, even as the number of vehicles increases.

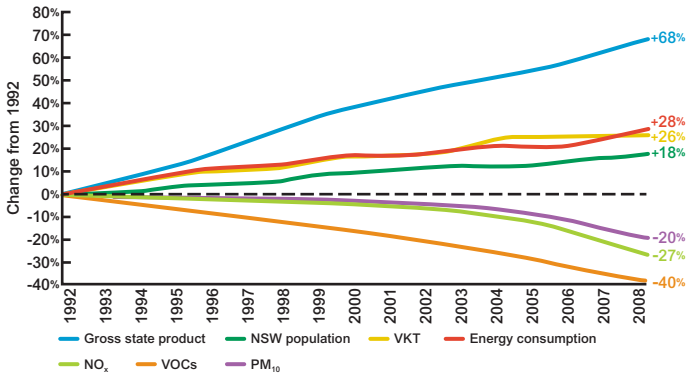
1. NSW Environment Protection Authority, *NSW State of the Environment 2012,* NSW Environment Protection Authority, Sydney, Australia.

Newer vehicles produce fewer emissions than older vehicles. Cars built in 2013 emit as little as 1 percent of the carbon monoxide emitted by a vehicle built in 1973.

The amount of carbon monoxide from vehicle emissions has been steadily dropping. By 2020 it is forecast to be 73 percent lower than what it was during the 2000 Olympics.

From 1992 to 2008 total emissions from man made sources steadily decreased in the Sydney region (figure 1), with nitrogen oxides (NO_x) and volatile organic compounds (VOCs) decreasing by 28 percent and 42 percent respectively, whilst PM_{10}, (airbourne particles up to 10 microns in diameter) are down 35 percent These reductions have been achieved despite increases in population, gross state product and vehicle kilometres travelled (VKT). One of the key reasons for this reduction is cleaner vehicles which even allowing for increasing numbers, the overall quantity of emissions continues to steadily fall.

Figure 1: Trend in emissions in the Sydney region, compared with key NSW statistics



Air quality and tunnels

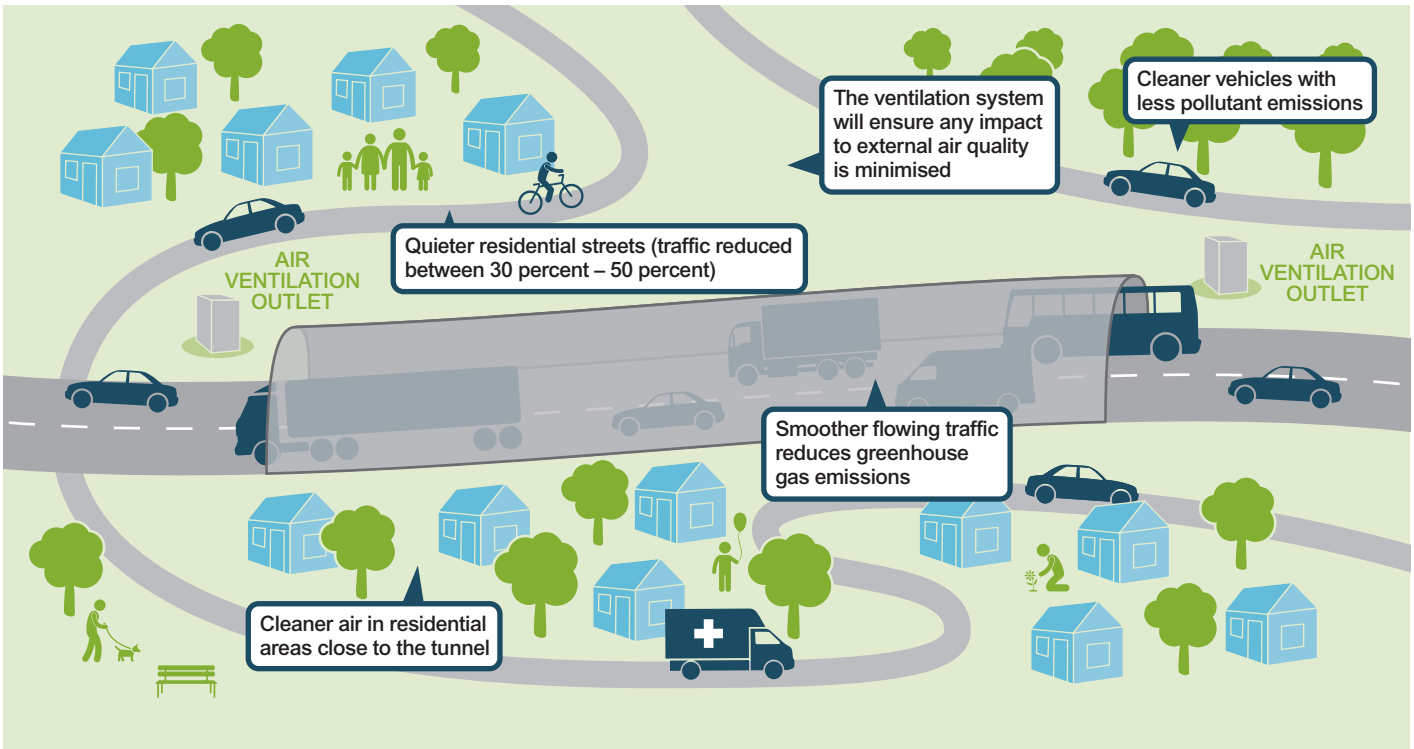
The NorthConnex tunnel ventilation system will be designed to meet stringent in-tunnel, local and regional air quality criteria. It will meet the Environment Protection Authority and NSW Department of Health standards, ensure tunnel users have a high quality experience and minimise impact to external air quality in the area around the tunnel.

This system will include a ventilation outlet at the main tunnel exit portals to effectively disperse the build-up of emissions within the tunnels. Ventilation outlets on other road tunnels have shown impact on local air quality cause little, if any, increase in exposure for people living nearby.

Tunnel air quality committee

The NSW Government has established an Independent Advisory Committee on Tunnel Air Quality chaired by the NSW Chief Scientist Professor Mary O'Kane to review national and international practice and experience with motorway tunnels to safeguard the health and safety of the community and motorists. The committee will:

- Enable setting of performance standards for road tunnel emissions
- Recommend appropriate monitoring, compliance and reporting mechanisms to acknowledge public confidence in the operation of road tunnels
- Provide ongoing advice to the NSW Government on air quality issues.



Transport
Roads & Maritime
Services

NSW GOVERNMENT

Dr Mehreen Faruqi MLC
Parliament House
Macquarie Street
SYDNEY NSW 2000

Enquiries: Stephen Kwok
Tel: (02) 8588 4914
Our ref:1415G-0188

28 August 2014

Dear Dr Faruqi

Decision on your application under the *Government Information (Public Access) Act 2009* (GIPA Act)

On 28 July 2014, we received your access application under the GIPA Act for the following information:

> *I would like to lodge a Government Information (Public Access) (GIPA) application with Roads and Maritime Services relating to the provision of public information on air quality for the NorthConnex project.*
>
> *Considering this, I would like the following request for information to be considered.*
>
> *1. For the period 1 April 2014 – 25 June 2014:*
>
> *a. All internal emails within Roads & Maritime Services relating to the "NorthConnex Factsheet – Air quality" and "NorthConnex Factsheet – Tunnel Ventilation System" documents (March 2014).*
>
> *b. All correspondence between Roads & Maritime Services and the NSW Chief Scientist's office relating to the "NorthConnex Factsheet – Air Quality" and "NorthConnex Factsheet – Tunnel Ventilation System" documents (March 2014).*
>
> *c. All correspondence between Chief Health Officer office and the NSW Chief Scientist's office relating to the "NorthConnex Factsheet – Air Quality" and "NorthConnex Factsheet – Tunnel Ventilation System" documents (March 2014).*

I have decided to provide access to some of the information subject to your application. I have also decided that RMS does not hold some of the information subject to your application.

My reasons for these decisions are outlined in the attached Notice of Decision. If you disagree with my decision, you may apply for this decision to be reviewed. Details on your review rights are contained in the review fact sheet enclosed with this notice.

Please do not hesitate to contact Mr Stephen Kwok on the above number or via email at: stephen.kwok@rms.nsw.gov.au if you have any questions.

Yours sincerely

Vincenza Kursun
Manager
Information & Privacy

Notice of decision on your access application under the *Government Information (Public Access) Act (2009)* (GIPA Act)

Applicant: Dr Mehreen Faruqi MLC

File reference: 1415G-0188

Decision maker: Vincenza Kursun – Manager, Information and Privacy

Date of decision: 28 August 2014

1. Your access application

1.1 On 28 July 2014, we received your access application under the GIPA Act for the following information:

I would like to lodge a Government Information (Public Access) (GIPA) application with Roads and Maritime Services relating to the provision of public information on air quality for the NorthConnex project.

Considering this, I would like the following request for information to be considered.

1. For the period 1 April 2014 – 25 June 2014:

a. All internal emails within Roads & Maritime Services relating to the "NorthConnex Factsheet – Air quality" and "NorthConnex Factsheet – Tunnel Ventilation System" documents (March 2014).

b. All correspondence between Roads & Maritime Services and the NSW Chief Scientist's office relating to the "NorthConnex Factsheet – Air Quality" and "NorthConnex Factsheet – Tunnel Ventilation System" documents (March 2014).

c. All correspondence between Chief Health Officer office and the NSW Chief Scientist's office relating to the "NorthConnex Factsheet – Air Quality" and "NorthConnex Factsheet – Tunnel Ventilation System" documents (March 2014).

I also refer to Mr Stephen Kwok's email on 20 August 2014. Thank you for agreeing to extend the due date by which a decision is to be made to 1 September 2014.

2. Searches for information

2.1 Under the GIPA Act, agencies must conduct reasonable searches to locate the government information you have applied for. Searches within Infrastructure Development Division and Strategy and Engagement Division were conducted for all relevant information subject to your application.

Seven pages have been identified as falling within the scope of your application.

3. Decision

3.1 I have been authorised in accordance with section 9 of the GIPA Act by the Principal Officer to make a decision in respect of your access application.

3.2 I have decided under section 58(1)(a) of the GIPA Act to release the information subject to your application. I have also decided under section 58(1)(b) that RMS does not hold some of the information subject to your application.

Page No.	Description of Request Item	Decision T = Section 14 Table of GIPA Act
1 - 5	*a/ All internal emails within Roads & Maritime Services relating to the "NorthConnex Factsheet – Air quality" and "NorthConnex Factsheet – Tunnel Ventilation System" documents (March 2014).*	Released in full
6 - 7	*b/ All correspondence between Roads & Maritime Services and the NSW Chief Scientist's office relating to the "NorthConnex Factsheet – Air Quality" and "NorthConnex Factsheet – Tunnel Ventilation System" documents (March 2014).*	Released in full
N/A	*c/ All correspondence between Chief Health Officer office and the NSW Chief Scientist's office relating to the "NorthConnex Factsheet – Air Quality" and "NorthConnex Factsheet – Tunnel Ventilation System" documents (March 2014).*	No information held – Section 58(1)(b)

4. Reasons for Decision

Under section 9(1) of the GIPA Act, you have a legally enforceable right to access the information you have requested, unless there is an overriding public interest against its disclosure.

Under section 5 of the GIPA Act, there is a presumption in favour of disclosing government information unless there is an overriding public interest against its disclosure.

To decide whether or not there is an overriding public interest against disclosure of the information you asked for, I applied the public interest test which is set out in section 13 of the GIPA Act.

I applied the public interest test by:

a. identifying any public interest considerations in favour of disclosure

b. identifying any relevant public interest considerations against disclosure, and

c. deciding where the balance between them lies.

4.1 Public interest considerations in favour of disclosure

Under section 12(1) of the GIPA Act, there is a general public interest in favour of disclosing government information. Section 12(2) of the GIPA Act sets out some examples of other public interest considerations in favour of disclosure. However, I am not limited to those considerations in deciding your application.

I find the following consideration in favour of disclosure to be relevant to your application:

- There is a general public interest consideration in favour of disclosing government information.

4.2 Public interest considerations against disclosure

When applying the public interest test, the only public interest considerations against disclosure that I can take into account are those set out in the table to section 14 of the GIPA Act.

I cannot see any relevant public interest consideration against disclosure in this instance.

4.3 Balancing the public interest considerations

I have considered the relevant public interest considerations in favour of and against disclosure of the information you requested and I have decided that there are no public interest considerations against the release of information subject to your application.

5 Form of Access

You have been provided with the requested information in the form of hard copy documents (seven pages) containing the information referred to in 3.2 above.

6 Disclosure Log

If information that would be of interest to other members of the public is released in response to a formal access application, an agency must record certain details about the application in its 'disclosure log' (under sections 25 and 26 of the GIPA Act).

In the letter dated 29 July 2014 acknowledging receipt of your valid application, you were told about the disclosure log. You were also advised of your right to object to the inclusion of details about your access application in the disclosure log.

I have decided that the information would be of interest to other members of the public and will therefore record the following details on RMS' disclosure log, which is publicly available on RMS' website.

- the date on which your access application was decided (that is, the date of this notice of decision)
- a description of the information that will be released to you
- whether that information is or will be available to other members of the public, and
- if so, how it can be accessed.

This decision is reviewable. Please see part 7 of this notice for information about your review rights.

7 Review rights

If you disagree with my decision, you may apply for this decision to be reviewed by

seeking:

- an internal review by another officer of this agency, who is no less senior than me;
- an external review by the NSW Information Commissioner; or
- an external review by the NSW Civil and Administrative Tribunal (NCAT).

You have 20 working days from the date of this letter to apply for an internal review and 40 working days to apply for an external review by NCAT.

8 Further information

For your information and assistance, I have enclosed a fact sheet explaining your rights to have our decision reviewed.

Further information about the GIPA Act is also available by contacting the NSW Information and Privacy Commission on 1800 472 679 or via www.ipc.nsw.gov.au.

Please do not hesitate to contact Mr Kwok on the above number or via email at: stephen.kwok@rms.nsw.gov.au if you have any questions about this letter.

Yours sincerely

Vincenza Kursun
Manager
Information & Privacy

WONG Emily

From: WRIGHT Kandice
Sent: Tuesday, 1 July 2014 5:48 PM
To: MATTES Andrew M
Subject: FW: Old NorthConnex factsheet issue on web

FYI :)

From: Wilkins, Anna [mailto:awilkins@transurban.com]
Sent: Tuesday, 1 July 2014 1:48 PM
To: WRIGHT Kandice
Subject: FW: Old NorthConnex factsheet issue on web

Hi Kandice,
The old factsheet has been removed from the server.
Regards, Anna

From: Sacco, Anthony
Sent: Tuesday, 1 July 2014 1:38 PM
To: Wilkins, Anna
Cc: Waddell, Suzanne; Muir, Amanda
Subject: RE: Old NorthConnex factsheet issue on web

I try to replace older versions of files, with the new version (hence why I remove dates from the filenames). I think on this occasion, the 1 factsheet become 2, so the older one was left on the server.

From: Wilkins, Anna
Sent: Tuesday, 1 July 2014 1:35 PM
To: Sacco, Anthony
Cc: Waddell, Suzanne; Muir, Amanda
Subject: RE: Old NorthConnex factsheet issue on web

Thanks Anthony,

Is that the case with other details removed and replaced do you think?

Cheers, A

From: Sacco, Anthony
Sent: Tuesday, 1 July 2014 1:23 PM
To: Wilkins, Anna
Cc: Waddell, Suzanne; Muir, Amanda
Subject: RE: Old NorthConnex factsheet issue on web

Hi Anna,

That old factsheet has now been deleted from the server.

Anthony Sacco
Web Specialist
Technology
Level 23 / 727 Collins Street

Melbourne VIC 3008
Australia

Phone: +61 (0)3 8656 8222
Web: www.transurban.com

transurban

From: Wilkins, Anna
Sent: Tuesday, 1 July 2014 1:13 PM
To: Sacco, Anthony
Cc: Waddell, Suzanne; Muir, Amanda
Subject: FW: Old NorthConnex factsheet issue on web
Importance: High

Hi Anthony,

See below from Kandice at RMS.

Can you assist with removing access to the old AQ fact sheet on web?

Cheers, Anna

From: WRIGHT Kandice [mailto:Kandice.WRIGHT@rms.nsw.gov.au]
Sent: Tuesday, 1 July 2014 12:52 PM
To: Wilkins, Anna
Subject: Old NorthConnex factsheet issue on web

Hi Anna

Not sure what has happened here but you can still access the old air quality fact sheets using the link below. Can you please the documents can not be accessed anywhere on the web.

Many thanks
K:)

From: MATTES Andrew M
Sent: Tuesday, 1 July 2014 12:47 PM
To: WRIGHT Kandice
Subject: NorthConnex factsheet

Kandice,

See below where Chris Armtrong from the Chief Scientists office found the old factsheet they were unhappy with.

I note it is not accessible through the NorthConnex website - only the updated northern and southern ones are

What looks to have happened is happened is the new updated factsheets were uploaded and the webpage changed - but the old one was not deleted.

Could you arrange to have the old factsheet taken down?

Andrew Mattes
Snr Enviro Specialist (Air Quality)
Environment | Infrastructure Development
T 02 8588 5749 **M** 0403017462
www.rms.nsw.gov.au
Every journey matters

Roads and Maritime Services
Level 17 101 Miller St North Sydney NSW 2060

From: Chris Armstrong [mailto:chris.armstrong@chiefscientist.nsw.gov.au]
Sent: Tuesday, 1 July 2014 12:37 PM
To: CROWLEY Michael D; MATTES Andrew M
Subject: factsheet

Hi Michael and Andrew,
I just googled the Advisory committee and the NorthConnex fact sheet from March comes up. I think this version was wrong and they were going to amend it/. I am not 100% sure whether the problem is that I have an old link to the site and it has actualy been changed, or whether it is still out there. The link is as below. can you have a look and see if you come up with the same sheet?

Chris

http://northconnex.com.au/docs/Factsheet_Air_Quality.pdf

Chris Armstrong PhD | Director | Office of the NSW Chief Scientist and Engineer
Level 49 | MLC Centre | 19 Martin Place | Sydney NSW 2000 | GPO Box 5477 | Sydney NSW 2001
T: +61 2 9338 6745 | F: +61 2 9338 6830 | M: +61 408 641 782 |E:chris.armstrong@chiefscientist.nsw.gov.au

---

WONG Emily

From: WRIGHT Kandice
Sent: Tuesday, 1 July 2014 12:51 PM
To: MATTES Andrew M
Subject: RE: NorthConnex factsheet

Very strange! I will get the web team to investigate and remove in full.

Cheers
K:)

From: MATTES Andrew M
Sent: Tuesday, 1 July 2014 12:47 PM
To: WRIGHT Kandice
Subject: NorthConnex factsheet

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WONG Emily

From: Chris Armstrong [chris.armstrong@chiefscientist.nsw.gov.au]
Sent: Tuesday, 1 July 2014 12:46 PM
To: MATTES Andrew M
Cc: CROWLEY Michael D
Subject: Re: factsheet

Thanks Andrew,
much appreciated
Chris

Chris Armstrong PhD | Director | Office of the NSW Chief Scientist and Engineer
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On 1 July 2014 12:44, MATTES Andrew M <Andrew.MATTES@rms.nsw.gov.au> wrote:

> Chris
>
> It's still out there
>
> but
>
> its not accessible through the NorthConnex website - only the updated northern and southern ones are
>
> what I think has happened is the new updated factsheets were uploaded and the webpage changed - but the old one was not deleted.
>
> I'll chase it up and get it done

Andrew Mattes
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