NSW GOVERNMENT Transport Roads & Maritime Services

How is air quality managed

in Sydney's road tunnels?

The Sydney Orbital Network includes over 160 kilometres of surface roads, tunnels, bridges and underpasses. There are five main tunnels along the network; Lane Cove Tunnel, Sydney Harbour Tunnel, Cross City Tunnel, Eastern Distributor Tunnel and the M5 East Tunnel.

Whilst expensive to build and operate, major road infrastructure such as tunnels, provide many benefits including:

- Reduced travel times.
- Quieter residential streets and improved air quality (surface traffic reduced by up to 40%).
- Preservation of valued green space and native habitats in urban areas (eg. the M5 East Tunnel runs under the Wolli Creek Reserve).
- Improved access to amenities and employment areas.
- Efficient transport of freight.
- Reduced greenhouse gas emissions and fuel costs due to less stopping and starting at traffic lights.

Air quality in and around road tunnels

Roads and Maritime Services adhere to strict conditions set down by the former NSW Department of Planning for the maximum allowable levels of vehicle emissions in the air both in and outside its tunnels. These standards are recommended by the World Health Organisation and the National Environmental Protection Council.

Air quality monitors in and outside the tunnels constantly measure the presence of carbon monoxide, nitrogen dioxide, fine particles and visibility levels.

External air quality in the suburbs adjacent to tunnels will vary during the year due to seasonal climate variations, wind speeds and external events such as dust storms, bush fires and construction works in the area.

Air quality management

Tunnel air quality is monitored 24 hours per day. It is managed by ventilating the tunnels with fresh air which dilutes the pollutants emitted from vehicles as they travel through the tunnels. How air quality is managed in individual tunnels varies and is determined by several factors, including:

- Length of tunnel.
- Volumes of traffic.
- Number and location of ventilation buildings, jet fans, axial fans, fresh air intake points, crossover passages and bypasses.
- Physical constraints within the tunnel.
- Operating Conditions of Approval (as set by the former Department of Planning).

Even though traffic volumes have significantly increased over time, Sydney's air quality has improved and is now cleaner than it was two decades ago with big improvements in vehicle emissions mainly due to stricter fuel and vehicle emission standards.

Roads and Maritime Services is committed to improving air quality by effectively managing its road network and traffic system and will continue to work towards reducing vehicle emissions and supporting initiatives that help keep our air clean.

The Cross City Tunnel

Inside the Cross City Tunnel

The Cross City Tunnel links Darling Harbour to Rushcutters Bay through separate east and westbound tunnels, avoiding up to 18 sets of traffic lights. From the west, you can access the Eastern Distributor directly to the airport. Coming from the east, you can avoid city traffic and access the harbour crossings.

The Cross City Tunnel improves air quality by taking cars and their emissions off surface streets. Better air quality in Central Sydney was one of the key objectives of the Cross City Tunnel. Studies show air quality is significantly improved, with up to 40,000 vehicles a day travelling in the tunnel instead of using existing streets.

How is air quality managed in the Cross City Tunnel?

Air quality is managed via a ventilation building located west of Harbour Street, between the existing Harris Street and Market Street viaducts above the eastern side of Darling Harbour.

The tunnel has been designed to provide better air quality during an incident such as a traffic accident or vehicle breakdown and features a unique “third” tunnel (ventilation tunnel) located beneath the two traffic tunnel tubes.

In normal operating conditions, air travels east in the eastbound tunnel before being directed into the westbound tunnel to travel to the ventilation building. A ventilation tunnel has been constructed beneath the road tunnels for use during heavy traffic and other incidents. At these times, air from the eastbound tunnel will be transferred into the ventilation tunnel and expelled via the ventilation outlet.

Other features of the ventilation system include:

- Jet fans along the ceiling of the tunnels and access ramps to control air flow.
- A main underground ventilation building at the western end near Druitt Street.
- A ventilation cross-over passage and ventilation station at the eastern end of the main tunnels.
- A bypass fan station at the western end that generates airflow in the bypass ventilation tunnel.

Air quality monitoring

Air quality in-tunnel monitoring is undertaken at various locations. The tunnel is operated to ensure air quality levels stay within the goals set by the former Minister for Planning. Air quality information from in-tunnel monitors, as well as relevant meteorological data such as wind factors, is available on the tunnel operator’s website at **crosscity.com.au**

Entrance to the Cross City Tunnel

The Eastern Distributor Tunnel

Entrance to the Eastern Distributor Tunnel

The Eastern Distributor provides a fast, efficient, easy link for travelling from the north, south and east of the city. It provides quick access between the city and the airport. An important objective of the design was to minimise the impact on the area it passes through. The Eastern Distributor provides a good example of how urban design can create a blend between the old and the new.

The six-kilometre motorway cuts city-to-airport travel times by at least ten minutes and bypasses 19 sets of traffic lights.

The Eastern Distributor tunnel tubes are 1.7 kilometres in length and run from Wooloomooloo to Surry Hills and are located underneath one of Australia's most densely populated areas. The tunnel tubes are arranged in a 'piggy back' configuration with the northbound tunnel sitting on top of the southbound tunnel.

How is air quality managed in the Eastern Distributor Tunnel?

The tunnel air can be expelled through two ventilation buildings, one at Darlinghurst (for northbound traffic) and another at Surry Hills (for southbound traffic) or through the tunnel portals (entrances and exits).

Air is circulated through the tunnel by a combination of vehicle movements and the use of jet fans.

Air quality monitoring

Monitors in the Eastern Distributor tunnel measure pollutant levels along the length of the tunnel.

The tunnel operator carries out routine testing of the air quality in the tunnel and monitors it 24 hours a day to ensure levels stay within the goals set by the former Minister for Planning. For more information visit the tunnel operator's website at **easterndistributor.com**

Inside the Eastern Distributor Tunnel

The Lane Cove Tunnel

Inside the Lane Cove Tunnel

The Lane Cove Tunnel is a 3.6 km twin tunnel motorway under Epping Road that links the M2 Motorway at North Ryde with the Gore Hill Freeway at Artarmon.

The Lane Cove Tunnel delivers a number of benefits including quicker travel times between the north-west and the city, provision of a direct link to the Sydney Orbital Network and a route that bypasses five sets of traffic lights, both east and westbound, along Epping Road.

The Lane Cove Tunnel improves local air quality by reducing traffic volumes on Epping Road. These air quality improvements extend several hundred metres either side of Epping Road.

How is air quality managed in the Lane Cove Tunnel?

Air quality in the tunnel is managed with two ventilation buildings: one at the western end, in the Lane Cove West Industrial Park in Sirius Road; and one at the eastern end, in the Artarmon industrial area, between the western end of Marsden Street and the Pacific Highway. The ventilation buildings are connected to exhaust points that are located at various points in the tunnel.

Fresh air is drawn into the tunnel via the portals (tunnel entrances and exits) and an intake located at 130-132 Epping Road, Lane Cove. Strategically positioned jet fans along with the movements of vehicles assist with the flow of air.

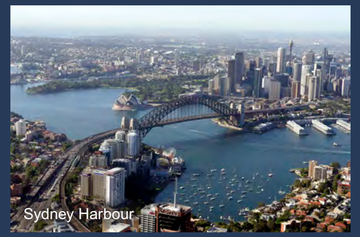
Air quality monitoring

Monitors in the Lane Cove Tunnel measure pollutant levels along the length of the tunnel. Air quality is also measured in the ventilation buildings. The tunnel operator carries out routine testing of the air quality in the tunnel.

The air quality standards for the Lane Cove Tunnel project were set down in the former Minister for Planning's Conditions of Approval. Air quality data is available to the public on the tunnel operator's website at **connectormotorways.com.au**

Entrance to the Lane Cove Tunnel

The Sydney Harbour Tunnel


Sydney Harbour

The Sydney Harbour Tunnel was completed and opened to traffic in August 1992 to provide a second crossing of Sydney Harbour and to alleviate congestion on the Sydney Harbour Bridge.

The tunnel is made up of three sections: twin 900-metre land tunnels on the north shore, twin 400-metre land tunnels on the south shore and a 960-metre immersed tube. The tunnel falls about 55 metres from the northern entrance and about 35 metres from the southern entrance to its deepest point, 25 metres below sea level.

The tunnel joins the Warringah Freeway at North Sydney, and the Cahill Expressway at the entrance to the Domain Tunnel. It has two lanes in each direction and carries around 90,000 vehicles per day.

How is air quality managed in the Sydney Harbour Tunnel?

Air quality in the tunnel is managed with a ventilation building located in the northern pylon of the Sydney Harbour Bridge. In addition to air being expelled via the ventilation building, air is expelled through the tunnel portals (tunnel entrances and exits). Air is circulated through the tunnel by a combination of vehicle movements and the use of axial fans. Fresh air can be drawn into the tunnel via a duct located on the top or side of each tunnel.

The tunnel ventilation system is managed to ensure carbon monoxide levels within the tunnel are kept within approved levels and that visibility for drivers is maintained at safe levels.

Air quality monitoring

The tunnel operator carries out routine testing of the air quality in the tunnel and in the ventilation building. The air quality is monitored 24 hours a day to ensure levels stay within the goals set by the former Minister for Planning

The tunnel is fitted with carbon monoxide monitors as well as visibility and air velocity monitors.

Inside the Sydney Harbour Tunnel

The M5 East Tunnel

Inside the M5 East Tunnel

The M5 East tunnel forms a key section of the M5 East Freeway and significantly improves access between south western Sydney, the city, Sydney Airport, Port Botany and the major industrial and commercial land uses surrounding the airport. The M5 East connects to the M5 South West Motorway at King Georges Road in Beverly Hills and with General Holmes Drive and on to the Eastern Distributor.

The M5 East Freeway is almost 10 kilometres in length and includes twin four kilometre tunnels between Bexley Road, Earlwood and Marsh Street, Arncliffe. A 550 metre tunnel passes under the Cooks River.

Since opening, the M5 East tunnel has been operating in accordance with the former Planning Minister's conditions of approval for the project issued in December 1997.

How is air quality managed in the M5 East Tunnel?

The tunnel has 132 jet fans and 18 axial fans to assist the operation of the in-tunnel ventilation system. Fresh air is brought into the tunnel from the portals (entrance and exits) and also from a separate fresh air intake plant located at Duff Street, Arncliffe.

Air containing pollutants is drawn away from the middle of the tunnel and expelled through a ventilation building located in Turella. The height of the outlet is 35 metres. This ensures that pollutants from vehicle emissions are well dispersed.

The M5 East Tunnel (westbound tube) is also fitted with a smoky vehicle camera/video system which detects vehicles that emit smoke for approximately 10 seconds or more. This deters drivers of smoky trucks from using the tunnel and encourages them to repair their trucks.

Air quality monitoring

Air quality in the tunnel is monitored 24 hours per day, 7 days per week. There are five ambient (outside) air quality monitoring stations located in the Wolli Creek area that collect important meteorological information and air quality data.

This information is available via an easy to use, real-time, interactive map. To view daily and historical air quality information, go to the Roads and Maritime Services website at **rms.nsw.gov.au/environment**

Entrance to the M5 East Tunnel

For more information go to www.rms.nsw.gov.au

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