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Committee Secretary
Senate Standing Committee on Community Affairs
Parliament House
Canberra, ACT 2600

Dear Committee Secretary,

The impacts on health of air quality in Australia

Thank you for the opportunity to make a submission to the Committee in relation to its inquiry into air quality and health in Australia. This is a timely and important inquiry.

I teach and research in environmental law at the Faculty of Law at the University of Sydney, with my research addressing a range of environmental issues, including the regulation of air pollution.

Although air quality in many urban and rural areas in Australia has improved over recent decades, there is one particular area where regulatory attention is urgently needed – addressing pollution from motorways and other busy roads. Australia is rapidly falling behind European and North American jurisdictions in regulating vehicle pollution.

A growing body of scientific literature has identified the wide spatial reach and significant health effects associated with air pollution from motorways (see in particular Australian Government: Department of the Environment and Heritage, *Health Impacts of Ultrafine Particles* (2004) and Morawska et al, 'Ambient nano and ultrafine particles from motor vehicle emissions' (2008) 42(35) *Atmospheric Environment* 8113 and Health Effects Institute, *Traffic-Related Air Pollution* (2010)). In June 2012, the World Health Organization International Agency for Research on Cancer reclassified diesel exhaust as having a definite link to cancer. Diesel exhaust now ranks alongside smoking, asbestos, UV radiation as posing identifiable cancer risks (see http://www.iarc.fr/en/media-centre/pr/2012/pdfs/pr213_E.pdf).

Despite the growing awareness of the dangers of motorway pollution, air quality impacts from motorways are not routinely assessed, if they are assessed at all, during the environmental impact assessment process in Australia. By way of example, neighbouring air quality issues were not considered in any significant way in planning for the M5 West Widening Project in Sydney, which commenced in 2012. The M5 and other motorways

that pass through heavily populated areas in Australia impose a significant health burden on neighbouring residents that are not being considered in the planning process.

Current regulatory attention in relation to motorways focuses on PM₁₀ and PM₅, however the scientific literature makes clear that smaller particulates, which make up a minor fraction of the total mass of particulate matter, carry much higher health risks (see, e.g., Raaschou-Nielsen et al, 'Air pollution from traffic and cancer: A Danish cohort study' (2011) 10 *Environmental Health* 67 which identified links between vehicle pollution and cervical and brain cancer). This is because of their much broader distribution than larger particles, and their propensity to be absorbed deeper into the human respiratory system. Despite the clear medical evidence of their harmfulness, there are no standards in place in Australia to regulate atmospheric ultrafine particles, nor are they subject to measurement by State or Federal authorities.

Since the late 1990s there have been a number of studies in Australia on motorway pollution. A landmark study was Hitchins et al, 'Concentrations of submicrometre particles from vehicle emissions near a major road' (2000) 34 *Atmospheric Environment* 51 which found that ultrafine or nanoparticles from motorways did not reach background levels during daytime until around 300 metres from a motorway. The results of this study have been confirmed in other settings in Australia and overseas (see especially Karner et al, 'Near-Roadway Air Quality: Synthesizing the Findings from Real-World Data' (2010) 44 *Environmental Science and Technology* 5334).

Studies in the United States have also found a significant diurnal variation in the spatial distribution of motorway pollution. Nitrous oxides and ultrafine particles remain at elevated concentrations for up to up to 1000 metres at night time and during pre sunrise hours (despite lower traffic volumes) (see Hu et al, 'A wide area of air pollutant impact downwind of a freeway during pre-sunrise hours' (2009) 43 *Atmospheric Environment* 2541).

The literature has also made clear that the emission factors for heavy vehicles, and vehicles travelling at high speeds, is significantly higher than for light vehicles, travelling at low speeds (Keogh and Sonntag, 'Challenges and Approaches for Developing Ultrafine Particle Emission Inventories for Motor Vehicle and Bus Fleets' (2011) 2 *Atmosphere* 36). In addition, there is agreement in the literature that concentrations of pollutants within street canyons are significantly higher than for motorways constructed in open topography (see, among others, Kumar et al, 'Dynamics and dispersion modelling of nanoparticles from road traffic in the urban atmospheric environment – A Review' (2011) 42 *Journal of Aerosol Science* 580).

Open motorways, whether they be at grade, depressed or elevated, generate poor air quality outcomes for areas several hundred metres either side of the roadway. This



exposes residents in ventilation buildings to dangerous levels of airborne pollution, particularly during night-time in summer months. Despite this, State governments in Australia are pressing ahead with motorway plans that will have significant health impacts for many thousands of nearby residents.

A good example is the NSW Government's planned WestConnex motorway which is to be constructed as a 'slot' motorway along a section of Parramatta Road. If the Northern Section of the WestConnex is constructed as indicated in Infrastructure NSW's proposal, this will result in the concentration of pollution from vehicles using the sunken motorway and traffic using Parramatta Road at grade. My review of the scientific literature suggests that it is not possible to construct a motorway of this type without resulting in unsafe levels of air pollution within the canyon by the combination of emissions from vehicles using the sunken motorway and the trapping of those emissions by the slot configuration and the canyon created by adjacent buildings.

Because of air quality concerns, in major global cities tunnels are widely preferred over open roads for new motorway projects within densely populated areas (see, e.g., the Victoria Park Tunnel in Auckland). And several cities have embarked on major urban renewal projects that have involved the covering of existing motorways to improve air quality (see, e.g., Madrid and Hamburg). It is also noteworthy that because of air quality concerns, several jurisdictions in Europe and North America recommend against the siting of schools and other sensitive uses within 150 metres of motorways.

Air quality concerns are more acute in relation to motorways in Australia than in much of Europe and North America because of the relatively greater fraction of time spent outdoors by users in the Australian environment, including users of sensitive facilities such as schools and childcare centres.

Yours sincerely,