KU-RING-GAI COUNCIL

SUBMISSION IN RESPONSE TO ENVIRONMENTAL IMPACT STATEMENT FOR THE NORTH CONNEX TUNNEL PROJECT

9th September 2014

Contents

1. Executive summary

Council has undertaken a review of the Environmental Impact Statement and has engaged suitably qualified consultants to assist with the review. Council held an issues workshop with representatives of the local community and their concerns are in Section 11 of this report.

The major concerns of Council and the local community are summarised below:

- **Number of stacks compared to Lane Cove Tunnel**

The Lane Cove tunnel is 3.6km long and has two (2) ventilation stacks. The proposed North Connex tunnel is 9km long and has only two (2) proposed ventilation stacks. Consequently, it is considered unacceptable for such a long tunnel to only have two (2) ventilation stacks. Serious consideration should be given to including at least one (1) additional ventilation stack at the mid-point of the tunnel to assist with the dispersion of pollutants over a broader area.

- **Location of stacks in industrial areas**

The Lane Cove Tunnel ventilation stacks are located in industrial areas of the North Shore and therefore away from residential areas. As the ventilation stacks for the North Connex project are not proposed to be filtered, they should at least be located in industrial areas. There is an opportunity to locate the northern ventilation stack in the industrial area of Hornsby. This relocation would minimise the impact on the residential areas of Hornsby and Wahroonga.

- **Consider extending tunnel**

To assist with improving the ventilation stack location, tunnel gradients and noise impacts of the tunnel, consideration should be given to extending the tunnel in the north direction to avoid the northern portals being located near residential areas.

- **Height of stacks**

The height of the ventilation stacks, where proposed, is identified as being 15 metres tall. This will have a negative impact on the visual character and Heritage Conservation Area of Wahroonga.

- **Background air stations and atmospheric conditions**

The differences between modelled and actual terrain need to be explained, particularly in terms of whether the simulated meteorological conditions in the vicinity of the northern ventilation outlet will change because of the data source (SRTM) and selected resolution.

The comparison of modelled and measured (Lindfield) wind speeds suggests the CALMET simulation of conditions in the vicinity of the northern ventilation outlet needs further

verification. A comparison between the modelled and measured (for example, James Park) wind patterns is required in order to demonstrate the CALMET output is representative of local conditions.

- **Air quality assessment and ongoing monitoring**

It is recommended concentrations of pollutants in the in-coming air are estimated and included in the emission calculations, with ventilation outlet emission estimates updated as appropriate. Additional information is required to demonstrate the northern ventilation outlet emissions and resultant concentrations in the vicinity of the northern ventilation outlet are not underestimated because of the assumed concentrations in the intake air.

The difference between the estimated in-tunnel concentrations for North Connex and measured concentrations from other tunnels should be explained, with consideration of differences between traffic volumes, ventilation flow rates and tunnel lengths to make sure modelled emissions for North Connex have not been under-estimated.

It is recommended the Department of Planning and Environment consider the predicted ambient concentrations in light of the modelled source concentrations, if concentration limits are to be set.

With regard to ongoing monitoring of the air quality, there needs to be consideration to consent requirements for the air quality to be measured over a five (5) year period to ensure emissions are within acceptable levels. If they are outside acceptable levels then filtering may be required.

- **Construction issues**

As indicated in the EIS, the project is to operate 24 hours per day, seven (7) days per week. Where there are residential dwellings in close proximity to the worksite, it is considered the working hours are unreasonable and should be restricted to working days, Monday to Friday, between the hours of 7am to 5pm and Saturdays 8am to 1pm.

To minimise noise, the access road off Eastbourne Avenue should not be used between the hours of 8.00 pm and 7.00 am. A suitable intersection arrangement will need to be provided at Eastbourne Avenue to ensure traffic on Eastbourne Avenue is not disrupted by construction vehicles and safety on Eastbourne Avenue is not compromised.

To minimise noise, the access road off Coonanbarra Road should not be used between the hours of 8.00 pm and 7.00 am. A suitable intersection arrangement will need to be provided at Coonanbarra Road to ensure traffic on Coonanbarra Road is not disrupted by construction vehicles and safety on Coonanbarra Road and Carrington Street is not compromised.

A road condition report is requested for Coonanbarra Road and Junction Road (between Coonanbarra Road and the M1 Motorway), to ensure any damage to Council's roads used by construction traffic for the North Connex project, during the life of the project, is identified and repaired to Council's satisfaction.

Council should be consulted on Construction Traffic Management Plans prior to any approval of the project.

A Construction Noise and Vibration Management Plan (CNVMP) will need to provide details and protocols for minimising and managing the risk of noise and vibration impacts from construction activity. Construction noise management and mitigation measures will have to be comprehensively covered within the CNVMP.

- **Design issues**

There is concern one (1) northbound lane on the M1 Motorway does not provide sufficient capacity for northbound traffic. This would result in traffic congestion back into Pennant Hills Road. An extra northbound lane should be provided at this location to maintain satisfactory levels of service.

In the northbound carriageway, under existing Edgeworth David Avenue / Junction Road bridge, there are currently three (3) northbound lanes with associated shoulders between the bridge abutment and the central bridge support. It is difficult to see how four (4) northbound lanes, nominal shoulders and a separation space could be accommodated without major modifications to the abutments and central support at the Edgeworth David Avenue / Junction Road bridge. This has not been identified or analysed. Modifications to the bridge would have significant impacts to Edgeworth David Avenue, Junction Road and the Regional Road 2043 route between Roseville and Hornsby.

- **Ecology impacts**

The Northern Interchange Compound Site (NICS) will result in the removal of 1.14ha of Critically Endangered Blue Gum High Forest (BGHF) (Eco Logical Australia 2013) which is listed under the *Threatened Species Conservation Act 1995* (TSC Act).

The 1.14ha of BGHF which is proposed to be removed to establish the NICS is one of the largest stands of critically endangered BGHF outside of local bushland reserves. These reserves are Dalrymple Hay, Sheldon Forest, Brown's Forest & Clive Evatt.

No BGHF biodiversity credits sites have been identified in the North Connex Technical Working Paper: Biodiversity. The Technical Working Paper Biodiversity fails to demonstrate compliance with the Director General's Requirement (biodiversity) and fulfil its requirements to offset in accordance with the NSW offset principles for major projects. The project, if approved, would require 10% or 17.52ha of all the remaining BGHF to be protected and conserved. In accordance with the Office of Environment and Heritage (OEH) principles the project should not be approved until such time the offset of 163 BGHF biodiversity credits can be demonstrated for the loss of 2.81ha of BGHF.

- **Heritage impacts**

Some of the information used for the Statements of Significance and Statement of Heritage Impacts was out-dated. However, it is recognised these oversights do not substantially alter the substance of the Heritage Impact Assessment in relation to most of the items (except 11A Lucinda Avenue) and the Heritage Conservation Area within the Ku-ring-gai Council LGA.

11A Lucinda Avenue (Hindfell) is a substantially intact property of potential State significance. It is appropriate a more detailed impact assessment and vibration monitoring program be established for 11A Lucinda Avenue. The issue of acoustic treatment needs to be addressed with regard to the intactness of the property and its aesthetic significance.

The Environment Impact Statement (EIS) assesses four (4) potential impacts to heritage items as confirmed by this review. They include:

1. Vibration impacts,
2. Settlement impacts,
3. Visual impacts and
4. Impact from acoustic treatments.

In summary:

Vibration impacts – The EIS does not define the scope of vibration monitoring works that would be undertaken or how any impacts would be addressed if they arise. The assessment does not take into account the fabric of the property in its assessment. The vibration assessment on page 78 of the EIS notes the individual features of the property would need to be factored into impact assessments. This should be considered to confirm the potential degree of impact and ensure adequate measures are put in place to protect properties.

Settlement impacts – The EIS determined some properties have the potential to be subjected to, at most, minor cosmetic damage. However, the assessment does not take into account the fabric of the property in its assessment. The vibration assessment on page 78 of the EIS notes individual features of the property need to be factored into impact assessments. This should be considered to confirm potential degree of impact and ensure adequate measures are put in place to protect the properties.

Visual impacts – The EIS determined the majority of the visual impact to heritage items would be negligible due to the plan for the replacement of noise walls and revegetation once construction is completed. However, it is noted the property known as 4 Burns Road will not be screened by neighbouring properties, as these properties are marked for acquisition and demolition. The EIS should be amended to address this potential impact.

Acoustic treatment impacts – The EIS for heritage recommends one property for potential acoustic treatment. The reasons for the selection of this property and the exclusion of neighbouring properties are not stated in the heritage chapter of the EIS. It is not clear either in the noise chapter of the EIS. Community consultation has raised the possibility acoustic treatment is being considered for other properties. If this is the case, the appropriate heritage assessments should be carried out.

The heritage chapter of the EIS has inconsistencies. In some cases it uses out-dated significance assessments as the basis for investigation of impacts. However, the general thrust of the document is considered to be accurate. The project will avoid direct impacts to heritage properties and the Heritage Conservation Area. However, the potential for impacts has not been adequately addressed. The EIS has left many aspects of future planning to detailed design. This has created confusion and uncertainty in the community and has made

it difficult for the community to understand the ongoing process. In addition, the low legibility of the document, cross referencing to technical papers which are not interpreted and difficult to read maps has made it difficult to clarify points of confusion.

- **Noise impacts**

Additional noise monitoring should be carried out to determine the representative background levels (RBLs) for the revised noise catchment areas (NCAs).

Additional noise monitoring should be carried out, where required, to determine existing traffic noise levels for the revised NCAs.

Further information should be provided regarding the northern ventilation facility and tunnel portal jet fans and a review of potential sleep disturbance from the operation of the northern ventilation facility.

Details should be provided to clarify how the study area was derived (i.e. how was it calculated the project adds no more than 2.0 dB(A) to the total noise level) and the boundary of the study area should be defined.

Operational daytime $L_{Aeq,15hr}$ and night-time $L_{Aeq,9hr}$ traffic noise contours should be provided.

Details should be provided to clarify what receiver heights were assessed as part of the operational assessment. Confirmation will be required as to whether this affects the outcomes of the noise barrier assessment.

More information is required as to how the open graded asphalt (OGA) corrections for the M1 southbound carriageway were derived.

With regard to pavement corrections, it should be clarified whether the corrections were applied equally for each vehicle emission string:

- car exhaust/engine;
- car/truck tyre noise;
- truck engines and truck exhaust or
- just for the car/truck tyre noise emission string.

It is not clear why the southbound carriageway of the M1 Motorway has been assumed to be resurfaced with open graded asphalt (OGA) for the No Build Opening year and Design year scenarios. This would imply the resurfacing is not project related and has perhaps already been undertaken post EIS noise monitoring (i.e. after December 2013).

Details should be provided to clarify whether Australian Road Research Board (ARRB) corrections or any other calibration corrections and safety factors have been applied to operational traffic noise predictions.

More information is required with regard to the portal correction used in noise assessment.

More detailed assessment of maximum noise level impacts associated with the Northern Interchange should be provided.

A reasonable and feasible noise barrier analysis in accordance with Environment Noise Management Manual (ENMM) Practice Note (iv) should be conducted for Lucinda Avenue properties (including IDs 1617, 1626, 1648, 1656 & 1661) which are located north-east of the on and off-ramp portals.

The Environmental Impact Statement -Noise and Vibration (EIS-NV) needs to provide more information to ensure the receivers affected by the Northern Interchange, where noise barriers are to be replaced, are provided with replacement noise barriers of at least the equivalent performance of the existing barriers.

A cumulative noise assessment should be included in the EIS to address operational Northern Ventilation Facility - portal noise and operational traffic noise.

Details should be provided to clarify whether the property treatments identified within table 59 of the EIS are applicable to the ground floor and/or first floor of multi-storey dwellings.

The EIS-NV should include a commitment to provide a road surface with similar acoustic performance to OGA when the road is resurfaced in future.

- **Traffic issues**

The use of the compounds in Ku-ring-gai will have a significant impact on local traffic conditions. This is required to be managed to reduce the impact on the local community. There are local schools in the vicinity of these compounds. Road and traffic safety concerns will need to be included in any consent conditions. This needs to be heavily consulted with Council and representatives of the local schools to ensure the safety of school children.

- **Vibration impacts**

Tunnelling work under the properties in Lucinda and Eastbourne Avenues will have an impact on the structural integrity of the properties. A dilapidation survey is required for all properties within a 100 metre zone of any construction work.

The proposal to undertake tunnelling work 24 hours per day is expected to cause vibration to properties. This activity should be limited to standard working hours. This needs to be addressed in the Construction Noise and Vibration Management Plan.

2. Air quality issues

This section documents the main outcomes of the independent review undertaken by Jacobs Group (Australia) Pty Ltd on behalf of Council, including elements of the study which have been found to be acceptable as well as those which need more information or correction.

The review has been carried out by checking the main factors which could affect the conclusions of the assessment such as:

- choice of models and model setup,
- mission calculations,
- meteorological data,
- ambient air quality data and interpretation.

In addition, the review has checked for consistency with the NSW Environmental Protection Authority's *Approved Methods of the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005) and whether the assessment has addressed the Director-General's Requirements.

Review outcomes are provided below.

2.1 Existing Air Quality Data ("Background" levels)

AECOM Pty Ltd quantified the background levels by adopting either the maximum predicted roadside concentrations by the CAL3QHCR model or from maximum levels recorded by the Office of Environment and Heritage (OEH) monitoring stations at Prospect and Lindfield. The derived levels were then added to model predictions to determine cumulative impacts. These cumulative predictions were compared to the EPA's air quality assessment criteria.

Five (5) air quality monitoring stations were installed in December 2013 specifically for this Project at Headon Sports Park, James Park, Observatory Park, Brickpit Park and Rainbow Farm reserve). Monitored levels from these sites for the period between December 2013 and March 2014 were reported.

AECOM Pty Ltd adopted a generally conservative approach to the quantification of existing air quality. Based on a comparison between the assumed background levels and the measured concentrations at James Park, the assumed background levels are conservative for nitrogen dioxide ($NO_{2)}$ although potentially underestimated for particulate matter of 10 micrometers or less in diameter($PM_{10)}$) and particulate matter 2.5 micrometers or less in diameter. ($PM_{2.5}$). The differences between the assumed air quality and the air quality in the vicinity of the northern ventilation outlet, as measured at James Park, are not significant in terms of affecting the conclusions of the assessment.

2.2 Meteorological Data

AECOM Pty Ltd has used a meteorological model (CALMET) to simulate conditions across an area of 60km by 62.5 km, at a resolution of 250 m. The model used hourly meteorological records from weather stations located at Lindfield, Terrey Hills, Richmond, Prospect and Sydney Airport, in addition to prognostic data from the M5 model. Terrain data was sourced

from the Shutter Radar Topography Mission (SRTM) database. Terrain data from weather station to the Project corridor is not necessarily an issue, so long as the modelled local meteorological conditions are representative of measured local meteorological conditions.

Potential issues with the meteorological data, meteorological modelling and terrain data have been identified below.

- **Modelled wind speeds:** AECOM Pty Ltd has provided wind-roses showing the CALMET simulated wind patterns in the vicinity of the northern ventilation outlet (refer to Appendix F of the Air Quality Impact Assessment of the EIS). From these wind-roses, CALMET has simulated calm conditions occur at this location for around 1% of the time. At Lindfield, the percentage of calm conditions is 27%. Wind speed is important for determining the amount of dispersion. It is important the meteorological data are representative of the area around the modelled emission sources.

Recommendation

The comparison of modelled and measured (Lindfield) wind speeds suggests the CALMET simulation of conditions in the vicinity of the northern ventilation outlet needs further verification. A comparison between the modelled and measured (for example, James Park) wind patterns are required in order to demonstrate the CALMET output is representative of local conditions.

- **Terrain source and resolution:** Figure 2.1 shows the area around the proposed northern ventilation outlet, overlayed with the SRTM terrain data, and including three (3) assumptions on terrain resolution; 50 m, 150 m and 250 m.
  CALMET Pty Ltd has used the SRTM data, gridded at 250 m resolution.
  From this figure, it can be seen there are differences between the modelled terrain (250 m resolution) and the “actual” terrain (assuming the 50 m resolution is closest to the actual terrain).
  Differences are in the order of 5 to 10 m depending on the location. The SRTM data has a limitation as the radar imaging technique does not always map the true surface, especially when the ground is covered by dense vegetation.

Recommendation

The differences between modelled and actual terrain need to be explained, in terms of whether the simulated meteorological conditions in the vicinity of the northern ventilation outlet will change because of the data source (SRTM) and selected resolution.

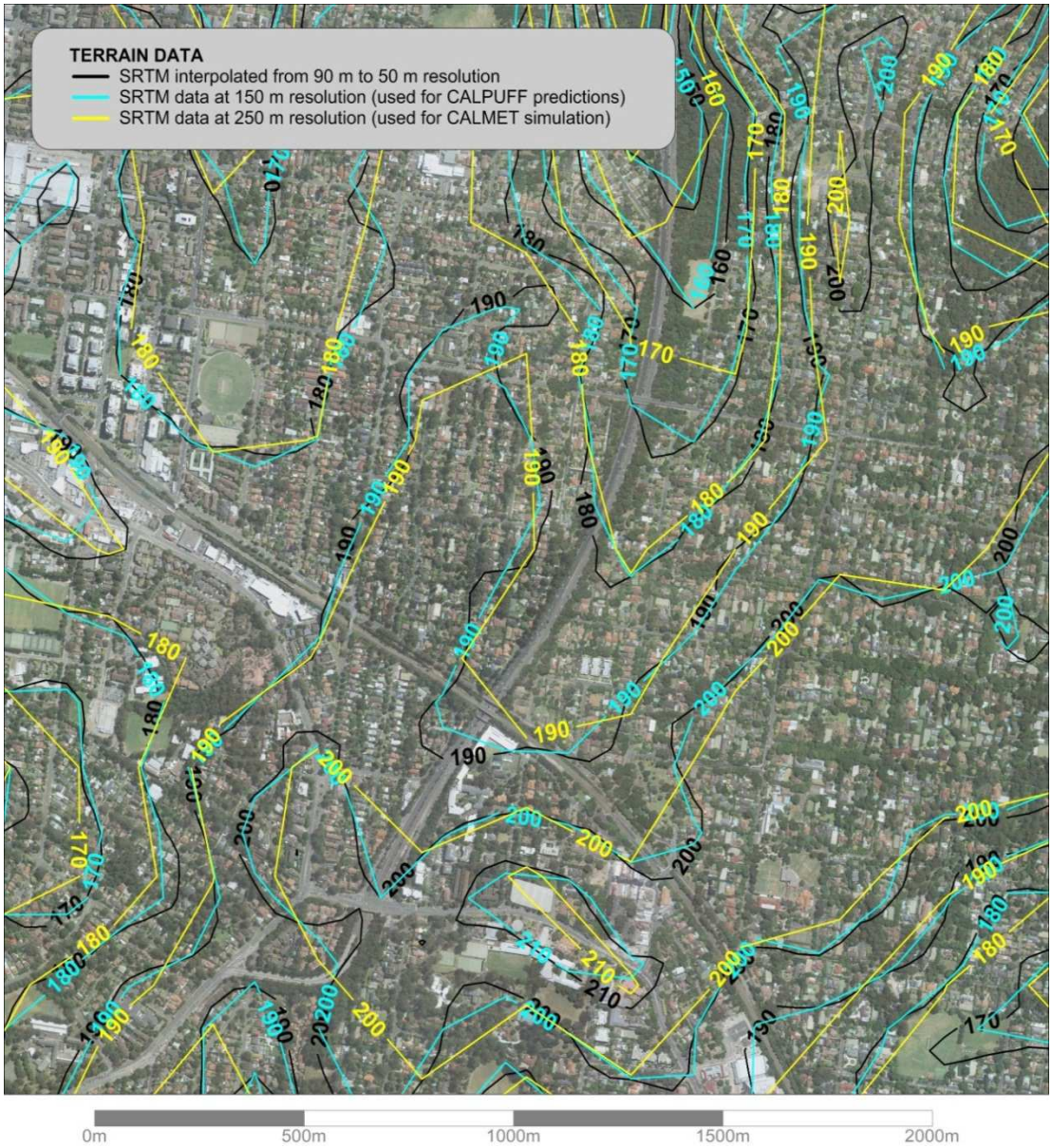

Figure 2.1 : Comparison of assumed SRTM data resolutions

2.3 Emission Calculations

Emissions of key pollutants (CO, NO_2 and PM_{10}) from the tunnel ventilation outlets have been estimated using forecast traffic volumes, tunnel grade, vehicle speed, and traffic mix, combined with emission factors from the World Road Association (PIARC 2012). Emissions from motor vehicles using surface roads have been estimated using the PIARC emission factors. $PM_{2.5}$, volatile organic compounds (VOC) and polycyclic aromatic hydrocarbons (PAH) emissions were calculated from the PIARC data using emission factor relationships from the National Pollutant Inventory (NPI).

Pacific Environment Limited undertook independent emission calculations. These calculations were compared to the AECOM calculations and consistency was demonstrated.

Potential issues with the emission calculations have been identified below.

- **Pollutant concentrations in the intake air:** Table 18 (from Technical Working Paper: Air Quality) shows the estimated in-tunnel pollutant concentrations at 1 km

increments along each tunnel, for peak hours of 9 am and 6 pm. From provided data, it appears the assumed pollutant concentrations of the incoming air are zero. The southern portal of the northbound tunnel is located in the vicinity of Pennant Hills Road and M2 Motorway interchange where CO, NO_2 and PM_{10} concentrations will not be zero but generally higher than at ambient monitoring stations.
PIARC (2012) recommends the concentrations in the ambient air supplied to the tunnel be considered for emission calculations and ventilation requirements.

Recommendation

Concentrations of pollutants in the in-coming air should be estimated and included in the emission calculations, with ventilation outlet emission estimates updated as appropriate. Additional information is required to demonstrate the northern ventilation outlet emissions and resultant concentrations in the vicinity of the northern ventilation outlet are not underestimated because of the assumed concentrations in the intake air.

- **In-tunnel concentration comparisons:** From Table 18, the estimated in-tunnel pollutant concentrations in the northbound tunnel at 6 pm by 2019, are up to 6.26, 0.86 and 0.504 mg/m^3 for CO, NO_2 and PM_{10} respectively.
  In-tunnel monitoring for the Lane Cove Tunnel (see for example Ecotech April 2014 report from http://www.lanecovemotorways.com.au) shows 30-minute average CO concentrations up to around 25 mg/m^3 during peak hours.
  Online in-tunnel 15-minute average, CO concentration data for the Brisbane Airport Link tunnel (6.7 km long and in the order of 50,000 vehicles per day) are typically[1] 20 to 30mg/m^3.
  These measurements are higher than the 6.26 mg/m^3 estimated for NorthConnex.

Recommendation

The difference between the estimated in-tunnel concentrations for NorthConnex and measured concentrations from other tunnels should be explained, with consideration of differences between traffic volumes, ventilation flow rates and tunnel lengths to make sure modelled emissions for NorthConnex have not been under-estimated.

- **Assumed heavy goods vehicle mass:** The emission calculations are based on an average heavy goods vehicle (HGV) mass of 23 tonnes (a typical fleet consisting of single lorries, trailer trucks and coaches).
  Traffic forecasts for NorthConnex indicate the proportion of HGVs will range from 28 to 28.5 per cent northbound by 2019, which means total emissions from the tunnel will be sensitive to the HGV mass assumptions.
  AECOM Pty Ltd has not discussed the variation in different sized HGVs. The emissions are strongly related to the total vehicle mass and different vehicle masses may need to be considered by using PIARCs vehicle mass factors.

[1] https://www.airportlinkm7.com.au/about-airportlinkm7/environment-sustainability/air-quality-monitoring.aspx

Recommendation

The air quality assessment should document the variation in different sized HGVs (single lorries, trailer trucks and coaches) to support the use of the average HGV mass of 23 t.

- **Traffic speed assumptions:** In-tunnel vehicle speed data for each hour of the day, and assumptions on congestion during peak hours, are not documented in the air quality assessment. These assumptions are important for the emission calculations.

Recommendation

This data should be documented in order to verify the northern ventilation outlet emissions and resultant concentrations in the vicinity of the northern ventilation outlet are not underestimated.

- **Emission source concentrations:** Peak hour (6 pm) emissions from the northern ventilation outlet for Design Analysis A (2019) are estimated to be 7.31, 10.9 and 0.67 g/s for CO, total NO_x and PM_{10} respectively (refer to Appendix H).
  Based on a flow rate of 700 m^3/s, these mass emission rates correspond to concentrations of 10, 16 and 1 mg/m^3 for CO, total NO_x and PM_{10} respectively.
  The same calculations have been done for Design Analysis B. The estimated concentrations are shown in the table below, and compared to data and limits from the Lane Cove Tunnel (LCT) and Airport Link Tunnel.
  The calculations show the modelled in-tunnel concentrations for North Connex are lower than typical maximum measured concentrations from the Lane Cove Tunnel and Airport Link Tunnel.

Pollutant	NorthConnex estimated concentrations, (northbound, 2019, 6 pm, hourly, mg/m^3)		Typical maximum measured concentrations (mg/m^3)		Concentration limits (mg/m^3)	
	Design analysis A	Design analysis B	LCT (30 min)	Airport Link (15min)	LCT	Airport Link tunnel
CO	10	6	~25	20-30	62.5 (50 ppm)	87 (70 ppm)
NO_x	16	8	NA	NA	32.8 (in-stack)	20 (1 ppm NO_2, 10% NOx is NO^2)
PM_{10}	1	0.4	NA	NA	1.6 (in-stack)	None (0.005 m^{-1} visibility)

Recommendation

It is recommended the Department of Planning and Environment consider the predicted ambient concentrations in light of the modelled source concentrations, if concentration limits are to be set.

2.4 Model Selection

AECOM Pty Ltd has used CAL3QHR to model emissions from surface roads and CALPUFF to model emissions from ventilation outlets. CALPUFF is a model which is listed by the EPA as an approved model for these types of assessments (DEC 2005). CAL3QHCR is not listed by the EPA in their *Approved Methods* but is listed by the US EPA as a recommended model for simulating air quality in the vicinity of roadways.

2.5 Receptor Data

AECOM has used CALPUFF to predict ambient pollutant concentrations across an area of approximately 15 km by 10 km (Table 17). Potential issues with the receptor data have been identified below:

- **Receptor resolution:** In the vicinity of the ventilation outlets, predictions were made at discrete receptors with a grid resolution of 150 m, up to 2.5 km from each outlet. Additional receptors were added along the project corridor, spaced 10, 35, 60, 105, 160 and 225 m from the road centreline (refer to page 45 of the Technical Working Paper: Air Quality). **Figure 2.2** shows the location of the CALPUFF model receptors in the vicinity of the proposed northern ventilation outlet.
  From this figure it can be seen there are areas of very little receptor coverage in the model (see for example area circled). This means maximum ground level concentrations, due to emissions from the 15 m high ventilation outlet, may not be identified by the model.

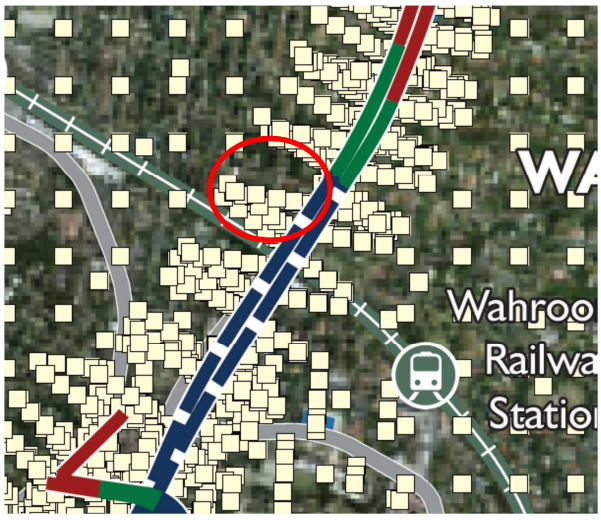

Figure 2.2 : Receiver locations, Figure 8 extract from Technical Working Paper: Air Quality

Recommendation

The proponent should demonstrate maximum ground level concentrations have not been under-estimated because of the selected receptor resolution around the ventilation outlets.

- **Elevated sensitive receptors:** The EPA's air quality impact assessment criteria apply to existing or likely future off-site sensitive receptors. The AECOM assessment

provides model predictions for ground-level locations but does not comment on likely future sensitive receptors or elevated locations.

A multi (5) storey residential development is proposed for 11-21 Woniora Avenue, approximately 200 m to the south of the proposed northern ventilation outlet.

No predictions of concentrations at elevated locations are available in order to check compliance with air quality criteria can be achieved at this proposed development (for example, at 15 m above ground level).

Recommendation

The air quality impact assessment should demonstrate air quality criteria will not be exceeded at elevated sensitive receptor locations, such as at the proposed multi (5) storey residential development proposed at 11-21 Woniora Avenue.

2.6 Assessment Criteria

AECOM Pty Ltd has referenced the air quality impact assessment criteria from the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC 2005). In the absence of air quality impact assessment criteria for PM2.5, AECOM has adopted the $PM_{2.5}$ standards from the National Environment Protection Measure (NEPM). The adopted criteria are appropriate.

2.7 Construction

In terms of construction impacts, the Director General's Requirements state:

> *"The assessment should provide an assessment of risk associated with potential discharges of fugitive and point source emissions, and include: details of the proposed methods to minimise adverse impacts on air quality during construction, particularly in relation to mobile plant…".*

Sections 5 and 7.1 of the assessment have addressed the Director General's Requirements in relation to construction.

2.8 Air Quality Impacts of an Alternative

This section provides a discussion on the likely air quality impacts due to two (2) project alternatives which have been raised by the community.

- Moving Ventilation Outlet to Industrial Area

Moving the northern ventilation outlet to the industrial area located approximately 1.6 kilometres to the north has been raised as an alternative by the community.

Section 6 from AECOM's assessment included predictions of ground level air pollutant concentrations due to emissions from the northern ventilation outlet. The potential air quality impacts of moving the ventilation outlet to the industrial area can be estimated by shifting the isopleths from their current position, to match a shift in the location of the ventilation outlet.

As can be seen from some of AECOM's model predictions (for example Figure 27), the highest ground level concentrations are not necessarily close to the ventilation outlet. In

some circumstances, moving the source to a new location may lead to higher concentrations in the vicinity of the original location. This would need to be confirmed by a quantitative assessment.

As noted in **Section 1** AECOM concluded the Project would not cause any greater excess of ambient air quality criteria (pending responses to the issues raised in **Section 2.**

It is likely moving the ventilation outlet to the industrial area can also demonstrate this outcome; however the level of compliance with air quality criteria would need to be confirmed by site-specific dispersion modelling or similar assessment technique.

In addition; the net effect of changes in ventilation outlet contributions and changes in emissions from motor vehicles using the surface roads needs to be considered.

The likely net change in air quality cannot be quantified without detailed modelling but, in a general sense, emissions from motor vehicles using surface roads would continue to be the more significant factor for determining ambient air quality, based on the information provided in AECOM's assessment.

- Moving Tunnel Portal to the North

Another Project alternative raised by the community, during the NorthConnex Information session and workshop held 18 August 2014, was the relocation of the northern tunnel portals.

Conceptually, the proposed alternative would include:

- Extending the length of the tunnel to the north by approximately one kilometre.
- Relocating the proposed northern ventilation outlet to the north by approximately one kilometre.
- Adjusting the grade of the tunnel to minimise the northbound exit grade, currently at 4%.

The relative effect on total tunnel emissions due to the concept outlined above has been quantified using "TRAQ" (Tool for Roadside Air Quality, developed by the Roads and Maritime Services). TRAQ uses information on the traffic volume, fleet composition, road grade, traffic speed and section length, combined with EPA-derived vehicle emission factors to estimate emissions of CO, NO_x and PM_{10}.

Two (2) emission scenarios have been compared, as follows:

- **Project scenario:** 1000 vehicles per hour (hypothetical), 8.75 km section of 0% grade and 250 m section of 4% grade. Default fleet mix and peak speeds.
- **Alternative scenario:** 1000 vehicles per hour (hypothetical), 10 km section of 0% grade. Default fleet mix and peak speeds.

The calculated mass emission rates in kilograms per hour (kg/h) are shown in the table below. While these results are based on a hypothetical peak hour traffic volume (1000 vehicles per hour) the relative change in emissions provides a useful comparison. Based on these results it can be seen the alternative scenario would lead to mass emission rates that are in the order of 5 to 10 per cent higher than the project scenario (because of the longer tunnel), depending on the pollutant. This increase is indicative of the potential change in emissions from the northern ventilation outlet.

Pollutant	Calculated mass emission rate by TRAQ (kg/h)	
	Project scenario (9 km section)	Alternative scenario (10 km section)
CO	7.99	8.43
NO_2	7.96	8.53
PM_{10}	0.57	0.63

From AECOM's modelling, the potential air quality impacts of this alternative scenario can be estimated by shifting the isopleths one kilometre to the north of their current position, to match a shift in the location of the ventilation outlet.

It is likely this alternative scenario could demonstrate no additional excesses of ambient air quality criteria, even with some increases in emissions from the northern ventilation outlet.

However, the level of compliance with air quality criteria would need to be confirmed by site-specific dispersion modelling or similar assessment technique.

2.9 Summary

Based on the assessment of the air quality, it is recommended the assessment review the following:

- Modelled meteorological conditions and terrain data, in particular, Issues 1 and 2 from above.
- Emission calculations and comparisons between NorthConnex in-tunnel concentrations and measurements from other tunnels. Refer to Issues 3 to 7 from above.
- Model receptor resolution and elevated sensitive receptors in the vicinity of the ventilation outlets. Refer to Issues 8 to 9 from above.

All recommendations should be addressed to make sure that the conclusions of AECOM's assessment remain valid, and that air quality criteria can be achieved at all sensitive receptor locations.

- Model receptor resolution and elevated sensitive receptors in the vicinity of the ventilation outlets. Refer to two (2) from **Section 2.5**
- All recommendations should be addressed to make sure the conclusions of AECOM's assessment remain valid, and air quality criteria can be achieved at all sensitive receptor locations.

References

AECOM (2014) "*NorthConnex Environmental Impact Statement – Volume 3, Appendix G – Technical Working Paper: Air Quality"*. Prepared by AECOM Australia Pty Ltd for the Roads and Maritime Services, report dated 1 July 2014.

DEC (2005) *"Approved Methods of the Modelling and Assessment of Air Pollutants in New South Wales* " August 2005.

PIARC (2012) "*ROAD TUNNELS: VEHICLE EMISSIONS AND AIR DEMAND FOR VENTILATION"* PIARC Technical Committee C4 Road Tunnels Operation.

3. Construction issues

General

As indicated in the EIS, the project is to operate 24 hours per day, seven (7) days per week. Where there are residential dwellings in close proximity to the worksite, it is considered the working hours are totally unreasonable and should be restricted to working days, Monday to Friday, between the hours of 7am to 5pm and Saturdays 8am to 1pm.

3.1 Northern Construction Compound (off Eastbourne Avenue)

A site construction compound is proposed near the project's northern interchange, on an area of motorway road reservation, located between the M1 Motorway and Eastbourne Avenue. Eastbourne Avenue is a quiet residential street within Ku-ring-gai LGA. The location of the compound and access to/ from the site by both light and heavy vehicles is shown in the diagram below. The area of the compound appears to be around one (1) hectare. The compound will accommodate a range of construction related activities.

The compound is proposed to contain:

- a large storage area,
- large compressor,
- acoustic shed,
- workshop,
- double stacked office/ site amenity buildings,
- water treatment plant and
- Substation.

The compound is expected to operate 24 hours a day, seven (7) days per week. This will include, at all hours, of the equipment referred to above. Access to/ from the site by heavy vehicles is expected during all hours. Activities on the construction compound can be expected to result in constant significant impacts on hundreds of nearby residents, some whose houses border the proposed compound. Impacts are expected to include noise from a range of sources as well as fumes and dust.

Access to the construction compound by heavy vehicles, will in effect, be left in/ left out from the M1 Motorway. This means heavy vehicles with the compound as their destination, will have to access the M1 Motorway from further north, at either Ku-ring-gai Chase Road at Asquith, or further north, at Berowra. It is requested access to the compound for heavy vehicles be restricted to / from the M1 Motorway only, as shown in the proposal, with no access to the site from any Council controlled roads, including Eastbourne Avenue and Lucinda Avenue.

It is estimated 1,140 heavy vehicle movements a day are expected to / from the compound, all directly to / from the M1 Motorway. If excavated material is taken to either Hornsby Quarry, or to the Central Coast, as proposed, there will be no need for heavy vehicles to use Pacific Highway, south of Pearce's Corner and, in fact, movement should be banned.

Details of types of heavy vehicles to be used on the project are not provided, but vehicles are likely to include a large fleet of large tippers with dog trailers, each truck having an aggregate mass exceeding 42 tonnes.

It is noted an enforceable three (3) tonne gross mass limit is applicable to traffic on Fox Valley Road, between Pacific Highway and The Comenarra Parkway, Wahroonga.

Light vehicles are to gain access directly off Eastbourne Avenue and other local streets, including Lucinda Avenue, within Ku-ring-gai LGA. Eastbourne Avenue and Lucinda Avenue have steep grades, of up to 20%. This means those streets and their residents, will be impacted by noise at all times of day and night by the approximate additional 200 vehicle movements expected to / from the construction compound.

Direct access to the site to /from the M1 Motorway, for light vehicles only is suggested. This will minimise impacts on local residential streets, particularly during night hours.

It is not clear whether the access road for light vehicles, from Eastbourne Avenue to the construction compound, will be sealed and/or if it will provide for two (2) way traffic movements. Details of the arrangements for traffic movement at Eastbourne Avenue are required. Due of the number of traffic movements and proximity to houses, it is considered the access road should be two (2) lanes in width (minimum of 7.5 metres) and be sealed to minimise dust. To minimise noise, the access road off Eastbourne Avenue should not be used between the hours of 8.00 pm and 7.00 am daily. A suitable intersection arrangement will need to be provided at Eastbourne Avenue to ensure traffic on Eastbourne Avenue is not disrupted by construction vehicles and safety is not compromised.

Traffic movements onto / off the access road to the northern compound will be hazardous, because of a pronounced crest in Eastbourne Avenue, approximately 50 metres east of the access road. Some motorists speed on Eastbourne Avenue and such vehicles could come into conflict with slow travelling, entering / exiting vehicles to / from the compound site.

A road dilapidation report is requested for Eastbourne Avenue, Fox Valley Road and Junction Road, if this road is used. This to ensure any damage, to Council's roads used by

construction traffic for the NorthConnex project, during the life of the project, is identified and repaired to Council's satisfaction.

It is expected any temporary works, including the northern compound and all access roads will be removed at the end of the project. This includes, in consultation with Council, any bushland area.

3.2 Junction Road compound (off Coonanbarra Road, Wahroonga)

A parking area and site office compound is proposed north of the Northern Interchange, near the Junction Road /Edgeworth David Avenue bridge, on an area of motorway road reservation between the M1 Motorway and Coonanbarra Road. Coonanbarra Road, north of Junction Road is a quiet local residential street within Ku-ring-gai LGA.

The compound is proposed be used as a parking area and site office facility only. Parking for approximately 50 cars is to be provided at the northern end of the compound. The office facilities will be located at the southern end of the compound. Access to the compound would be via an access road off Coonanbarra Road (opposite Carrington Road) which is currently an unformed road. Private property access to 152 Coonanbarra Road is currently provided through this unformed section of road. An open stormwater drain / creek run on the southern side and are parallel to the unformed road.

The compound is expected to operate 24 hours a day, seven (7) days per week. Tunnelling works are expected to occur continuously. Movements to and from the construction compound can be expected to result in impacts to residents in Coonanbarra Road (north of Junction Road). Some of the houses adjoin the proposed compound. Temporary crossing of Cockle Creek is proposed as part of the site works.

Access to the construction compound by vehicles will be from Junction Road. Heavy vehicles would only need to access the site during establishment and dismantling / rehabilitation of the compound. Approximately 15 heavy vehicles are expected per day for 3-6 months during site establishment, with the same number for dismantling / rehabilitation. Table 7-15 from Volume 1B of the EIS suggests heavy vehicles involved in the establishment and subsequent dismantling /rehabilitation of the site would access the site from Myra Street / Ingram Road / Edgeworth David Avenue / Junction Road. It is requested access to the compound for heavy vehicles be restricted to / from this route only, as shown in the proposal, with no access to the site from any Council controlled roads including Eastern Road / Burns Road and the remainder of Regional Road 2043. It should be noted an enforceable three (3) tonne gross mass limit is applicable to Regional Road 2043.

Approximately 100 light vehicle movements a day or around 16 movements during the am / pm peak hour are expected to / from the compound, to / from Coonanbarra Road and Junction Road. While this is not a significant amount, it probably represents a doubling of existing traffic volumes in Coonanbarra Road. It is suggested light vehicles be made to use the same route to access the site as the heavy vehicles to minimise the impact on Regional Road 2043.

It is not clear whether the access road to the compound will provide for two-way traffic movements. Because of the number of traffic movements and proximity to houses, it is considered the access road should be two (2) lanes with minimum width of 7.5 metres and be sealed to minimise dust. To minimise noise, the access road off Coonanbarra Road

should not be used between the hours of 8.00 pm and 7.00 am daily. A suitable intersection arrangement will need to be provided at Coonanbarra Road to ensure traffic on Coonanbarra Road is not disrupted by construction vehicles and safety on Coonanbarra Road and Carrington Street is not compromised.

A road condition report is requested for Coonanbarra Road and Junction Road (between Coonanbarra Road and the M1 Motorway), to ensure any damage to Council's roads used by construction traffic for the NorthConnex project, during the life of the project, is identified and repaired to Council's satisfaction.

It is expected the compound and all access roads will be removed at the end of the project and this should considered as a consent condition.

4. Design issues

4.1 Pacific Highway / Pennant Hills Road / M1 Motorway Interchange

The artist's impression of the Northern Interchange (view looking Northwest) in Volume 4 of the EIS shows two (2) eastbound / northbound lanes on the M1 immediately beside the tunnel entrance. As the northbound lanes on the M1 Motorway pass under the Pacific Highway bridge, the number of lanes are shown as two (2) lanes, merging to one (1) lane north of the Pacific Highway bridge.

There is concern one (1) northbound lane on the M1 Motorway does not provide sufficient capacity for northbound traffic. This would result in traffic congestion back into Pennant Hills Road. An extra northbound lane should be provided at this location to maintain satisfactory levels of service.

4.2 Edgeworth David Avenue/Junction Road bridge

Figure 5-21 in Volume 1A of the EIS shows the M1 Motorway tie-in works. In particular, under the existing Edgeworth David Avenue bridge, there are four (4) northbound lanes shown in the proposed layout, as well as nominal shoulders and a separation space between the traffic lanes from the northbound tunnel and the northbound M1 Motorway lanes.

In the northbound carriageway, under existing Edgeworth David Avenue / Junction Road bridge, there are currently three (3) northbound lanes with associated shoulders between the bridge abutment and the central bridge support. It is difficult to see how four (4) northbound lanes, nominal shoulders and a separation space could be accommodated without major modifications to the abutments and central support at the Edgeworth David Avenue / Junction Road bridge. This has not been identified or analysed. Modifications to the bridge would have significant impacts to Edgeworth David Avenue, Junction Road and the Regional Road 2043 route between Roseville and Hornsby.

4.3 Lane Configuration at Northern Portals/Northern Ventilation Facility

The documentation describes tunnels with two (2) lanes in each direction, with the provision for three (3) lanes in each direction to cater for future traffic demand.

It is unclear from the EIS if the southbound entry portal, shown as two (2) lanes wide as part of the current proposal, would need to be widened to three (3) lanes as well. If this is the case, then the proposed southbound bicycle overpass at the southbound entry portal would be impacted and possibly be made redundant. The provision of cycling facilities on the M1 Motorway is questioned, as cyclists tend not to cycle this route.

The following link shows of indications of proposed / existing cycle use in the area:

http://labs.strava.com/heatmap/#15/151.12133/-33.71034/yellow/bike

It would be preferable to improve conditions for cyclists on Pacific Highway at the Northern Interchange as well as at the Millewa Avenue / Alexandria Avenue overbridge, and at the Junction Road / Edgeworth David Avenue overbridge. These are the routes more used by cyclists and roads in the Ku-ring-gai Bicycle Plan which features cycling routes.

Council's Noise and Vibration consultant has made some recommendations for detailed design considerations. Those being:

Detailed Design Stage Recommendations and Information Requests

- A detailed design stage background noise monitoring at a receiver located west of the Bareena Avenue Compound should be conducted.
- Care will need to be taken when installing the Northern ventilation Facility and supporting structure to ensure ground-borne noise is not an issue.
- For the ventilation fans and jet fans, an assessment to identify any "annoying characterises" such as tonality / low frequency noise will need to be undertaken.
- Detailed Design stage ground-borne noise predictions will need to be more comprehensive and include predictions associated with cross passage excavation and rock hammers.
- It is recommended existing noise walls within the Project area, which are not proposed to be replaced with new walls, undergo a condition report and be repaired.
- EIS should clarify if Woonoona Avenue will be utilised for access to Barenna Avenue compound. If so, a construction traffic noise assessment should be undertaken.
- The Construction Noise and Vibration Management Plan (CNVMP) will need to provide details and protocols for minimising and managing the risk of noise and vibration impacts from construction activity. Construction noise management and mitigation measures will have to be comprehensively covered within the plan.
- Assessment of impact on heritage properties should be included in the Conditions of Approval.

5. Ecological issues

A review has been undertaken of an environmental impact statement, more specifically the NorthConnex Technical Working Paper: Biodiversity (Eco Logical Australia 2013) which has been prepared.

An assessment of the potential ecological impacts of the project, with specific reference to vegetation and habitat clearing, connectivity, edge effects, weed dispersal, bushfire risk, riparian and aquatic habitat impacts and soil and water quality impacts.

The assessment must:

- make specific reference to impacts on threatened species and endangered ecological communities.

- have reference to the Draft Guidelines for Threatened Species Assessment (DEC/DPI, 2005), Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC), the Guidelines for Aquatic Habitat Management and Fish Conservation (DPI, 1999) and any relevant draft or final recovery plans.

- include details of any offset measures required, including demonstration that the measures are consistent with the NSW offset principles for major projects (state significant development and state significant infrastructure) (OEH, 2013c).

5.1 Ecological Impact

The Northern Interchange Compound Site will result in the removal of 1.14ha of Critically Endangered Blue Gum High Forest (BGHF) (Eco Logical Australia 2013) which is listed under the *Threatened Species Conservation Act 1995* (TSC Act).

The 1.14ha of BGHF which is proposed to be removed to establish the NICS is one of the largest stands of critically endangered BGHF outside of local bushland reserves (Dalrymple Hay, Sheldon Forest, Brown's Forest & Clive Evatt).

The area remaining of BGHF is less than 170ha (OEH 2013c). The project as a whole will result in the removal of approximately 2.81ha or 1.5% of the remainder of BGHF (Eco Logical Australia 2013).

5.2 Offsets for BGHF

Offsets are areas of land protected and managed to improve biodiversity values. Requirements for offsets are determined using an objective assessment of predicted loss of biodiversity at the development site and expected gain in biodiversity to be achieved at the offset site.

5.3 Biodiversity Credits

Biodiversity credits created for the Biobank site for management actions improve biodiversity values. The number and class of credits created for the Biobank site will be specified in the Biobanking Agreement.

To offset the impacts of the loss of 2.81ha of BGHF as a result of the Project, 163 biodiversity offset credits are required (*Eco Logical Australia 2013*).

The Office of Environment & Heritage (OEH) principles for the use of biodiversity offsets in NSW have been reviewed with consideration to achieving the requirement of 163 biodiversity offset credits for the loss of BGHF.

Principle 8 of the principles for the use of biodiversity offsets states:

> *"Offsets should be agreed prior to the impact occurring. Offsets should minimise ecological risks from time-lags. The feasibility and in-principle agreements to the necessary offset actions should be demonstrated prior to the approval of the impact. Legal commitments to the offset actions should be entered into prior to the commencement of works under approval".*

No details have been provided to demonstrate offsets can be secured for the loss of BGHF.

Page 124 of the Technical Working Paper: Biodiversity states the following:

> *"The credit report identifies that 280 ecosystem credits are required for the clearance associated with the project (**Table 16**). Based on an average 9.3 credits generated per hectare of Biobank site (based on the OEH credit converter), this would require an estimated 30.1 hectares of offset lands. The quantum and location of offsets would be confirmed in the Offset Strategy".*

Based upon the above assumptions to offset 163 BGHF Biodiversity credits, approximately 17.52ha BGHF is required to be secured and protected as a result of the project.

The NICS within Ku-ring-gai will result in the loss of 1.14ha BGHF. Therefore the requirement of approximately 65 biodiversity credits, which equates to area of approximately 6.56ha.

5.4 Key Issue

No BGHF biodiversity credits sites have been identified in the NorthConnex Technical Working Paper: Biodiversity. The Technical Working Paper Biodiversity fails to demonstrate compliance with Director General Requirements - (Biodiversity) and fulfil its requirements to offset in accordance with the NSW offset principles for major projects. The project, if approved, would require 10% or 17.52ha of all the remaining BGHF to be protected and conserved. In accordance with the OEH principles, the project should not be approved until such time the offset of 163 BGHF Biodiversity credits can be demonstrated for the loss of 2.81ha of BGHF.

References:

Department of Environment and Climate Change NSW (DECC) 2008b. *Biobanking Assessment Methodology*.

Department of Environment and Climate Change (DECC) 2009a. *BioBanking Assessment Methodology and Credit Calculator Operational Manual.*

Department of Environment and Climate Change (DECC) 2009b. *Biobanking Credit Calculator.*

Department of Environment and Climate Change NSW and Water (DECCW) 2008. *Principles for the use of Biodiversity Offsets in NSW.*

Eco Logical Australia Pty Ltd 2012b. North Wahroonga B2-B3 Corridor – Draft Flora and Fauna Assessment. Prepared for Office of Strategic Lands and Roads and Maritime Services.

NSW Department of Planning and Infrastructure, 2013, DGRs for F3 to M2 project SSI – 13_6103 (Ref:13/14378), Director Generals Requirements letter addressed to Roads and Maritime Services.

Office of Environment and Heritage (OEH), 2012. Draft Operational Manual for using the Biobanking Credit Calculator v2.0. NSW Office of Environment and Heritage.

Office of Environment and Heritage (OEH). 2013c 'Blue Gum High Forest in the Sydney Basin Bioregion - Determination to make a minor amendment to Part 2 of Schedule 1A of the Threatened Species Conservation Act'. http://www.environment.nsw.gov.au/determinations/bluegumhighforest36a.htm [Accessed December 2013].

Office of Environment and Heritage (OEH). 2013d. 'Blue Gum High Forest in the Sydney Basin Bioregion - critically endangered ecological community listing'. http://www.environment.nsw.gov.au/determinations/BlueGumHighForestEndSpListing.htm

Office of Environment and Heritage (OEH) 2013n. *NSW offsets principles for major projects (State significant development and State significant infrastructure*.

6. Heritage issues

Council engaged NGHEnvironmental Pty Ltd to undertake a review of the heritage impacts on heritage listed properties and the impact on the Heritage Conservation Area of Wahroonga. The report is included in **Appendix C** of this report. A summary of their findings is as follows:

- Some of the information used for the Statements of Significance and Statement of Heritage Impacts was outdated. However, it is recognised these oversights do not substantially alter the substance of the heritage impact assessment in relation to most of the items (except 11A Lucinda Avenue) and the Heritage Conservation Area within the Ku-ring-gai Council LGA.

- 11A Lucinda Avenue (Hindfell) is a substantially intact property of potential state significance. It is appropriate a more detail impact assessment and vibration monitoring program be established for 11A Lucinda Avenue. The issue of acoustic treatment needs to be addressed with regard to the intactness of the property and its aesthetic significance.

The EIS assesses four (4) potential impacts to heritage items. They include:

i) vibration impacts,
ii) settlement impacts,
iii) visual impacts and
iv) impacts from acoustic treatments.

In summary the following can be summarised:

i. Vibration impacts – The EIS does not define the scope of vibration monitoring works that would be undertaken, in particular how impacts would be addressed if they arise. Also the assessment did not take into account the fabric of the property in its assessment. The vibration assessment on page 78 of the EIS notes that the individual features of the property need to be factored into impact assessments. This should be considered to confirm potential degree of impact and ensure adequate measures are put in place to protect the properties.

ii. Settlement impacts – The EIS determined some properties have the potential to be subject to at most minor cosmetic damage. However, the assessment did not take into account the fabric of the property in its assessment. The vibration assessment on page 78 of the EIS notes the individual features of the property need to be factored into impact assessments. This should be considered to confirm potential degree of impact and ensure adequate measures are put in place to protect the properties.

iii. Visual impacts – The EIS as confirmed by our review has determined the majority of the visual impact to heritage items would be negligible due to the plan for the replacement of noise walls and revegetation once construction is completed. However, it is noted for 4 Burns Road the potential visual impact described in the EIS will not be screened by neighbouring properties, as these properties are marked for acquisition and demolition. The EIS should be amended to address this potential impact.

iv. Acoustic treatment impacts – The EIS for heritage recommends one property for potential acoustic treatment. The reasons for the selection of this property and the exclusion of neighbouring properties is not stated in the heritage chapter of the EIS and is not made clear in the noise chapter of the EIS. Community consultation has raised the possibility that acoustic treatment is being considered for other properties. If this is the case, the appropriate heritage assessments should be carried out.

The heritage chapter of the EIS has inconsistencies and in some cases uses out-dated significance assessments as the basis for investigation of impacts, but the general thrust of the document is considered to be accurate. The project will avoid direct impacts to heritage properties and the Heritage Conservation Area.

However, the potential for impacts has not been adequately addressed. The EIS has left many aspects of future planning to detailed design. This has created confusion and uncertainty in the community and has made it difficult for the community to understand the ongoing process.

In addition, the low legibility of the document, cross referencing to technical papers are not interpreted and difficult to read maps has made it difficult to clarify points of confusion.

7. Noise issues

Please refer to independent assessment prepared for Council by Renzo Tonin and Associates attached as **Appendix B** to this submission.

The main recommendations of their report relating to noise issues are as follows:

EIS Submission Recommendations and Information Requests

Noise Monitoring & Assessment

- NCAs defined in the EIS-NV should be further subdivided to ensure that each catchment represents a similar existing acoustic environment.
- Additional noise monitoring should be carried out to determine RBLs for the revised NCAs;
- Additional noise monitoring should be carried out, where required, to determine existing traffic noise levels for the revised NCAs.

Operational Noise Impacts

- Further information should be provided regarding the Northern Ventilation Facility and tunnel portal jet fans and a review of potential sleep disturbance from the operation of the Northern Ventilation facility.
- Details should be provided to clarify how the study area was derived (i.e. how was it calculated that the Project adds no more than 2.0 dB(A) to the total noise level) and the boundary of the study area should be defined.
- Operational daytime $L_{Aeq,15hr}$ and night-time $L_{Aeq,9hr}$ traffic noise contours should be provided.
- Detail should be provided to clarify what receiver heights were assessed as part of the operational assessment. Confirmation will be required as to whether this affects the outcomes of the noise barrier assessment.

- More information is required as to how the open graded asphalt (OGA) corrections for the M1 southbound carriageway were derived.
- With regard to pavement corrections it should be clarified whether the corrections were applied equally for each vehicle emission string (car exhaust/engine; car/truck tyre noise; truck engines and truck exhaust) or just for the car/truck tyre noise emission string.
- It is not clear why the southbound carriageway of the M1 Motorway has assumed to be resurfaced with open graded asphalt (OGA) for the No Build Opening year and Design year scenarios. This would imply that the resurfacing is not project related and has perhaps already been undertaken post EIS noise monitoring (i.e. after December 2013).
- Details should be provided to clarify whether ARRB corrections or any other calibration corrections and safety factors have been applied to operational traffic noise predictions.
- More information is required with regard to the portal correction used in noise assessment.
- More detailed assessment of maximum noise level impacts associated with the Northern Interchange should be provided.
- A reasonable and feasible noise barrier analysis in accordance with ENMM Practice Note (iv) should be conducted for Lucinda Avenue properties (including IDs 1617, 1626, 1648, 1656 & 1661) which are located north-east of the on and off-ramp portals.
- The EIS-NV needs to provide more information to ensure the receivers affected by the Northern Interchange where noise barriers are to be replaced are provided with replacement noise barriers of at least the equivalent performance of the existing barriers
- A cumulative noise assessment should be included in the EIS to address operational (Northern Ventilation Facility, portal noise) and operational traffic noise.
- Details should be provided to clarify whether the property treatments identified within Table 59 of the EIS are applicable to the ground floor and/or first floor of multi-storey dwellings.
- The EIS-NV should include a commitment to provide a road surface with similar acoustic performance to OGA when the road is resurfaced in future.

8 Property value issues

There are a number of properties likely to be impacted on by the Project. The main area of concern would be those properties in Lucinda and Eastbourne Avenues where the tunnel will be directly under the properties and fairly close to the surface. The owners of these properties need to be consulted with regard to the possibility of any impacts the tunnel works will have on the structural integrity of the properties and whether any covenants are required.

There is a need to consult with all property owners on what avenues are available for compensation should any damage be caused to properties and what impacts the project will

have on property values. Independent valuations need to be sought to determine the effects the project will have on property values that are directly affected by the project and construction compounds.

9 Traffic issues

While the project when completed will assist congestion on Pennant Hills Road, there is a four (4) year period of construction that will add additional traffic on the local road network. Council will require consultation on any Traffic Management Plans to ensure residential amenity is protected during construction and Council's infrastructure is maintained and restored to Council's satisfaction at the completion of the project.

The use of the compounds in Ku-ring-gai will have a significant impact on local traffic conditions and they need to be managed to reduce the impact on the local community. There are local schools in the vicinity of these compounds and road and traffic safety will need to be included in any consent conditions. This needs to be heavily consulted with Council and representatives of the local schools to ensure the safety of school children.

Incentivise connection between M2 Motorway (east of Pennant Hills Road) to the NorthConnex

From a Ku-ring-gai perspective, the notion of a link between the M1 and M2 Motorway could have had the potential to reduce through vehicle movements through the LGA. However, it's connection to the M2 Motorway at Pennant Hills Road favours traffic west of Pennant Hills Road, targeting the main north-south heavy vehicle route, and clearly the analysis in section 8.5 of Volume 2 of the EIS indicates reductions in traffic volumes on Pacific Highway (between the M1 Motorway and A3 Ryde Road) are expected to be modest at best. Some increases in heavy vehicles are expected southbound on Pacific Highway (south of the M1 Motorway interchange) due to the North Connex, probably as a result of heavy vehicles avoiding the toll.

While there is provision for stubs at the southern end of the North Connex to permit future connection to the M2 Motorway to the east under Pennant Hills Golf Course, under the proposed configuration there would be no incentive for motorists to connect between the North Connex and the M2 Motorway east of the Pennant Hills Road interchange. In particular, the movement from the M2 Motorway (westbound) to the North Connex (northbound) would require traffic to exit the M2 Motorway and be subjected to the traffic signal intersection at Pennant Hills Road and its associated delays. In the reverse, the movement from North Connex (southbound) to the M2 Motorway (eastbound) would be subject to slightly less delays as this would involve a left turn movement which would only be held during certain turning movements.

The proposal should incorporate incentives to facilitate these movements, as this has the potential to further reduce traffic volumes (and heavy vehicles) on the A1 Pacific Highway/A3 Ryde Road-Lane Cove Road route.

Once the North Connex is completed, there would be a significant portion of Sydney's motorway network managed and operated by Transurban. From the M7 Motorway at Casula, this would incorporate the M2 to North Ryde and the Lane Cove Tunnel to Artarmon.

There is the opportunity, therefore, for Transurban to implement distance-based tolling (as currently applies to the M7 Motorway) to these other sections managed and operated by Transurban. This would provide an incentive for motorists to use a short section of the M2 Motorway to access the North Connex (and vice-versa) and pay a fair amount for doing so, rather than paying a flat fee for the current use of the M2 Motorway. Alternatively, a discount could apply for a vehicle logged using the eastern portion of the M2 Motorway and the North Connex in close time proximity.

10 Vibration issues

Please refer to independent assessment prepared for Council by Renzo Tonin and Associates attached as **Appendix B** to this submission.

Construction Noise and Vibration Impacts

- The literature source of the sound power level (SWL) of 98 L_{Aeq} dB(A) adopted for delivery trucks, truck and dogs and articulated dump trucks should be stated. Justification should be provided as to why this seeming low SWL is applicable.
- Confirmation is required as to whether a penalty has been applied to noise sources identified in the ICNG (p16) as having particularly annoying characteristics, including jackhammering, rock hammering or rock breaking.
- The number of spoil truck movements proposed to occur during the daytime, evening and night-time for the Northern Interchange compound should be quantified. The number of spoil truck movements which have been assumed for the construction noise predictions should be clearly stated. Deciphering the data within the construction road traffic noise assessment, section 4.3 of the EIS, shouldn't have to be relied on to acquire this information.
- Review of the EIS-NV found that has not been provided. Further information is required regarding the excavation methodology for the construction of the tunnels near portals. Due to the close proximity of these works to residential receivers, this stage of construction may cause significant noise impact.
- It is not clear in the EIS-NV whether existing noise walls earmarked for replacement have been included in the construction noise assessment. There should be a commitment in the EIS-NV that where possible, new noise walls should be constructed prior to or as soon as practical after the commencement of construction.
- Further consideration of the noise benefits of increasing the height of compound perimeter barriers to be explored to address the high level of construction noise impacts predicted within the EIS-NV.

- A review of on-site heavy vehicle movements at the Northern Interchange compound outside of standard construction hours required to identify potential impacts and confirm that proposed compound mitigation and shed structure will satisfactorily mitigate noise.

11 Workshop forum summary

Council held a workshop forum with local residents on 18th August 2014 and below is a summary of the issues raised that need to be addressed in the assessment of the EIS.

TOPIC	ISSUES	REASONS FOR CONCERNS	POSSIBLE SOLUTIONS
AIR QUALITY	Pollution from vehicle emissions	Inside the tunnel and outside from the stacks	Filtering of stacks
AIR QUALITY	Is the air from the stacks clean	1.4 tonnes of pollution per day and 15 metres from road	Filtering of stacks
AIR QUALITY	Stack emissions	Level of noise and frequency of emissions	Definite calculations required.
AIR QUALITY		Is it achievable to have zero reading	Independent engineer to assess Move stacks Monitor emissions permanently Extra ventilation and noise monitoring
AIR QUALITY	Are the proposed height of stacks sufficient	Dispersion is too low	Raise the heights
AIR QUALITY	Does it require more stacks	More stacks would disperse and dilute pollution over larger area	Add extra stack in midpoint of tunnel
AIR QUALITY	Asbestos pollution while constructing	Airborne particles	Move stack, filter and monitor
AIR QUALITY	During construction, 56.5 million m3 is expected to be removed	High crystalline free silica in sandstone will this be monitored for cacogenic poisoning	Construction monitoring

AIR QUALITY	Ventilation	Data reflects outputs of Lane Cove Tunnel & M5 with poor results	
HERITAGE	Location of stacks	Heritage impacts, close to houses and schools	Move the stacks
AIR QUALITY	Atmosphere at M2 entry	Pollution from different locations entering tunnel	
AIR QUALITY	Prevailing weather conditions	Weather conditions are known to be different at Wahroonga than presented in EIS	
AIR QUALITY	Monitoring for 12months after construction considered to be too short	Given all weather and traffic variables, more time would be required.	Monitoring should be longer than proposed.
BIODIVERSITY	Impact on BGHF and riparian zones	Loss of threatened species	Relocate exit and compound
GEOLOGY	At northern entrance there is shale soil	Possible unstable terrain under homes	Risk management strategy for locations of potential impact.
BIODIVERSITY	Head of Cockle Creek is a riparian zone	Pollution, degradation, erosion and vegetation removal	Measures needed to address this issue
BIODIVERSITY	Reserve located at Junction Rd & Burns Rd – how much trees/vegetation to be removed	Definite details on tree / vegetation are required.	Measures needed to address this issue
BIODIVERSITY	Identified construction compound – Junction Road	What are the plans for restoration as there is a waterway within this compound? Is it to be piped?	Measures needed to address this issue
BIODIVERSITY	Known wild life corridors	Has there been a frog/red crowned toadlet survey done in this area? There is other wildlife such as lyrebirds and swamp wallabies	Measures needed to address this issue

DESIGN	Slope of highway rising some 8 metres before exiting at northern exit	Increased vehicle acceleration causing extra emissions	Move the highway exit and location of stacks, achievable 1/5th less emissions
DESIGN	More lanes are required in the tunnel.	Number of lanes leading from feeder roads into tunnel would create traffic congestion.	Construct extra lanes
PROPERTY	Acquisition of property	Compulsory acquisition	Relocate exit
NOISE	Is the ventilation noise in addition to traffic noise	Additional and constant noise	Noise attenuation measures required
NOISE	Construction noise is expected for 4 years	Hours of construction noise	Noise attenuation measures required
NOISE AND VIBRATION	Tunnel located under residential properties	Noise and vibration within residential homes	Dilapidation surveys required
NOISE	Proposed night work for road integration at M1/Pacific Highway junction	Constant noise, lights and traffic	Reduce working hours at this location
NOISE	Will existing noise walls be removed during construction		Build new acoustic walls before removing old existing ones
NOISE	Traffic noise	Heading south – gradient steep, possible increase in air braking. Heading north – heavy acceleration	
NOISE	Road surface	Surface required to reduce tyre noise and continued maintenance	Open grade asphalt pavement required.
PROPERTY	Property values	Decrease in real estate property $ values	
PROPERTY	Development opportunities	Building restrictions within the vicinity of the stacks	
PROPERTY	Visual impact	Not addressed in EIS	

TRAFFIC	Truck movements	Size of trucks to be used, times of movement, location of spoil	
TRAFFIC	Provisions of cycleways	Danger to cyclists and exposure to vehicle emissions	Do not acquire land for cycleways
LIGHTING	What is the final lighting to be used on	Illumination concerns	
LIGHTING	What lighting is to be used during construction and when.	Constant brightness of lights	

12. Conclusion

While Council is not objecting to the project proceeding, there are a number of issues of concern to Council and the local community relating to both construction and post construction operations.

Council will require a draft copy of the proposed conditions of consent for review and comment prior to the release of any approval.

The main areas of concern are:

- Construction traffic
- Impact on residential properties during construction and post construction
- Monitoring of pollution from ventilation stacks
- Treatment of ecological communities
- Traffic noise and height of noise walls
- Visual impact of ventilation stacks
- Location of ventilation stacks

APPENDIX A

AIR QUALITY REVIEW

APPENDIX B –

NOISE AND VIBRATION CONSULTANT REPORT

APPENDIX C –

HERITAGE CONSULTANT REPORT