Air Quality & Ventilation

The Waterview Connection tunnels have been designed to meet stringent air quality standards, both inside the tunnels themselves and outside in the neighbourhoods of Waterview and Owairaka. The systems that will operate the tunnels have been designed by engineers with international experience in tunnel construction and operations. They are using the latest technology and most up-to-date information available to ensure the tunnels are safe to use and vehicle emissions are removed with minimal impact on the surrounding areas.

What standards must the Waterview tunnels meet?

The potential impact of the tunnels on air quality was a major consideration in the extensive consultation and planning for the Waterview Connection. In giving the project the go-ahead in 2011 the Board of Inquiry stipulated that vehicle emissions from the tunnels should meet the National Environmental Standards for air quality.

This involves installing fans to draw vehicle emissions from the tunnel. Tunnel ventilation stations and discharge ventilation stacks at each exit from the tunnels will ensure the emissions are dispersed in a controlled manner.

As the Waterview tunnels will remove a significant amount of traffic from local roads in the Owairaka to Waterview area, we can expect an overall improvement in local air quality.

What work was done to determine the best system for Waterview?

Modeling was undertaken to predict the number of vehicles expected to use the tunnels and to determine the emissions that would be generated. Engineers then looked at the expected volumes of traffic in the tunnel at any one time, the likely age and type of vehicles, the speeds they would be travelling at and the impact of any gradients in the road level on emissions.

Air quality modelling confirmed that ventilation stacks 15 metres above ground level would provide the dispersion required to ensure no detrimental effects on air quality at street level outside the tunnels. The designers of the ventilation system also considered local, national and international air quality guidelines to ensure the limits for carbon monoxide, fine particles and nitrogen dioxide would not be exceeded.

How will the ventilation system work?

The Waterview tunnels will feature state-of-the-art ventilation and monitoring systems that will be managed 24 hours a day from Auckland’s traffic operations centre at Takapuna. The centre will have real-time access to monitoring information as well as remote control of the system, so that the level of gases from vehicle emissions allows
remains within the allowable limits either inside or outside the tunnel.

Inside the tunnels, the ventilation system will comprise 62 jet fans suspended from the roofs. Two types of fans will work to pull fresh air into the tunnels and push it along the tunnel in the same direction as the traffic flow, towards the ventilation buildings. The system will manage air flows to prevent any build-up of emissions inside the tunnels. In addition to managing the in-tunnel air quality, the ventilation system will also be used in emergencies such as a fire to quickly remove smoke so that users can exit the tunnels safely.

The ventilation building at the exit of each tunnel will house four large fans that draw the vehicle emissions into the building and then disperse them into the atmosphere from the stack. These axial fans will be 2.5 metres in diameter and each cost approximately $250,000. They will occupy almost all of one floor in the buildings, along with the sound attenuators that will greatly reduce the noise generated from the fans.

**Will air quality be monitored?**

Air quality monitors inside and outside the Waterview tunnels will constantly measure the levels of carbon monoxide, nitrogen oxide and fine particles emitted by vehicles. Continuous real-time monitoring at both ends of the tunnels, and a monitoring station in the grounds of the Waterview School will provide this information. The in-tunnel air quality monitors are linked with the ventilation system. If traffic conditions become heavy or a high level of emissions is present, the system will automatically increase the air flow.

For the first 12 months following the opening of the new tunnels, the results of the outside air quality monitoring will be reported monthly on the project’s website and reported regularly to Auckland Council. Reporting will then be quarterly for the next 12 months or until an independent review panel says this is no longer necessary.

**What will the ventilation buildings look like?**

The ventilation buildings and shafts have been designed by a specialist team of architects, urban designers and engineers to be visually attractive as well as efficient and functional. There has also been extensive consultation with community representatives and Auckland Council.
Southern Ventilation Shaft and Building
The southern ventilation building has been designed as part of the southern tunnel portals. The majority of the building will be underground, in fact the only above ground structure will be a roof top access building.

The stack will be located in the middle of the motorway, between the entry and exit portals.

Rising 15 metres above ground level, the stack has been designed and landscaped to look and feel like part of the Alan Wood Reserve.

Northern Ventilation Shaft and Building
The northern ventilation building will comprise mechanical and electrical equipment at the northern tunnel portals and a vent stack located 120 metres away from the tunnel portals, on the eastern side of Great North Road.

The ventilation building and stack have been designed as architectural features, and reflect key contributions from the project’s Community Liaison Group. Like the southern ventilation stack, the northern stack will rise 15 metres above ground level.

The majority of the building will be underground. The only above ground structure will be a hoist building on the corner of Herdman Street and Great North Road.