

Western Harbour Tunnel and Beaches Link

Tunnel ventilation and air quality



The NSW Government has announced the preferred route, community engagement, the start of geotechnical test drilling and a market sounding process for the proposed Western Harbour Tunnel and Beaches Link.

The Western Harbour Tunnel and Beaches Link project is currently at the initial, or concept design stage and is based on desktop studies.

Extensive field work currently taking place across the preferred route includes geotechnical studies, traffic analysis, noise and air quality monitoring, marine ecology and flora and fauna studies.

Roads and Maritimes Services is actively engaging with local communities to help inform the next level of design which will allow decisions to be made on whether to proceed with the project and the actual proposed route and location of the motorway.

Western Harbour Tunnel would connect to WestConnex at the Rozelle Interchange, cross underneath Sydney Harbour between the Birchgrove and Waverton areas and connect with the Warringah Freeway.

Beaches Link is a tunnel which would connect to the Warringah Freeway, cross underneath Middle Harbour and connect with the Burnt Bridge Creek Deviation at Balgowlah. The Wakehurst Parkway would be upgraded to two lanes each way between Seaforth and Frenchs Forest.

More detailed information on the design and operation of the proposed tunnels will be available by mid-2018 when the NSW Government releases a reference design for the project. The reference design will include details such as the location of tunnel entry and exit portals, and the preferred location of ventilation facilities, none of which have yet been determined.

Tunnel ventilation and air quality

Roads and Maritime Services recognises the high levels of community interest in tunnel ventilation. We understand that questions about air quality in motorway tunnels in Sydney are important topics.

Tunnel ventilation systems are designed to manage air quality both inside and outside the tunnel.

Western Harbour Tunnel and Beaches Link ventilation systems will be designed to meet stringent in-tunnel, local and regional air quality criteria set by the NSW Department of Planning and Environment, the Environment Protection Authority and NSW Health.

Roads and Maritime has over 20 years' experience designing road tunnels, with five major tunnels operating in Sydney and further tunnels planned or under construction.

Experience from other motorway tunnels and studies of ambient air quality data from existing Sydney tunnels has confirmed emissions from tunnel ventilation outlets have a negligible impact on local and regional air quality.

Western Harbour Tunnel and Beaches Link will be designed and operated in line with the highest standards. Designs will be informed by lessons learnt from other motorway tunnels and will include international best practice.

Lessons learnt include:

- Regulate and eliminate heavy vehicles that produce high volumes of smoke
- Increase the clearance height and width of tunnels to provide higher volumes of in-tunnel air
- Design tunnels to allow vehicles to maintain consistent speed
- Locate ventilation outlets close to exit portals for more efficient ventilation
- Create smooth traffic flows at entry and exits to prevent congestion
- Acknowledge filtration is not effective; it is not used in Australian tunnels and overseas it is only used in limited circumstances

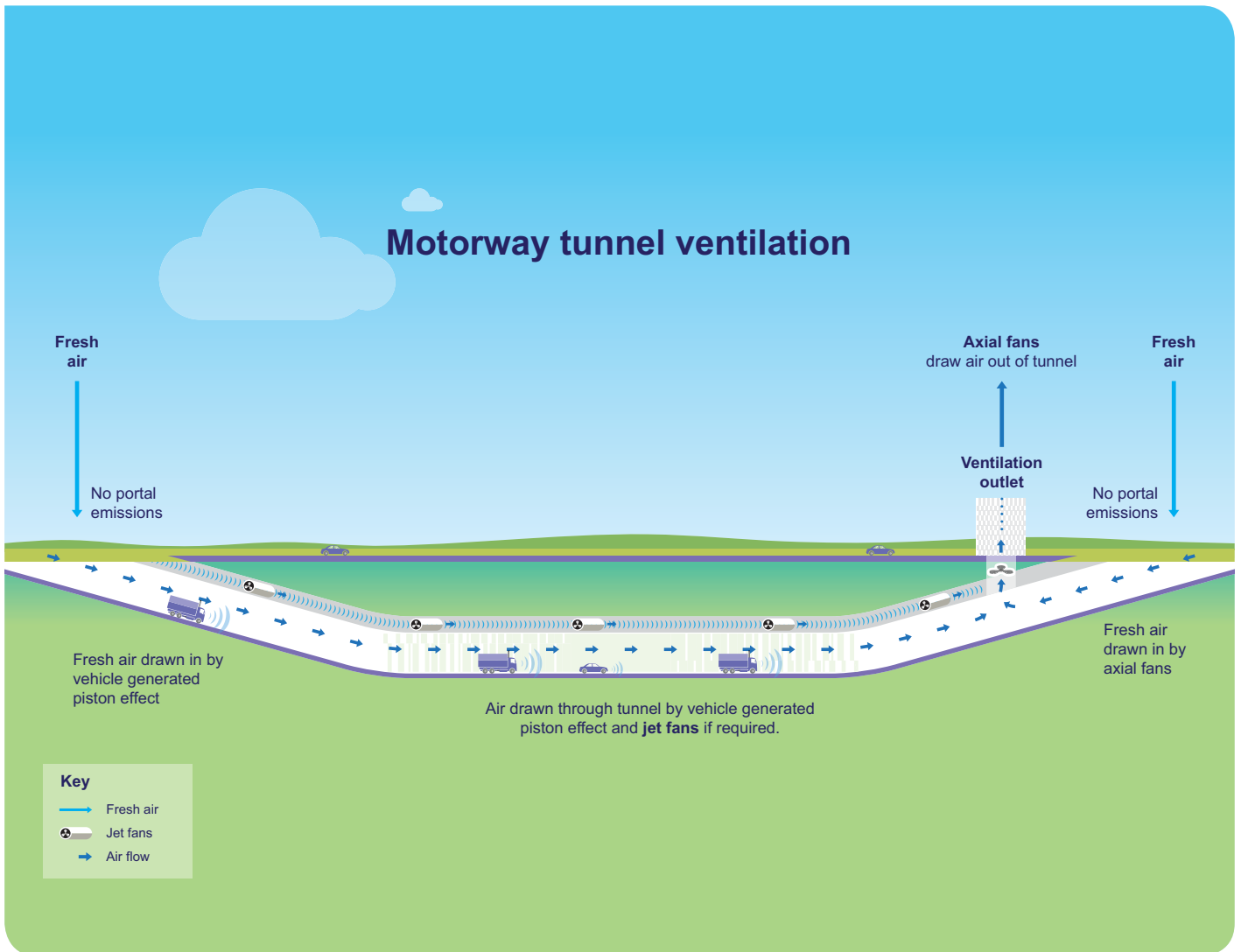
Key facts

- ✓ Concept design only - reference design to be released by mid 2018
- ✓ Decisions on ventilation outlets have not yet been made
- ✓ Well-designed ventilation outlets are very effective at maintaining local air quality
- ✓ No motorway tunnels in Sydney, Melbourne or Brisbane are filtered
- ✓ Filtration is not an efficient and sustainable option for managing external air quality via the ventilation outlets
- ✓ Extensive monitoring of tunnel ventilation systems in Sydney, Melbourne and Brisbane has not detected any change in air quality due to outlet emissions
- ✓ Proposed ventilation systems will be transparently and thoroughly assessed by experts in the Environment Protection Authority, NSW Health and Department of Planning and Environment



The Sydney Harbour Tunnel ventilation outlets are in the northern pylons of the Sydney Harbour Bridge

How tunnel ventilation works



Well-designed ventilation outlets are very effective at dispersing tunnel emissions.

The basic principle of tunnel ventilation is the maintenance of air quality by providing fresh air and removing the air from the tunnel near the main portals via a ventilation outlet (see above).

Western Harbour Tunnel and Beaches Link ventilation will be designed with a longitudinal ventilation system with air drawn into the portals by moving traffic.

At the tunnel exits, air will be extracted from the tunnel through a ventilation outlet to effectively and safely disperse the air high into the atmosphere.

Jet fans are used to keep fresh air flowing through the tunnel when traffic is slow or stopped to make sure air quality inside the tunnel is always at the required standard.

Western Harbour Tunnel and Beaches Link are planned to be significantly higher and wider than some previous Sydney tunnels. This allows greater volumes of fresh air to move through the tunnel to reduce the build-up of emissions across the length of the tunnels.

Ventilation systems for the project will reflect the latest technology from around the world.

Project status

The project is currently in concept design. Detailed design information is due to be finalised by mid-2018. It is expected that the Western Harbour Tunnel and Beaches Link will have ventilation outlets near the tunnel exits.

Ventilation outlets and tunnel facilities will be designed to integrate with the local environment.

Monitoring air quality

Air quality monitors are being placed at key locations along the preferred route to gather baseline data.

Western Harbour Tunnel and Beaches Link air quality would be assessed as part of a rigorous environmental assessment should the project proceed.

As with other modern motorways in Sydney, the tunnels would have management plans that include continuous monitoring of air quality.

Air quality results would be publicly available.

Designing for now and the future

Newer vehicles produce significantly less emissions than older vehicles, and this trend is continuing.

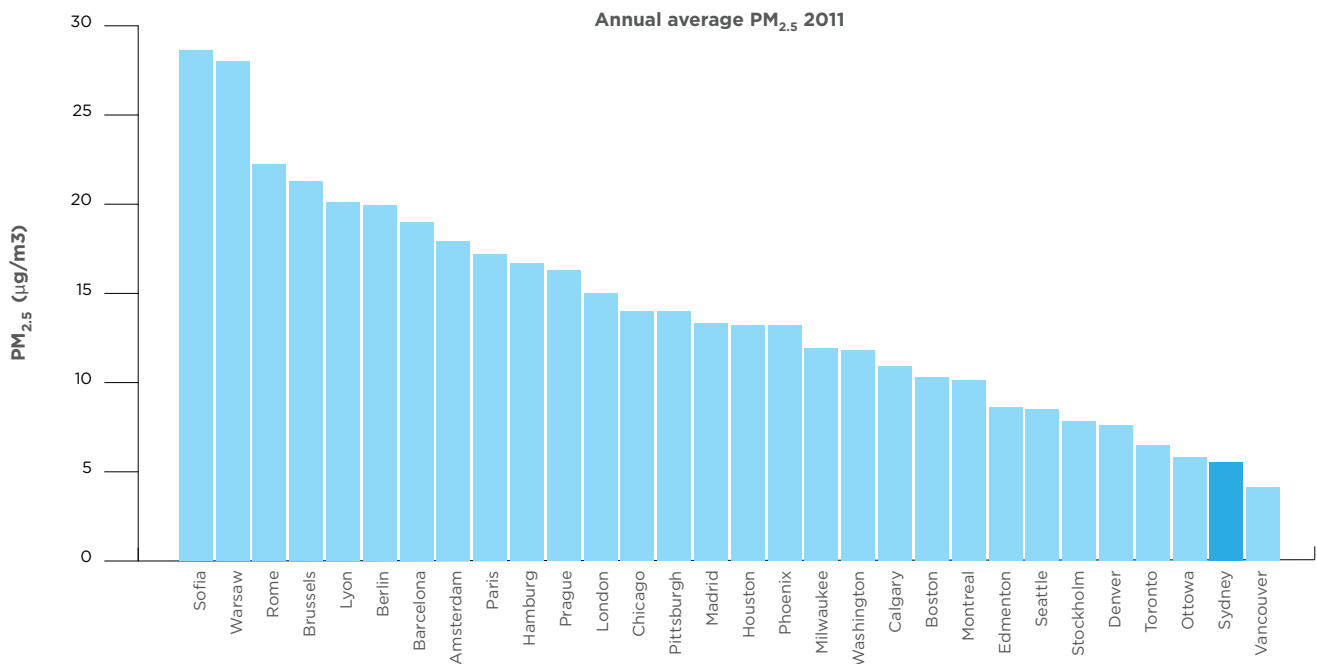
For example:

- Cars built from 2013 emit three per cent of the nitrogen oxides emitted by cars built in 1976
- Diesel trucks built from 2013 emit eight per cent of the particles emitted by vehicles built in 1996
- Total motor vehicle emissions have fallen over the past few decades and are expected

to continue to fall, despite increases in population and the number of kilometres driven

- Due largely to declining emissions from motor vehicles, total emissions in Sydney have declined significantly, and this improvement is expected to continue

For more information about motorway tunnels and air quality, please see the NSW Advisory Committee on Tunnel Air Quality's Initial Report: www.chiefscientist.nsw.gov.au.



Annual average concentrations of fine particulate matter for selected international urban areas, 2011

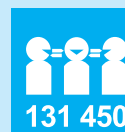
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