Health impacts
Cross-examination matters by Western Distributor Authority
Conclave: issues of agreement

- No fundamental opposition to project
- Pollutants cause adverse health effects
- No “safe” level of certain pollutants (eg PM$_{2.5}$)
- Fine details of social demography not available
- Roadside changes in air quality can have positive and negative impact
Qualifications

Jackie Wright has more than 25 years’ experience in human health and ecological risk assessment in Australia. Experience includes leading and developing a national risk practice group for a major consultancy, training of staff, providing technical (and toxicological) direction, developing internal technical standards, participating in the development on industry guidance and standards, developing appropriate risk models and providing peer-review.

Education
- BE (Hons)
- PhD (Public Health)

Professional Accreditation
- Fellow of the Australasian College of Toxicology and Risk Assessment (ACTRA)
WEST GATE TUNNEL PROJECT


Submitted to:
AECOM Australia Pty Ltd
Collins Street
Level 10, Tower 2
727 Collins Street
Melbourne, VIC 3008
West Gate Tunnel Project: Technical Report J – Human Health Impact Assessment
Prepared for: AECOM

Rev 0
May 2017
6. Policy Aims

The aims of the policy are to:

(a) ensure that the environmental quality objectives of the State environment protection policy (Ambient Air Quality) are met;

(b) drive continuous improvement in air quality and achieve the cleanest air possible having regard to the social and economic development of Victoria; and

(c) support Victorian and national measures to address the enhanced greenhouse effect and depletion of the ozone layer.
## Table 12: SEPP(AAQ) and Air Toxics NEPM objectives

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Objective$^1$</th>
<th>Units</th>
<th>Averaging period</th>
</tr>
</thead>
</table>
| $\text{PM}_{10}$ | 50  
           | 20  | $\mu g/m^3$  | 24 hour  
                      |                |       | Annual |
| $\text{PM}_{2.5}$ | 25  
                 | 20 (2025) | $\mu g/m^3$ | 24 hour  
                       | 8  |                | Annual |
|          |                | 7 (2025) |                |           |
| $\text{PM}_{2.5} (2025)$ | 20  
               | 7   | $\mu g/m^3$  | 24 hour  
                       |     |                | Annual |
| $\text{NO}_2$ | 0.12  | ppm   | 1 hour |
Most impacted receptor: Site 14
Combined impacts

24 hour PM$_{10}$ – Most impacted receptor (2031 base scenario)

- **Background**
- **Surface Roads**
- **Standard**

Concentration (µg/m$^3$)

Month:
- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct
- Nov
- Dec
Conservative assumptions

• Background pollutant concentrations for 2022 (anticipated year of project opening) and 2031 were assumed to remain at levels recorded during the period 2009 to 2013

• Vehicle emission factors for 2022 and 2031 were assumed to remain at levels predicted for 2020.
Wood Burning

Over the winter months, wood heaters are responsible for over a third of all PM2.5 emissions in many parts of Australia. Domestic wood heaters are listed by the Australian National Pollutant Inventory lists as the largest single source of polycyclic aromatic hydrocarbon (PAH) emissions. The problem can be exacerbated by meteorological inversions that occur in autumn and winter, preventing smoke from rising and dispersing. In Launceston a woodsmoke reduction program launched in 2003, was shown to be very effective in reducing particulate matter: The mean daily PM10 reduced from 44μg/m3 (between 1994–2000) to 27μg/m3 (between 2001–2007). The decrease in wood smoke was associated with a significant reduction in annual all-cause mortality rates for men (11.4%) and reductions in cardiovascular (17.9%) and respiratory mortality (22.8%) over the winter months. Given the lag time to developing lung cancer, the Launceston study was unable to account for any reduction in cancer, however it is pertinent to note that along with generating PM2.5, woodsmoke contains a number of other carcinogens including benzene, benzo(a)pyrene (BaP) and formaldehyde.
\textbf{PM}_{10}
Numerous epidemiological studies⁴ have reported significant positive associations between particulate air pollution and adverse health outcomes, particularly mortality as well as a range of adverse cardiovascular and respiratory effects.

Where co-exposure is accounted for the available science supports that exposure to fine particulate matter (less than 2.5 μm, PM₂.₅) is associated (and shown to be causal in some cases) with health impacts in the community (USEPA, 2012). A more limited body of evidence suggests an association between exposure to larger particles, PM₁₀ and adverse health effects (USEPA, 2009b; WHO, 2003).
The policy is guided by the following principles of environment protection:

(1) **Integration of Economic, Social and Environmental Considerations**

(a) Sound environmental practices and procedures should be adopted as a basis for ecologically sustainable development for the benefit of all human beings and the environment.

(b) This requires the effective integration of economic, social and environmental considerations in decision making processes with the need to improve community well-being and the benefit of future generations.

(c) The measures adopted should be cost-effective and in proportion to the significance of the environmental problems being addressed.
Policy has a specific attainment program for diffuse emissions from motor vehicles
Location of schools

• California Air Resources board: new schools should not be located within 500 feet (152.4 metres) of major roads (>50,000 vehicles per day)
Design and implement a tunnel ventilation system to introduce and remove air from the tunnels to meet in tunnel air quality requirements for carbon monoxide (CO) listed below including provision for the retrofitting of pollution control equipment.

Achieve a longitudinal air velocity in the Tunnels not exceeding 10 metres/second. In tunnel air quality must meet the following CO standards:

- Maximum peak value of 150ppm
- 15 min. average of 50ppm
- 2-hour average of 25ppm.
SPACE FOR THE PROVISION OF POLLUTION CONTROL EQUIPMENT

TITLE
SOUTHERN TUNNEL VENTILATION BUILDING PLAN LAYOUT AT LOWER DECK LEVEL

SCALE
1:250

DRAWING No
WDT-AJJ-DRG-300-000-500-CON-4884

REV
A
<table>
<thead>
<tr>
<th>PM$_{10}$ reduction measure</th>
<th>Cost of PM$_{10}$ reduction ($ per tonne</th>
<th>PM$_{10}$ reduction (tonnes per annum)</th>
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<tbody>
<tr>
<td>National emission standards for wood heater (1g/kg limit)</td>
<td>1,000</td>
<td>1,701</td>
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<tr>
<td>National emission standards for wood heater (3g/kg limit)</td>
<td>1,000</td>
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<td>Emission limits for industry</td>
<td>5,000</td>
<td>359</td>
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<td>Tier 4 emission standards for off-road vehicles and equipment</td>
<td>12,000</td>
<td>31</td>
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<td>Wood heater – reduced moisture content of firewood</td>
<td>20,000</td>
<td>93</td>
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<td>Small engines (2-stroke to 4-stroke) for recreational boating and lawn mowing</td>
<td>39,000</td>
<td>261</td>
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<td>Truck and bus diesel retrofit program</td>
<td>151,000</td>
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<td>Diesel locomotive replacement (USEPA Tier 0 to Tier 2)</td>
<td>156,000</td>
<td>53</td>
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<tr>
<td>Diesel locomotive replacement (USEPA Tier 0 to Tier 2 + Retrofit Tier 2 Locomotives with selective catalytic reduction)</td>
<td>191,000</td>
<td>72</td>
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<td>Euro 5/6 emission standards for new passenger vehicles</td>
<td>209,000</td>
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<td>Recommission and electrification of Enfield Port Botany freight line</td>
<td>244,000</td>
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<td>Port Botany shore-side power</td>
<td>274,000</td>
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<td>M5 East tunnel ESP (operating cost only)</td>
<td>3,800,000</td>
<td>0.2</td>
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<tr>
<td>M5 East tunnel ESP</td>
<td>17,400,000</td>
<td>0.2</td>
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