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Director - Infrastructure Projects
 Department of Planning and Environment
 Number: SSI 13_6136
 Major Projects Assessment
 GPO Box 39
 SYDNEY NSW 2001

Submission by Bryan Johnson,
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Via online form:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6136

NorthConnex Application Number: SSI 13_6136

Please find below my submission in response to the exhibition of the EIS for NorthConnex.

I would like to state that I object to the project as described in the EIS.

Introduction

My name is Bryan Johnson. I am a grandfather. Three of my grandchildren live with their parents in Wahroonga. Their family home is located only 25 metres from the base of the proposed northern exhaust stack for the NorthConnex tunnel. They will be living in very close proximity to the proposed northern portal.

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 ██████████ risk of respiratory disease from particle and other forms of pollution ██████████
 ██████████ children, who in turn are at greater risk, during their formative years than adults in the population. This is unfortunate, but widely accepted medical opinion.

Prior to retirement I was a career public servant, working in the then N.S.W. Department of Public Works and Services and then in N.S.W. Treasury, Office of Financial Management. I was associated with infrastructure provision throughout my career.

I am concerned that the currently proposed unsolicited proposal by NorthConnex exposes the State of N.S.W. to possible risks to its credit rating, significant risks to liabilities for ongoing adverse health outcomes suffered by the community in proximity to the tunnel infrastructure, significant risk of financial burden from future community class action for specific damages from this project and from similar projects currently proposed. I am also concerned at the unfair burden of health, wellbeing and financial impacts that appears to be imposed on particular individuals and communities from this and similar projects where overall benefits claimed for the community at large are achieved at the extreme detriment and cost to communities often in proximity to the projects.

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I have read the submission in response to the NorthConnex Environmental Impact Statement by CAPS (Community Against Polluting Stacks) and Ku-Ring-Gai Council and I fully endorse both submissions.

Concerns

I have great concern regarding the following issues and request that these be considered by NorthConnex, Roads and Maritime Services and the Department of Planning and Environment.

In regards to the NorthConnex tunnel, I am concerned about:

Local community health.

1. placement of the northern ventilation stack in the centre of a densely populated residential area in Wahroonga, where 9,300 school children will be exposed, as well as multiple aged care facilities, hospitals, businesses and homes.

The base of the stack is located at an R.L. of approximately 170metres above sea level. This compares with an R.L. of 190 metres on the Pacific Highway at Wahroonga. Locating the exhaust stack in this valley reduces the likelihood of wind flows dispersing the stack pollutants.

Wind flow predictions for the stack site at Wahroonga show only one percent of days are still at this site. Yet no weather data close to this location have been used. Instead, data from sites as far away as Prospect and Sydney Airport have been used. The data used by NorthConnex suggests that Wahroonga is the windiest suburb in Sydney. This is in stark contrast to local knowledge that fogs not infrequently hang in Wahroonga for several hours of a morning. Pictures taken by Prof. Richard Chard, from upper floors of the San Hospital at Wahroonga last week clearly shows fog in the valley.

Such lazy weather and pollution dispersal predictions appear to me to be incompetent or deliberately misleading.

If the one percent figure for still air conditions has been understated which seems from all other wind speed data quoted in the EIS most likely, then the dispersals predicted will not be achieved, leading to higher levels of pollution spill onto the community in the vicinity of the proposed stacks.

The EIS predicts sufficient mixing and disposal of stack emissions to minimize dangers to health of people at ground level. There does not appear to be any consideration that many people in the vicinity of the northern stack will be living well above the level at the base of the stack. This is not only due to the fact that the stack is proposed to be built in a valley but that 6 story medium density housing located within 200 metres of the proposed stack is currently under construction and will be completed before the NorthConnex project is completed. Other apartment projects up to 10 stories are likely within 500 metres of the proposed stack. There are also several four story residential blocks in the area. The Minister for Planning has alerted the north shore that it will be the location for an influx of multi-story residential development. The current NorthConnex northern ventilation proposal could make such development unhealthy and unviable.

2. that the exhaust stack beside the southern portal is located alongside residential areas. This is despite the location of Pennant Hills Golf Course across Pennant Hills Road. There has been no attempt to locate the exhaust stack within and to the centre of that open space by way of a horizontal offset to the stack from the tunnel. This would have provided at least some protection to surrounding communities from exhaust pollution from the stack. When NorthConnex project staff were asked at the community pollution forum at Hornsby RSL Club in August 2014, about this extraordinary stack location alongside a residential area they stated that RMS already owned land at the proposed site yet they assured incredulous attendees that this was not a cost saving measure. This once again flies in the face of the Minister for Roads and Maritime Services' claim that this is a gold standard proposal. Then it came to light that RMS already own a site of some 4000m² within the golf course.
3. NorthConnex Publications that state "there are a number of tunnel ventilation outlets located within and near urban and residential areas in Sydney and Australia. These include the Cross City, Eastern Distributor, M5 East and Lane Cove tunnels in Sydney". This is misleading as most of these exhaust stacks are in commercial precincts (as in Darling Harbour with residences several hundred metres from the stack), or in industrial areas (as is the case with the Lane Cove stack). The NorthConnex proposal is for stacks located among residences. What makes this proposal even more outrageous is that NorthConnex is more than twice the length of any other tunnel, thus exhausting more than twice the pollution load of any other tunnel. The NorthConnex tunnel design uses only one stack at the exit end of each tunnel. The Ku-Ring-gai Council submission has suggested investigating the use of several exhaust stacks to at least distribute the pollution from such a long tunnel and so few stacks. While this may make public health sense it would cause great political pain for government, and community anxiety, the suggestion highlights that the two stack solution has public health problems. NorthConnex has at least limited the public health problem to two sources (dismissing for the moment the significant problem of portal emissions). It suggests the importance of locating these two pollution sources so as to eliminate the public health risk. Having horizontal offsets to each of the proposed stacks, in the south to Pennant Hills Golf course and in the north to Ku-Ring-gai Chase, would allow discharge further from surrounding homes and make it more politically possible to make each stack higher to achieve the dispersion required.
4. NorthConnex publications that also state "The continuing reduction in vehicle emissions has enabled NorthConnex to design a ventilation system that would not have been possible a decade ago" One of the main stated aims of NorthConnex project is to remove 5000 trucks daily from Pennant Hills Road. NorthConnex project team stated at a NorthConnex community forum in Pennant Hills that heavy trucks produce 30 to 50 times the overall pollution of a passenger car. Most such vehicles are also diesel fuelled. NorthConnex traffic modelling has been based on particular mixes of vehicle types and loadings. This mix and the modelled speed of these vehicles will have a significant effect on the predicted level of pollution exhausting from the stacks. I am concerned that the NorthConnex may be underestimating pollution levels. Diesel emissions have been classified as carcinogenic by the World Health Organisation, and also

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contain a larger number of fine particles which penetrate deep into lung tissue and remain there causing inflammation.

The emissions from the NorthConnex project will be significantly different to the emissions from other tunnels. Considered together it seems misleading to liken the exhaust stacks from NorthConnex with any other Sydney tunnel.

NorthConnex project have publically stated that the tunnel will be built to accommodate three lanes of traffic but will initially be lane marked for two lanes. Thus there is a 30 percent extra capacity built into the tunnel's capacity. I understand that tunnel exhaust modelling is based on initial traffic flow capacity, not full flow. I believe this understates pollution fallout by a similar amount.

5. that NorthConnex proposes to monitor pollution levels from exhaust stacks for a period of only twelve months from the opening of the project. This will coincide with a period of possibly lower patronage as motorists become used to incorporating the tunnel into their travel. It will also not track the predicted growth in patronage over time and will not give the tunnel operators data on which to determine more efficient and healthy operations. Independent air monitoring at critical points along the corridor for the life of the tunnel and real time electronic distribution of this data to the general public, and the linking of this data to the pollution license under which the project will operate is necessary for the safety of the community, the protection of both State and Federal Governments against future class actions for damages and to encourage the tunnel operator to optimize the effectiveness and efficiency of operations.
6. the many respected large scale research studies that suggest the impacts of air pollutants on health are serious. These include increased death from heart disease, increased risks of lung cancer, stroke, poor lung growth in children, increased asthma, and recent research suggesting low birth weight for pregnant women, increased autism, and congenital heart defects. These studies confirm air pollutants have prothrombotic and inflammatory effects on humans which cause the above health problems.
7. portal emissions, some level of which are unavoidable because of the piston-like effect of exiting vehicles from the tunnel, being emitted from all proposed tunnel openings. This will result in emissions remaining at ground level, exposing the local population to pollutants without even the benefit of higher level dispersion from a stack. The jet fans proposed to be installed on the tunnel ceiling cannot be located closer than 300 metres from the portals because of the noise impact on surrounding residential properties. The north and south portals have exhaust stacks located in close proximity to the portals to exhaust polluted air drawn from along the entire length of the tunnels and to draw back whatever air they can into the tunnel exit portal, to reduce portal emissions. No exhaust stack is proposed for the portal at Pierces Corner thus making it very difficult not to have high levels of portal emission at that location. This would require the reader of the EIS to believe that sufficient air flow will be achieved by fans not closer to the portal than 300 metres and that that air can be effectively drawn back down the tunnel to the stacks at either end.

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8. I am also concerned that NorthConnex claims that there will no portal emissions from current proposal cannot be verified.
9. that the air quality within the tunnel which is shown in the EIS to exceed at times the standards for pollutants such as NO₂, and haze from particulate matter at the ends of the tunnel.
10. about the many flaws in the air quality modelling of the northern stack in the EIS. These include:
 - a) extrapolation of meteorological data from other weather stations which do not reflect the local meteorology, local topography, and the valley location.
 - b) The use of a coarse topographical model
 - c) The failure to consider polluted intake air from the Pennant Hills/M2 interchange as part of the project contribution to air quality at Wahroonga
 - d) the background air quality being based on air quality at Lindfield and Prospect
 - e) the lack of any actual data on PM_{2.5}. Peer reviewed medical and scientific literature is becoming more concerned at the health consequences of such fine particles and of very fine particles down to PM_{0.1}. This so called asbestos of the twenty first century should not be dismissed so easily that it is simply measured as part of the PM₁₀ count. Such poor science leaves the community open to potential health risks in the future and NorthConnex, the N.S.W. Government and Commonwealth Government as joint participants in this infrastructure proposal, exposed to future class action for damage caused to the community. As James Hardie was liable for damages because of their knowledge of the dangers of asbestos, with the current knowledge of fine particles on health and the direction in which continuing research appears to be heading, it would seem likely that those authorities who presently took a cavalier approach to potential health consequences would be held to have acted in bad spirit and recklessly. The precautionary principle should apply in this situation, especially given the very long life of such infrastructure projects.
 - f) the financial cost burden on government should it be forced to retrofit the NorthConnex tunnel to improve air quality in the future. The community remembers the financially and politically expensive retrofit of the M5 tunnel stacks. Government I presume is also concerned that such a debacle might be repeated. The Minister for Roads and Maritime Services stated on the A.B.C. Stateline program on Friday 5 September 2014, that the NorthConnex proposal was a gold standard design and that no short cuts were being taken. This does not appear to me consistent with much of the approach set out in the project EIS.
11. that a full and transparent options assessment process was not undertaken to assess alternative designs for the project. Unlike other tunnel projects in Sydney there are no alternatives for locating the stack and portals in non-residential areas. The current location of the northern portal and its associated exhaust stack changed from the nominal proposal that came out of the 2004 and 2007 Government enquiries into the road infrastructure requirements in this area of Sydney. The current proposal appears to have used lazy engineering design that has led to major health and amenity concerns for communities located around

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this project. It appears to be a cheap and nasty response to Government's expressed road transport needs.

12. that the justification for not providing filtration for the north and south exhaust stacks is cursory and unconvincing. NorthConnex publications and its project team have dismissed filtering as not being "cost effective". There has been no discussion of the capital cost of filtering or its ongoing operating costs, its effectiveness in reducing specific pollution products or its use alongside other pollution control proposals. On the face of it this appears to fly in the face of the Minister for Roads and Maritime Services attestations on the gold standard of the proposal.

Community amenity

1. that absolutely no regard has been paid to the impacts the proposal has on the community amenity. The northern portal has been configured as an industrial object some 4 stories in height and some hundred and fifty metres in length, with a substation, pump room, and close by, 2 large water tanks. The NorthConnex publications show a photo montage of this industrial structure located in an industrial area. This is deliberately misleading due I presume to NorthConnex's embarrassment in having to more accurately show that the industrial structure is to be erected into a currently sylvan residential street setting directly opposite significant heritage listed houses. It again appears that lazy engineering and an attempt to produce only the cheapest solution is the only reason for the decision to create this industrial scaled solution. This would be unnecessary had the pump room, substation, and water tanks been located below or partly below ground level, or below the level of the sound walls. There is no need to locate such infrastructure in the immediate vicinity of the portal. Moving the portal further north, or moving the infrastructure further south are obvious solutions. Locating the infrastructure below ground level and beside the tunnel corridor could also be examined. As long as the water tanks are above all points along the length of the tunnels, they will still flow under the force of gravity. This lazy engineering is apparent throughout much of the NorthConnex proposal.
2. that the southern portal and exhaust stack site have been located with insufficient consideration for the amenity of surrounding homes. The water treatment plant, substation and switch station (located on adjoining Coral Tree Drive) are not proposed to sit above the portal, as on the northern portal but are still proposed to be above ground level. While a noise wall appears to be proposed to separate only part of the site from adjoining homes there has been no attempt to minimize visual impact on these homes. Extending the noise walls along workshop storage areas and other areas subject to site traffic and maintaining the height of the treatment plant, substation and switch station below the noise wall, by constructing them as necessary below ground level would appear an easy way to minimize the visual and noise impact on community amenity. Effective vegetation screening around service yards, storage areas and workshops appears on NorthConnex publications and should be mandated by Department of Planning and Environment to minimize visual impact to surrounding homes.

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3. that the operating noise of the pumps, substation, jet fans within the tunnel and exhaust fans within the stack will have a significant and intrusive acoustic impact on homes located close to the exhaust stacks. While at the northern portal the portal and the substation and pump room located above it, will be behind a sound wall, the height of the equipment will locate it up to 10 metres above the top of that wall. Should an attempt be made to increase the escape velocity of the pollution being emitted from the exhaust stack, in an attempt to increase mixing and dispersal, this is likely to result in higher fan and air flow noise.
4. that the exhaust stacks which are currently proposed to be some 15 metres above the existing ground level will be a major visual intrusion especially at the northern portal where it intrudes in a heritage precinct. Should the stack height be raised to accommodate better dispersion, the visual intrusion will increase and its visibility will affect most of Wahroonga. This suggests the proposed location is difficult and a better siting would alleviate both public health and community amenity difficulties.
5. that existing tree cover will be removed as part of the construction of the portals. This is critically important in that if the response to the loss of tree cover is to replant replacement trees it will leave the four story blight with no visual screening for many years. As the blight is within 25 metres of surrounding houses the visual intrusion on the streetscape and amenity of the area is very significant.
6. that large swathes of blue gum high forest will be removed at the site of the northern interchange to erect a compound for the storage and loading of excavated material from the tunnel. Some 1.41ha of forest will be removed of the remaining 170ha of remnant forest in the Sydney area. The project is designed to remove a total of 2.81ha of forests and tree cover. While the EIS does not give definite information on any environmental offsets or biodiversity credits for this quite shocking deforestation, the value of remnant forests and tree cover in the Sydney area is not just their effects on global carbon levels but the effects they have on their immediate microclimate as well as their important visual impact on an increasingly dense and hard landscaped city. Thus any offsets must take into account how such swathes of forest can be removed and this impact on this area be offset without waiting 30 to 50 years for any reforestation to be effective. Proposing to process excavation material in this way is not acceptable and is yet another example of lazy engineering, completely dismissing the value of community amenity and flying in the face of the Minister for Roads and Maritime Services statements.
7. that no assessment has been made on ground water and its management throughout the infrastructure corridor. Without such modelling there is no way of identifying the porosity of substructure rock and soils. This could lead to changes to the water table during construction or permanently, with impacts on runoffs and the creation of sink holes. The embarrassing loss of much of a multi-story residential building into the Lane Cove tunnel could be replicated by NorthConnex. Widespread damage to homes undermined or close to the tunnel corridor is also possible.

Tunnel configuration

1. that tunnel gradients are steeper than they need be. Despite the NorthConnex project team rhetoric at community forums that the NorthConnex tunnel would provide very low gradients which would lead to fuel savings to motorists and reduction in exhaust levels, an investigation of RLs at the south and north ends of the tunnels indicates the following problems. RLs at the southern end are about 115 metres above sea level. At the northern portal, RLs are about 170 metres. Further north along the M1 freeway, RLs fall to 100 metres some one Km from the proposed portal. A portal located 1 to 1.5Km north would allow an almost flat run along the tunnel. Entering and exiting at a high point at Wahroonga appears to cause many of the problems of this proposal. Tunnel levels also fall to 75 metres to go under the railway tunnel. Having the road tunnel pass above the railway tunnel, even if this requires more careful excavation, would permit more level gradients to be maintained.
2. While the Kur-Ring-Gai Council submission on the NorthConnex EIS questions the quantum of pollution generated from a longer tunnel because of difficulties with gradients (which I fail to understand) the alternative which is to leave the northern portal as proposed and pipe the stack by a trenched pipe to a relatively safe location north of North Wahroonga or preferably to Ku-Ring-Gai Chase and allow a higher stack to obtain the necessary dispersal.
3. that the tunnel operating license may not require the operators to continue operations over the total service life of the tunnel with compliance to external operating noise levels, pollution levels, runoff levels and other operating parameters the tunnel is claimed to achieve or to improve these performances as community knowledge and expectations change.
4. that the operator may not have to maintain for the service life of the tunnel, infrastructure aimed at ameliorating the tunnel impact on surrounding communities. This would include but not be limited to vegetation, noise walls, berms and embankments.
5. that construction impacts on surrounding communities appear to have been treated with arrogant dismissal by NorthConnex. The heavy vehicle route proposed at the southern interchange which uses currently residential streets appears not to have considered tunneling under Pennant Hills Road to allow access from the south to the construction site. Continuing use of this underpass should be considered as part of the tunnel's operation. The Minister for Roads and Maritime Services' promise of a gold standard project once again looks to be at odds with the proposal.
6. the lack of detail as to where the massive amount of excavated material is to be disposed. Risk management plans calculate the risk of death and injury resulting from a project. The plan then attempts to minimize such risk. An obvious risk is in the transport of excavated material. It will obviously be a function of the distance it has to be relocated. There is no information on this. This suggests a level of oversight by NorthConnex within the realm of criminal negligence or a veil of secrecy to minimize public appraisal. It also allows the NSW State Government to abrogate its responsibilities for making decisions on levels of risk beyond which

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the community would not be asked to endure. Suggestions by the Mayor of Hornsby that Hornsby Council could accept a major portion of the excavation material to fill its Quarry in the Asquith area should be considered as it would reduce transport distance, risk and probably cost. These proposals included transporting material by tunnels allowing quick access to the quarry, which would then become on / off ramps from the M1 to Hornsby.

7. the NorthConnex team's common advice to the community on matters ranging from locations for disposal of excavation material to vehicle access to homes during construction. This appears to give NorthConnex unnecessary discretion without effective overview of a wide range of important decisions that could significantly change project risks, construction and operational impacts on communities. While day to day decisions must be made on any project during the course of their construction, effective independent review of detailed design decisions must be implemented to protect the community interest.
8. the heavy toll this project has already taken on the mental health of individual members of affected communities. Much of this has been due to the very incompetent (or perhaps it seems to me, deliberately dishonest) communication by NorthConnex with the community. This includes letters to property owners on whether their properties were noise affected or to be reclaimed, going to wrong addresses or not being sent. (NorthConnex puts this down to it identifying properties on Google. I know this beggars belief but it was admitted by project staff.) NorthConnex, aware of the significant effects its actions had caused, instigated a mental health referral and support system. This should continue to operate until at least the end of the construction period as distress from intrusive construction activities is likely.

To address my concerns I request that the following actions are undertaken:

1. The Department does not approve the project in its current form as it clearly does not meet the principles of Ecologically Sustainable Development as required by the Environmental Planning and Assessment Act.
2. Wind speed estimates at both the north and south portals be reviewed. That weather data most appropriate to the sites be used. That weather data from privately operated local weather stations, which are believed to exist be sourced and independently assessed, and if considered credible, be used as part of revised weather modelling.
3. In view of revised weather modelling, review the pollution dispersal models including stack heights and exit velocities to ensure the long term safety of the community. Review stack noise predictions to minimize nuisance to surrounding residents.
4. Ensure that pollution dispersion modelling takes into account that a 6 story building is currently under construction some 200 metres from the northern exhaust stack, that there are several 4 story residential buildings in the same

area and that it is probable that there will be an influx of 8 to 12 story residential buildings in the area according to the advice of the Minister for Planning and Environment. Furthermore, ensure that dispersion modelling uses suitably detailed topographical data to ensure accurate assessment of fallout on areas at higher elevations around the proposed stacks.

5. Consider alternative placement of both the northern and the southern exhaust stacks to locations that lessen the danger from stack fallout on surrounding communities. Specifically consider location of the southern stack in a central part of Pennant Hills Golf Course which would provide several hundred metres of protection around the stack and allowing higher stack heights than would be politically acceptable in residential areas. Specifically consider location of the northern stack some 1.6Km north of its presently proposed, along the M1 freeway. Consider piping the exhaust below ground over this distance. This would locate the stack in a largely industrial area of Asquith, providing some protection to surrounding residences and allowing higher stack heights than would be politically acceptable in residential areas. Also specifically consider relocation of the northern portal some 1.6Km north along the M1 freeway and piping the exhaust to a stack located in Ku-Ring-Gai Chase, again allowing higher stack heights. Specifically consider the possibility of reclaiming the land currently occupied by the M1 freeway for use as medium density housing to offset any additional cost in relocating the stacks. This idea was first proposed by Peter Georgiadis. It also appears to align with the State Government policy for increasing urban population density. That all siting alternatives be subjected to independent engineering assessment.
6. Consider the current tunnel gradient running from a RL of about 115 metres in the south, then dropping to a RL of 75 metres to pass under the railway tunnel, exiting at an RL of about 170 metres at Wahroonga. Consider tunneling above the railway tunnel to reduce tunnel gradients, vehicle fuel use and resulting pollution. This reduced gradient would work whether the northern portal was located as presently proposed or moved northward to exit at a reduced RL.
7. Review the proposed location of tunnel infrastructure above the northern portal. Location of pump room and substation above the portal is not operationally necessary as is demonstrated by the location of such equipment other than above the southern portal. The resulting 10 metre industrial complex is an affront in a heritage area. Reconfigure this infrastructure to keep it below ground level or at sufficient height below the sound walls for it not to be visible from surrounding homes. Consider minor relocation of the portal or the associated infrastructure so that the infrastructure can be located below or partly below ground while still above the line of the portal. Consider the integration of water tanks below ground on land with RLs much closer to that of Pearce's Corner, say up to 30 metres higher than the site selected. (Note the RLs of the proposed tanks are about 170 metres. THIS IS NOT THE HIGHEST POINT ON THE PROPOSED TUNNEL ROUTE. Pearce's Corner has an RL of about 200metres) It would make better hydraulic sense to locate the water tanks and water pumps to a below ground site in close proximity to Pearce's Corner. This would save purchase of at least one property in Bareena Avenue Wahroonga and reduce the visual intrusion into a heritage residential environment. Also consider location of several water tanks

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along the tunnel route, possibly on the site of fire dampers, depending on visual impact to surrounding areas. This could increase fire safety overall.

8. A groundwater assessment completed to consider impacts on water tables, and porosity of substrata to eliminate adverse environmental impacts, manage runoff and eliminate the risk of sink holes occurring.
9. Consider the use of several exhaust stacks to reduce the quantity exhausted from each. This proposal made by Ku-Ring-Gai Council in their submission on the EIS would be politically difficult and should not be done if it exposes any communities to health risks or significantly impacts local amenity.
10. The effectiveness of stack filtration to reduce exhaust emissions be modelled. That the capital and maintenance costs over the service life of the project be estimated and compared to alternative options for dealing with emissions.
11. Review vehicle modelling used for exhaust and air quality prediction. Include sensitivity analysis to determine how much changes made in vehicle size and loading, vehicle speed and gradient data make to predictions.
12. The Department of Planning and Environment implement independent review of the alternative stack and portal assessment process.
13. Local road proposals for trucks around the southern stack be reconsidered. That construction of a short tunnel under Pennant Hills Road for trucks approaching from the south be considered and the incorporation of such tunnel into the tunnel operating plan be considered to stop major impacts by heavy construction traffic for many years on large areas of currently residential areas.
14. Undertake a review of the health effects of fine particle pollution ($PM_{2.5}$) and ultra-fines ($PM_{0.1}$) and advise how the NorthConnex project will deal with this risk. The EIS has included finer particles in its count of PM_{10} . In light of current research and medical concern, including that recently expressed by the AMA and local concerned doctors, this is unsatisfactory.
15. Traffic flow modelling and pollution modelling for NorthConnex be based on three lanes of traffic, and maximum tunnel capacity so as to reflect the tunnel's capabilities.
16. NorthConnex be required to set up and maintain for the service life of the tunnel, air quality monitoring stations at critical points external to and along the tunnel corridor, and similar in-tunnel air quality monitoring stations, as part of the licensing conditions for the project. That air quality monitoring be conducted independent of NorthConnex and be publically available electronically in real time. That significant penalties be imposed on the tunnel operator for breeches of the terms of its license, especially those affecting public health.
17. Air flow be modelled around all portals including those with no exhaust stack close by, to ensure zero portal emissions as has been claimed by NorthConnex.

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18. The effect on portal emissions, of reducing the height of portals from the design height of tunnel roofs down to a height just able to allow safe exiting of maximum legal height vehicles be modelled.
19. NorthConnex be required as a condition of its operating license to maintain all infrastructure associated with the tunnel, including sound walls, monitoring equipment, berms, embankments and runoff controls to meet ongoing performance requirements, for the operating life of the project.
20. Architectural and landscape architectural design be employed to ensure effective and aesthetic integration of exhaust stacks, plant rooms, pump rooms substations, water tanks, sound walls and ancillary infrastructure into their surrounding heritage and residential environments. That architectural forms and colour, landscape elements and ground contours be used to ensure this integration.
21. NorthConnex develop detailed design of its construction and operating plans to minimize destruction of all existing vegetation especially that which could screen surrounding homes from the visual impact of proposed development. That penalties be imposed for damage to significant vegetation as would be required of other developments. That plans be prepared showing what action NorthConnex will take to replace any vegetation removed and how it will address the impacts of its vegetation removal in the period of regrowth. That NorthConnex amend its plans to deforest major areas of blue gum high forest. That any environmental offset plans provide benefits to the immediate areas where microclimates and urban amenity has been affected. That NorthConnex be solely responsible for the cost of replacing and maintaining all vegetation affected by the project for a period of 20 years.
22. All revisions to the NorthConnex EIS and project be submitted for review by independent specialists appointed by the Department of Planning and Environment to reduce the ongoing expense and lack of surety by both the community and the developer. The resulting report be exhibited to allow the community limited opportunity to respond to the revised information contained in the report.
23. Detailed design not yet determined or that becomes necessary during the course of construction to be agreed to by independent experts in that field to protect Government and the community from decisions that may be made without due regard to these interests.
24. That risk management plans be prepared and made public for each aspect of the project. That this includes the risk of death to constructors and the community from transport of excavation material. That the location of sites for disposal of excavated material be announced. That the distance material has to be transported be taken into account when developing risk management plans. That the Mayor of Hornsby's suggestion that the Hornsby Quarry site at Asquith could accept a significant portion of excavated material be pursued with the Council and assessed for its suitability including how this site could work if the northern portal was located further north.

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25. A long term health study on children and residents in areas impacted by stack discharges be included as part of the conditions of approval. This could be used by all parties to future class actions for health damages.
26. All revisions to the NorthConnex EIS and project be submitted for review by independent specialists appointed by the Department of Planning and Environment to reduce the ongoing expense and lack of surety by both the community and the developer. The resulting report be exhibited to allow the community limited opportunity to respond to the revised information contained in the report.
27. Sensitivity analysis be conducted on all modelling to determine the sensitivity of particular presumptions and the effect they may have on results.
28. The precautionary principle be applied to all modelling and measurements especially where there is incomplete scientific understanding of issues and likely changes in public opinion and expectation. This includes but is not limited to the effects of particle and other pollution on public health.
29. Considering the serious effect this project has had on some members to date, and the level of use that has been made of the NorthConnex psychological counselling service, this service be continued and be funded by NorthConnex for the entire construction and bedding in period of the project.

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