

# Air filtration in the M5 East tunnel

Air quality improvement plan



**FACT SHEET**

**UPDATED SEPTEMBER 2008**

**This fact sheet has been prepared to provide information on proposals by the RTA to install and operate an air filtration unit to clean the air in the western end of the M5 East tunnel.**

On the 16 June 2006 the former NSW Minister for Roads, Eric Roozendaal, announced plans by the NSW Government to improve air quality in the M5 East tunnel.

The air quality improvement plan currently includes:

- Video identification of pollution-causing heavy vehicles and sending evidence of polluting vehicles to the Department of Environment and Climate Change.
- Increased ventilation flows inside the tunnel with an extra 12 jet fans installed in December 2006.
- A trial of filtration technology.

## Why a trial of air filtration?

The M5 East tunnel is a popular facility, particularly with heavy vehicles. Current traffic levels have resulted in congestion and visible haze in the tunnel. Air filtration technology is considered appropriate for the M5 East tunnel to improve the air quality in the tunnel.

Officers from the RTA have inspected road tunnel ventilation systems in Norway and Japan.

## Update

An independent consultant, Child and Associates has completed a report for the RTA (September 2004), which examined international use of air filtration technologies in road tunnels. A copy of this report is available on the RTA website [www.rta.nsw.gov.au](http://www.rta.nsw.gov.au).

## Did you know?

There are currently no air filtration units that have been installed in road tunnels in Australia.

The M5 East tunnel air filtration unit will be an Australian first.

As part of the air quality improvement plan, the RTA will trial an electro-static precipitator and a denitrification unit in the M5 East tunnel (these are described below). The work is considered a trial as this is the first time such a system will be installed in Australia.

It is proposed to operate the air filtration equipment under varying tunnel operating conditions to test their effectiveness for reducing visible haze in the M5 East tunnel. After an initial 18 month period, an evaluation report will be prepared. This will be submitted to the Department of Planning and be made publicly available.

The installation and use of an air filtration system required a modification to the existing conditions of approval for the M5 East Motorway. An environmental assessment has been undertaken on the construction and operation of a proposed air filtration system and in this respect, a modifications report was submitted to the Department of Planning and approved by the Minister for Planning, on 18 July, 2007.

A 12 page community summary, *Modifications to the M5 East Motorway - Air quality improvement plan* (November 2006) has been prepared. This document can be downloaded from the RTA website at [www.rta.nsw.gov.au](http://www.rta.nsw.gov.au) or a copy can be sent to you by phoning 1800 667 199.

## What does air filtration do?

Air filtration removes certain pollutants, which in the case of road tunnels, are mostly emitted from vehicle exhausts.

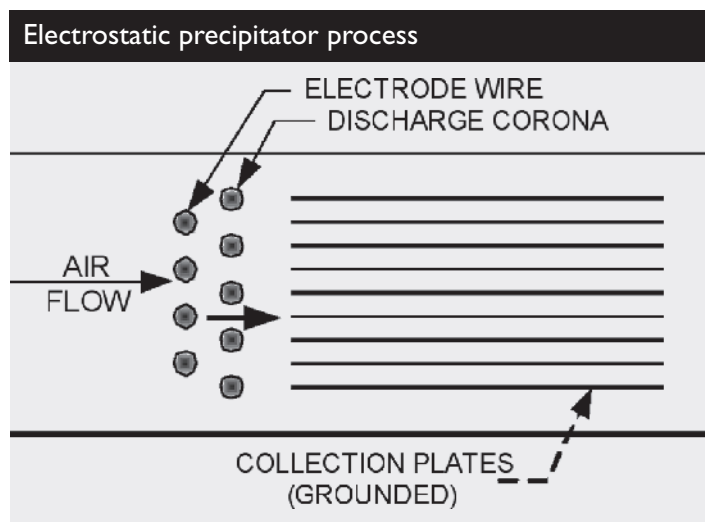
Electro-static precipitators remove particulate matter from tunnel air, including dust, soot and other tiny bits of material. Particulate matter is measured by particle size: PM10 and PM2.5 refer to particulate matter that is less than 10 microns in diameter and 'fine' particulates less than 2.5 microns in diameter respectively.

Denitrification units remove nitrogen dioxide.

## How do electro-static precipitators work?

A typical electro-static precipitator contains wires and collecting plates, as shown in the figure below. The wires are continuously charged with several thousand volts, which release electrons into the air-stream. These electrons attach to the particulates (dust, soot etc.) and provide them with a negative charge. The charged particulates are then attracted to the oppositely charged collecting plates.

The collecting plates are regularly washed and cleaned. The washing water is filtered and reused.



## What is denitrification?

There are a number of alternative systems for denitrification. They mostly work by either a chemical reaction or a catalytic process. Tunnel air would pass through a filter medium, contained in a cartridge, that would remove nitrogen dioxide by either:

- A chemical reaction – by absorbing or binding the nitrous oxide pollutants; or
- A catalyst – that initiates the conversion of nitrous oxide pollutants to less harmful or benign gases.

The tenders for supply of filtration systems will call for systems that remove nitrogen dioxide using the different types of filter mediums. The selection of the technology would be based upon criteria such as performance and cost.

## How much of the air in the M5 East tunnel would be treated?

The filtration plant would need to be able to filter and clean:

- 200 cubic metres of air per second to remove at least 80% of particulates less than 10 microns in diameter.
- 50 cubic metres of air per second to remove at least 90% of nitrogen dioxide.

## How big will the air filtration units be?

A building approximately 40 metres long, 20 metres wide and 8 metres high will be built to house the filtration equipment. The size of the building is based on dimension specifications, from publicly available information, for an electro static precipitator and a denitrification unit. The building size provides enough room to enable the RTA to monitor the efficiency of the system and to maintain the equipment.

## What happens before the air filtration systems can be used?

The process to select a preferred supplier for the filtration system commenced in September 2008.

Detailed design for the air filtration system are focussed on:

- The design of the air tunnel used to extract and reinject air into the tunnel.
- The point at which the air tunnel/s would join the M5 East tunnel.
- The design and appearance of the building used to house the air filtration units.

## How will the air filtration trial be evaluated?

After installation, the air filtration system will be monitored for the initial 18 months. The following would be recorded and reviewed during the trial:

- In-tunnel air quality monitoring including carbon monoxide, nitrogen oxides, nitrogen dioxide, particulate matter and haze.
- Availability and reliability of the systems, including number and duration of system shutdowns for maintenance etc.
- Electricity, labour and operating costs.
- The performance of the filters to remove pollutants.

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### Want more information? Please contact:

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