Rozelle Interchange AQCCC Meeting 2

16 November 2021

Additional questions

Air quality modelling factors

Does the air quality modelling identify locations that will be negatively impacted and those that benefit from either change in traffic volumes or AQ?

The air quality modelling identifies locations in the local vicinity of the outlets that will be impacted by changes in traffic and air quality as a result of the project.

An example of this is shown in Figure 8-78 from the EIS. In this figure, one of many modelled scenarios, the green shading indicates an improvement in maximum 24-hour PM2.5 concentrations due to the project, while the purple where maximum 24-hour PM2.5 concentrations increase due to the project.

The changes due to the project seen in the figure are all resulting from changes in surface road traffic. The outlets are designed to disperse pollutants and are very effective in this task such that ground level impacts are too small to be measured

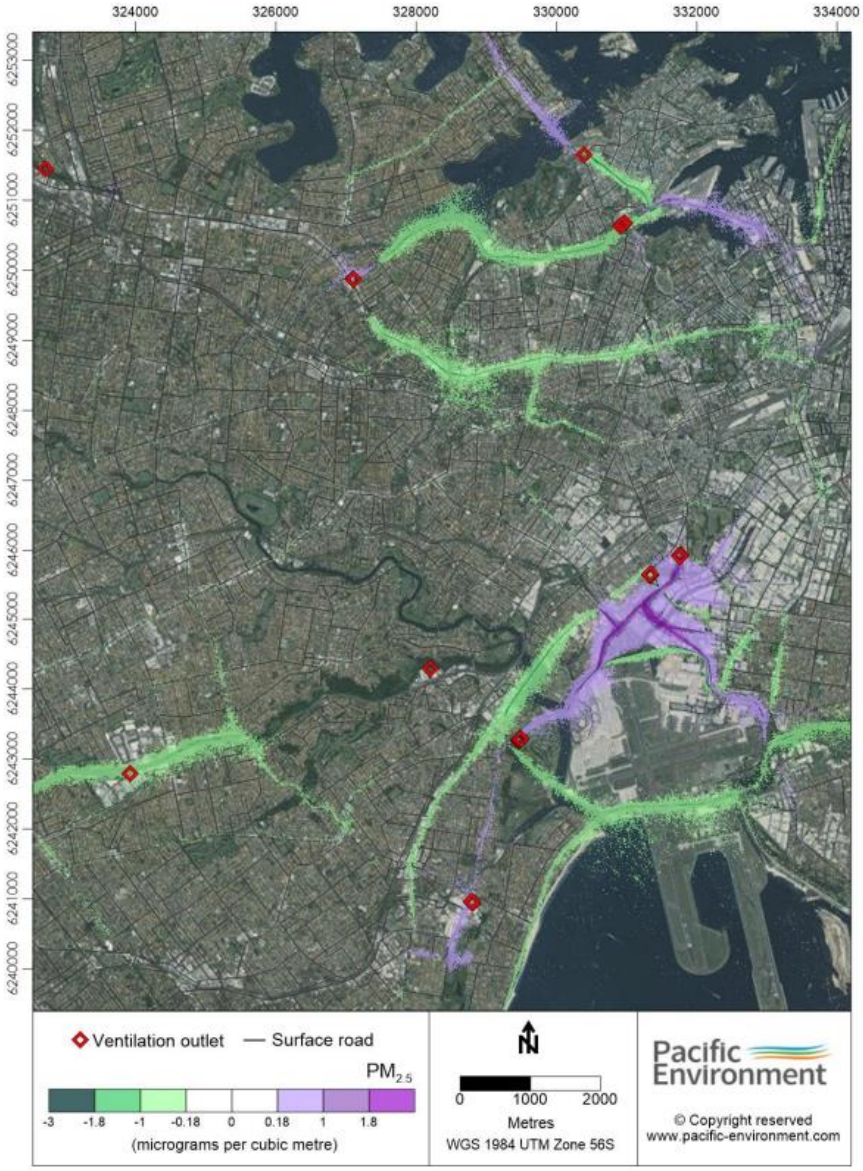


Figure 8-78 Contour plot of change in annual mean $PM_{2.5}$ concentration in the 2033 cumulative scenario (2033-DSC minus 2033-DM)

Vol2C Part A Appendix I of the M4-M5 EIS: https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSI-7485%2120190227T230639.357%20GMT

Ventilation facility siting and design

Can you show all Sydney tunnels and relevant ventilation facilities (including length of built and approved tunnels?

Source: EMM Consulting 202

If the ventilation outlets are 36-42m high as measured from the ground, what is in this area of all the ventilation outlets? How does the parklands and sporting fields on the Rozelle Railyard site positioning and height impact this guide?

Land use in the vicinity of the Rozelle ventilation facilities is shown in the figures below.

The first figure is taken from the approved Urban Design and Landscape Plan (UDLP) for the Project, while the second shows an artist's impression (also from the UDLP) which illustrates the new parklands, as well as land uses immediately to the south of the ventilation facilities.

The ventilation facilities are designed and operated such that changes to pollution levels due to the outlet are too small to be measured. This can be seen from the EIS assessments and from experience from other tunnels in Sydney such as the WCX M4 East project.

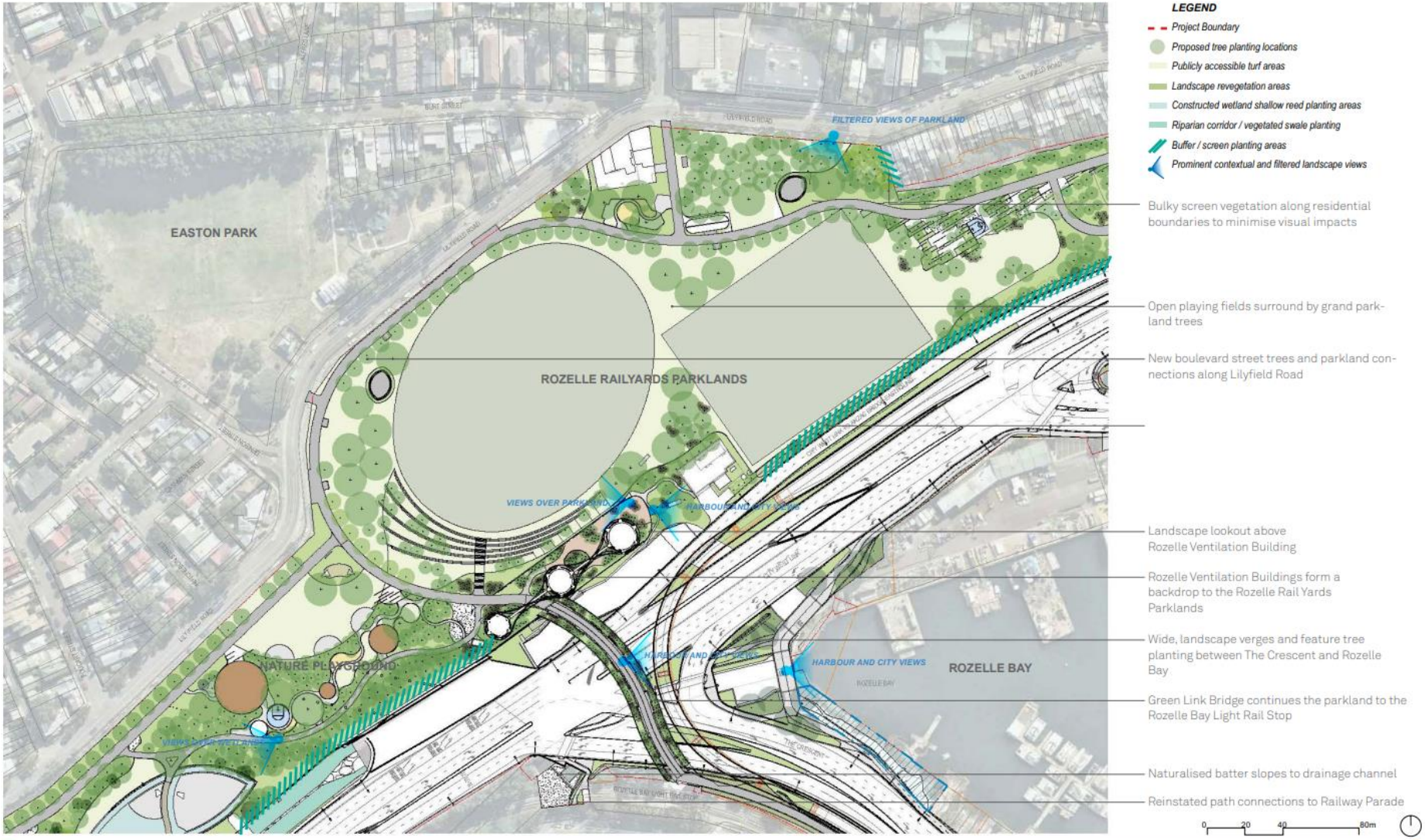


Figure 5-10: Rozelle - Landscape Strategy Plans - Drawing 2 of 4

Artist’s impression: View over Rozelle Rail yards parkland (UDLP)

A guide presented to the AQCCC during the first meeting showed exhaust fumes falling to ground level from a distance of twice the outlet height – is that correct?

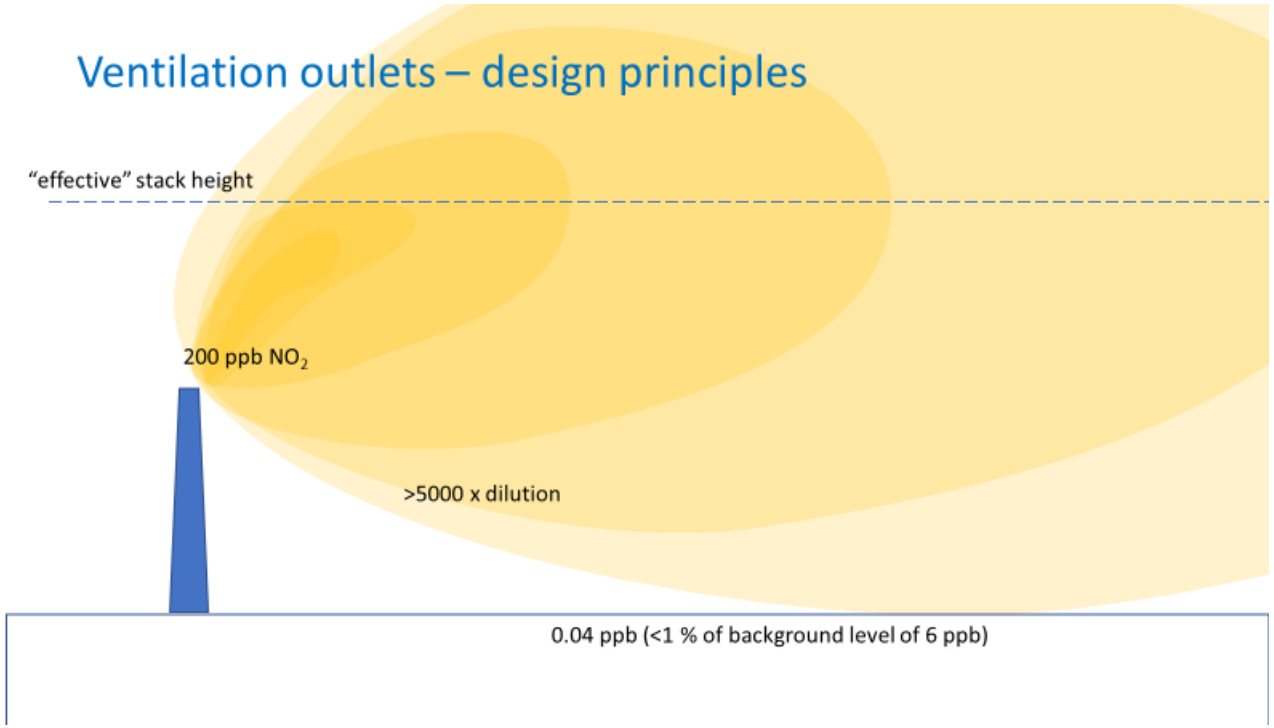
The pollution coming from the outlet is represented in the figure below. The concentration of pollutants is already relatively low when it leaves the outlet because it has already been diluted by the in-tunnel ventilation system to meet in-tunnel pollutant limits.

This is then further diluted as the pollution is pushed some 50 to 100m above the stack to the point where it would be difficult to difficult to determine what is background pollution and what has come from the outlet. This is then even further diluted (around 5000 times) by the time it reaches ground level.

Further details on the science of ventilation outlets is provided at the link below:

https://chiefscientist.nsw.gov.au/__data/assets/pdf_file/0004/196645/TP05_Road-Tunnel-Stack-Emissions.pdf

Ventilation outlets – design principles



Which consultancy engineered the ventilation facilities? Which other facilities have they engineered over the past 15 years? Have all these facilities achieved real world outcomes consistent with the design? Are there any specific failures?

For the below consultants in the last 15 years there are no known failures.

These consultants, in one combination or another, have been involved in almost every major Australian road and rail tunnelling infrastructure project.

Other relevant projects that these engineers have been involved in have achieved outcomes consistent with the design with no known failures. An example of this is Jacobs Engineering, who have worked on the design of the ventilation facilities for the M8.

Design Consultant / Engineer	Design Contribution	Other Projects
Pacific Environment / ERM / AECOM	Air quality impact assessment.	Global organisations with projects on every inhabited continent
WSP Arcadis Joint Venture	Design ventilation outlets to meet identified parameters	Global organisations with projects on every inhabited continent
McMillan Jacobs Associates Pells Sullivan Meynink Joint Venture	Design of ventilation tunnels to meet identified parameters	North American and Australian footprint
EMM Consulting	Air Quality impact assessment	Air quality projects Australia wide
Jacobs Aurecon Joint Venture	Independent certification to Australian and other codes and standards	Global organisations with projects on every inhabited continent
Auditors to be appointed	Audit and validate the system	-

What is the redundancy approach and plan for mechanical/electrical plant failure?

Redundant equipment is provided; additional jet fans in the tunnel and axial fans in the ventilation facility are required in case of component failure.

Dual feed power: A completely redundant power supply system is provided to all the WestConnex tunnels. This is in the form of an A and B supply from two separate zone substations or from a transmission substation.

If power, control, or a sufficient number of systems or fans cease operating, the tunnel is not considered safe to be open and therefore must be closed until the issue is rectified.

Air quality outputs

How does the tunnel AQ approval limits compare to other tunnels built over the past 20 years across Australia, Europe, USA, UK? At the very minimum, all the tunnels built in Sydney over the past 20 years.

WestConnex tunnels have some of the most stringent in-tunnel air quality criteria in the world. These criteria have become tighter over time and are more stringent than older tunnels in Sydney eg Lane Cove Tunnel and Cross City Tunnel. Outlets have been designed so that there is a general improvement in air quality due to a reduction in surface traffic and more efficient vehicle operation within the tunnels.

For example, figure 8-74 below from the EIS demonstrates the minor contribution made by the outlet emissions (thin black line on the top) when viewed against the background (blue) and modelled surface contribution from roads (red).

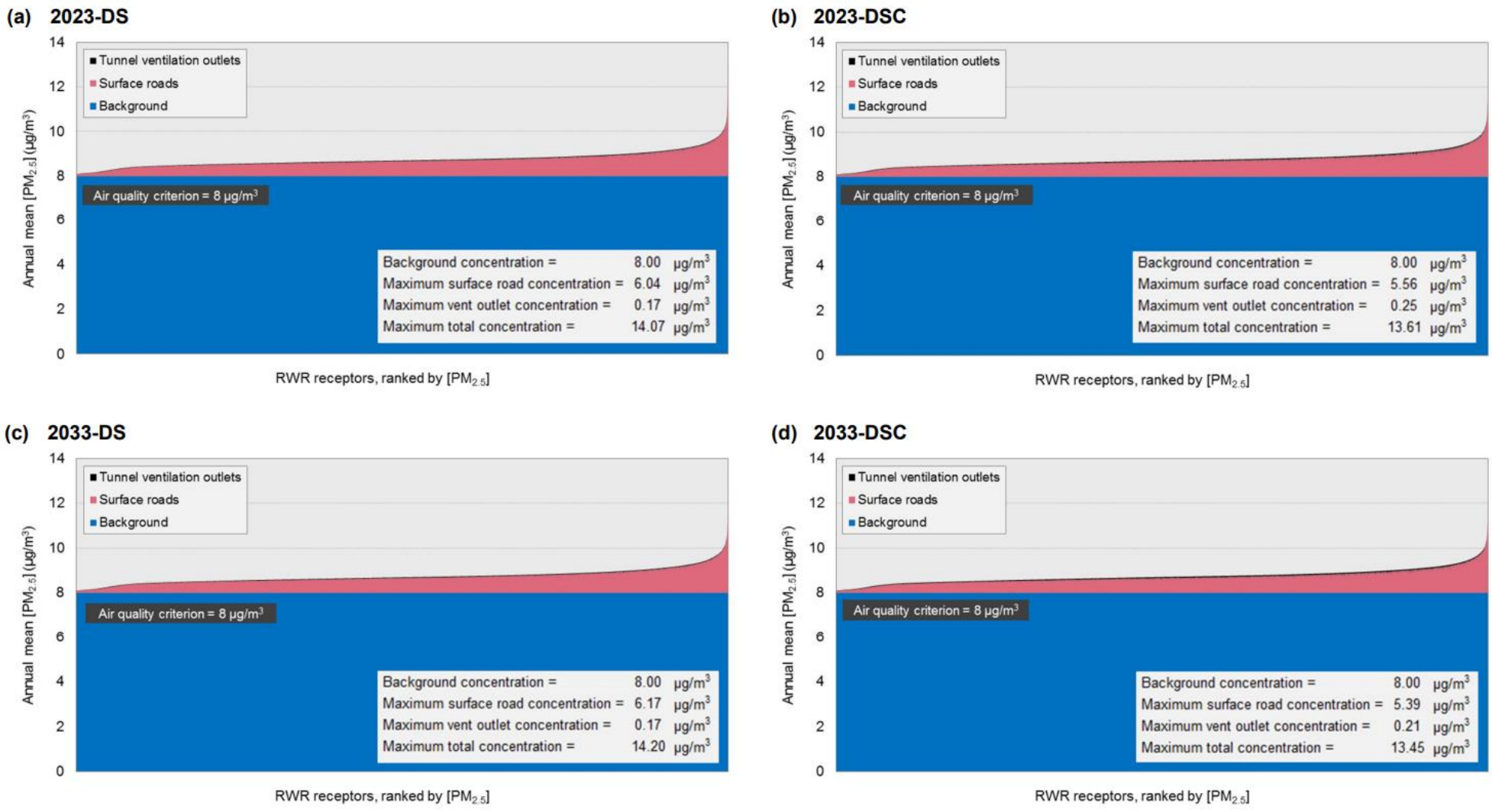


Figure 8-74 Source contributions to annual mean $PM_{2.5}$ concentration at RWR receptors (with-project and cumulative scenarios)

What is the best metric to understand and compare the outlet capacity against other projects in Australia?

Outlet capacity for tunnels in NSW are generally around twice the capacity required to meet pollution concentration limits. The capacity is governed by the need to prevent portal emissions. That is, all the air that is moved along the tunnels by the vehicles through the piston effect is captured by the outlet plus additional air that is drawn against the traffic flow to avoid portal emissions.

The maximum flow from the piston effect is generated by capacity traffic travelling at 80km/hr (the maximum speed limit). However, this traffic case is not the worst pollution case as there are less cars in the tunnel at this speed (a greater average space between cars) when compared to lower speed (cars closer together).

In general, these traffic cases are seen as design cases to determine maximum ventilation system capacity and are rarely if at all seen in real world operations.

Air Quality monitoring

Can community-based air quality monitors (including those in local schools) be utilised to complement the Project's air quality monitors?

The air quality monitoring approach used on WCX includes;

- Scientific grade equipment which is installed, calibrated and maintained in accordance with Australian Standards and EPA guidelines
- Equipment audited in accordance with the Conditions of Approval
- The organisation responsible for installation, calibration and maintenace must be accredited by the National Association of Testing Authorities (NATA)
- A full year of data is required prior to tunnel opening to ensure a robust data set with an extensive range of meterological conditions
- All data collected is validated in accordance with Australian Standards

The above requirements are expensive and require significant resourses to ensure that the data collected is valid and robust and can be used reliably for assessment.

Unless the community based monitoring stations meet all of these criteria, the data would not be considered valid for detailed assessment.

How does the audit process work? How is the auditor selected? What is audited and how often is it audited? Is the operator bound to the findings of the auditor and required to make changes based upon his advice?

There are a number of Conditions of Approval which relate to environmental auditing of the Project, specifically in relation to ventilation facility monitoring.

The table below sets out the relevant conditions and details of what is required. The Project Conditions of Approval can be viewed via the following link:

https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSI-7485-MOD-5%2120201117T225358.040%20GMT

CoA	Audit details	Recipient of the audit report	Implementation
A38	All environmental audits must be conducted by a suitably qualified, experienced and independent team of experts in auditing and be documented in an Environmental Audit Report which: (a) assesses the environmental performance of the CSSI, and its effects on the surrounding environment; (b) assesses whether the project is complying with the terms of this approval; and (c) recommends measures or actions to improve the environmental performance of the CSSI.	The Proponent must submit a copy of the audit report to the Secretary	Compliance Tracking and Environmental Audit Program
A39	The Proponent must submit a copy of the Environmental Audit Report to the Secretary for information, with a response to any recommendations contained in the audit report within six (6) weeks of completing the audit.	The Proponent must submit a copy of the audit report to the Secretary	N/A
E10	All tunnels must be designed and constructed so as to allow for future modification of the ventilation system if required.	The Proponent must submit a report to the Secretary demonstrating how this will be allowed for prior to finalising detailed design.	
E19A	Ventilation outlet monitoring equipment must be independently verified prior to its commencement of monitoring.		
E22	All sampling points and visibility monitoring points must be audited prior to commencing monitoring, for compliance with the requirements set out in Conditions E3, E4, E5 and E20. Verification and compliance auditing is to be undertaken by an independent person(s) or organisation(s) whose appointment has been approved by the Secretary. The independent person(s) must be a Chartered Professional Engineer (either Mechanical, Chemical or Control Systems engineer).	N/A	Operational Environmental Management Plan, Section 5.11
E36	Continuous emissions monitoring systems installed and operated as required by CoA E21 must undergo relative accuracy test audits at an interval not exceeding 12 months, or as otherwise agreed to by the Secretary.	N/A	Operational Environmental Management Plan, Section 5.11

E37	The Proponent must engage a person independent from the design and construction of the CSSI, to audit the air quality monitoring (in-tunnel and ambient) for the CSSI at six (6) monthly intervals following commencement of operation of the CSSI, or at any longer interval if approved by the Secretary.	N/A	
E38	The Proponent must consult with the EPA and AQCCC before nominating the proposed auditor to the Secretary. Operation of the CSSI must not commence until the auditor's appointment is approved by the Secretary	N/A	Approval of the auditor by the Secretary
E39	The auditor must ensure that the operating procedures and equipment to acquire air monitoring, meteorological data and emission monitoring data and monitoring reporting comply with NATA (or equivalent) requirements and sound laboratory practice.	N/A	
E40	The Proponent must document the results of the audit and make available all audit data for inspection by the Secretary upon request.	The Secretary. A copy of the audit report must also be issued to the Proponent and AQCCC.	
E41	The Proponent must undertake appropriate quality assurance (QA) and quality control (QC) measures for air quality and ventilation outlet emission monitoring data. The QA/QC measures must be approved by an expert independent from the design and construction of the CSSI.		The independent expert must be approved by the Secretary prior to monitoring of air quality and ventilation outlet emissions

In the case of a failure to meet AQ criteria, what penalties are in place and what compensation plan exists for those impacted?

The Department of Planning, Industry and Environment's Compliance team works with communities and local councils across NSW, as well as State and Federal government agencies, to ensure State significant development (SSD) and State significant infrastructure (SSI) projects across NSW meet the project conditions of approval.

These conditions often include the need to regularly monitor, audit (refer Q21 above) and report on compliance. It may also include the need to commission independent experts to audit compliance, assess and recommend improvements to environmental performance.

The Compliance Policy can be reviewed via the following link: Compliance Policy (nsw.gov.au).

If a non-compliance results in a fine, it is generally $15,000 for each non-compliance.

There is no requirement for compensation.

Traffic considerations

For the New M4, is it possible to present a correlation of actual traffic volumes with expected traffic volumes versus actual air quality with expected air quality to determine model accuracy?

At meeting 1 of the Rozelle Interchange Air Quality Community Consultative Committee, information was presented showing the New M4 in tunnel air quality levels and reductions in average ambient NOx concentrations.

The New M4 air quality assessment considered a number of traffic scenarios. For the in-tunnel air quality assessment, the following three scenarios were assessed:

- Expected traffic volumes (2021, 2031 and 2031 cumulative)
- Maximum capacity traffic flow
- Vehicle breakdown

Modelling different scenarios demonstrated that the New M4 ventilation system has been designed to achieve specified in-tunnel air quality outcomes for traffic volumes up to and including the maximum traffic throughput capacity of the project's main alignment tunnels.

Expected emissions and concentrations from the ventilation outlets under the above scenarios was shown in Appendix I of the Air Quality Assessment Report.

An analysis of ambient air quality monitoring results in the vicinity of the New M4 for the 12 months following operation has shown reductions in road traffic emissions by up to 26%. The analysis undertaken by Dr Ian Longley (Programme Leader – Air Quality National Institute of Water & Atmospheric Research Ltd) is available here: NIWA Client report (westconnex.com.au)

In terms of comparing expected traffic verses actual traffic, and the resultant modelling accuracy, the modelled scenarios are considered to be conservative for a number of reasons;

- Expected traffic numbers/scenarios tend to be conservative in nature
- The pollution generated by the expected traffic is for an older more polluting fleet ie the worst case is the day of tunnel opening and from that time onward, the fleet is renewing with older more polluting vehicles being replaced by newer less polluting vehicles

Further validation of actual verses predicted can be undertaken as part of the overall assessment of tunnel air quality.

For information

The predominate wind direction(s) to be discussed and I suggest indicated on key ventilation stack location diagrams. Ideally a “wind rose” to be shown on these diagrams close to the ‘North’ direction indicator.

Thanks, we will put this on diagrams when we present next year.