

'The Health Impact of Elevated Rail on Bayside Communities'

The academic literature shows that proposed elevated rail bridges negatively impact the health of individuals and communities. The World Health Organisation recommends 'health in all policies' which includes consideration of the health impact of large infrastructure projects on populations (Leppo, Ollila, Pena, Wismar, & Cook, 2013).

Elevated rail adjacent to residential areas increases noise and vibration, reduces natural light, reduces property values, increases air pollution, impacts green space and clashes with local amenity. It also attracts crime, compromises safety and impacts the social determinants of health. All of these factors negatively impact health. A 'rail under road' or 'rail trench option' will not have these deleterious effects on health.

Noise and Vibration

The literature indicates that noise and vibration increases significantly and travels greater distances with elevated rail. Xia et al. (2009) report noise concerns and vibration impacts on the environment and people near elevated rail. Research shows a link to sleep disturbance resulting in fatigue, impaired judgement, poor decision-making and an increased risk of occupational and road accidents (Killgore, Balkin & Wesensten, 2006; Lamond et al., 2004). Stickgold, Hobson, Fosse & Fosse (2001) state good quality sleep is a public health issue, essential for optimal health. Insufficient sleep is linked to diabetes, cardiovascular disease, obesity and depression (Unruh et al., 2008; Babisch, 2006). Passchier-Vermeer and Passchier (2000) associate noise with decreased school performance. The negative health impact associated with noise pollution from rail bridges will impact thousands of homes and community facilities such as schools, kindergartens, churches and aged care homes.

Mental Health

Elevated rail bridges will significantly **overshadow homes**. The impact of reduced sunlight on mental health is well supported in the literature (Halpern, 2013). Multiple studies assert that a lack of natural light increases the risk of mental health issues including depression and anxiety (Edwards & Torcellini, 2002).

The Office of the Victorian Government Architects (OVGA) reported on lessons learned with level crossing removal (2014). They state that an elevated rail structure will have a significant impact on a place and is typically not a preferred solution. Elevated rail is often a cheaper solution but offers a poorer outcome for the community. Rail bridges also impact negatively on visual amenity, permeability, viability of activity areas and the value of land. Close proximity to rail infrastructure (particularly heavy diesel) **reduces property values** due to noise, visual intrusion and the perception of crime (Diaz, 1999). These factors would be exacerbated by elevated rail. On the Dandenong line it is predicted that elevated rail sections are likely to reduce property values by 20-25% and negatively affect the revenue of small businesses (Zhou & Robb, 2016, Ferguson, 2014). Uncertainty about income is proven to induce emotional strain, anger, anxiety and depression (Schonfeld & Mazzola, 2015). In other contexts mortgage stress and financial strain is a risk factor for conflict, mental illness and domestic violence (Pattavina, Socia & Zuber, 2015).

Air Pollution

Elevated rail carrying diesel trains is likely to increase the amount and distance travelled of air pollution because height facilitates greater drift. Diesel exhaust emissions contain hundreds of chemical compounds that are associated with irritation of the eye and the respiratory and gastrointestinal systems (Balmes, 2011). The long term effects of exposure to exhaust and brake particulate matter are poorly understood and therefore best avoided. (Morawska, Moore & Ristovski, 2004, Stenfors et al., 2004; Abbasi, Jansson, Sellgren & Olofsson, 2013). The International Agency for Research on Cancer has recognised diesel exhaust soot as a carcinogen (Abbasi et al., 2013).

Green Space and Amenity

Elevated rail bridges will negatively impact green space and clash with amenity in the Bayside suburbs. This area along the line includes 40 km of beachfront, the Edithvale/Seaford 'Ramsar Convention'

listed wetlands and a 2,070 hectare 'green wedge' in the city of Kingston alone. The positive link between green space and health is well documented and most apparent in the elderly and people of lower socioeconomic status, both already vulnerable sub-populations (Maas, Verhiej, Groenewegen, De Vries & Spreeunwenberg, 2006; Mitchell & Popham 2008). The visible and audible elevated rail will significantly reduce the health benefits of this green space.

Crime and Safety

Graffiti is a visible form of crime and considered a sign of social decline, representing a threat to safety and quality of life (Morgan & Louis, 2009; Lorenc et al., 2013). Elevated railway bridges and pylons attract graffiti because they are prominent, visible and easy to reach with limited surveillance. Controlling and removing graffiti in Australia costs \$1.5 billion annually (Morgan and Louis, 2009). This cost is expected to be borne by local councils along the Frankston line, creating further stress to residents. Railway bridges also attract anti-social behaviour such as dumping, drug use and loitering due to reduced lighting and limited surveillance. This impacts community safety and liveability. Under-road stations are easier to illuminate and monitor and are less appealing for anti-social behaviour.

Social determinants of health (SDH)

The SDH will be negatively impacted by elevated rail. A Lancet Commission found that factors which have the greatest impact on health are social and include community engagement, social inclusion and early life (Marmot, Friel, Bell, Houweling & Taylor, 2008). Liveable communities create conditions that optimise health and wellbeing outcomes by improving neighbourhood walkability, public open space and social facilities (Giles-Corti, Badland, Mavoa, Turrell & Bull, 2014). An elevated concrete construction will divide communities and impinge on these conditions, negatively impacting health and wellbeing.

We often assume that what is, has to be. In reality, virtually everything in our built environment is the way it is because someone designed it that way. Researchers agree that the design of the built environment holds tremendous potential to address health concerns including cardiovascular disease, diabetes, asthma, depression, violence and social inequity. In short, we have the capacity to build future communities that promote, rather than reduce, physical and mental health (Jackson, 2003). *The OVGA states that lowering a section of the rail corridor is the most supportable solution in most circumstances, is more discrete, has the least impact on the urban environment and improves social and economic outcomes (2014).*

The academic evidence portrays a strong case against elevated rail. A rail trench is the preferred option for the Bayside suburbs on the Frankston line.

No Sky Rail: Frankston Line

October 27th 2016

Reference List

- Abbasi, S., Jansson, A., Sellgren, U. and Olofsson, U. (2013). Particle emissions from rail traffic: A literature review. *Environmental Science and Technology*.
<http://dx.doi.org/10.1080/10643389.2012.685348>
- Babisch, W. (2006). Transportation noise and cardiovascular risk: Updated Review and synthesis of epidemiological studies indicate that the evidence has increased. *Noise Health*, 8, 1-29
- Balmes, J.R (2011). How does diesel exhaust impact asthma? *Thorax*, 66(1), 4-6.
- Diaz, RB (1999) *Impacts of Rail Transit on Property Values*. Booz-Allen & Hamilton Inc. McLean VA
- Edwards L. & Torcellini P (2002). A literature review of the effects of natural light on building occupants. *National Renewable Energy Laboratory*.
- Ferguson, I. (2014). Compensating for Economic Loss Caused By New Projects. *Australia and New Zealand Property Journal*, June 589- 592.
- Gilles-Corti, B., Badland, H.M., Mavoa, S., Turrell, G. & Bull, F. (2014). Reconnecting urban planning with health: a protocol for the development and validation of national liveability indicators associations with noncommunicable disease risk behaviours and health outcomes. *Public Health Research Practice*, 25(1), 1-5.
- Groenewegen, P., van den Berg, A.E., de Vries, S. & Verheij, R.A. (2006). Vitamin G: effects of green space on health, well-being, and social safety. *BMC Public Health*, 23(2), 109-123.
- Halpern, D. (2013). *Mental Health and the Built Environment*. Routledge, London.
- Jackson, R.J (2003). The impact of the built environment on health: An emerging field. Editorial. *American Journal of Public Health*, 93(9).
- Killgore, W.D.S., Balkin, T.J., & Wesensten, N.J. (2006). Impaired decision making following 49h of sleep deprivation. *Journal of Sleep Research*, 15(1), 7-13.
- Lamond, N., Dorrian, J., Burgess, H.J., Holmes, A.L., Roach, G.D., McCulloch, K., Fletcher, A. & Dawson, D. (2004). Adaptation of performance during a week of simulated night work. *Ergonomics*, 47(2), 154-165.
- Leppo, K., Ollila, K., Pena, S., Wismar, M. & Cook, S. (2013). Health in all policies - seizing opportunities, implementing policies. WHO.
- Lorenc T., Petticrew, M., Whitehead, M., Neary, D., Clayton, S., Wright, K., Thomson, H., Cummins, S., Sowden, A., Renton, A. (2013). Fear of crime and the environment: systematic review of the UK qualitative evidence. *BMC Public Health*, 2013, 13, 496.
- Office of Victorian Government Architects (2014) Level crossing removals lessons learned.
<http://www.ovga.vic.gov.au/news/100-lessons-learned-level-crossing-removals.html>
- Maas J, Verheij R.A., Groenewegen P.P., De Vries S. & Spreeunwenberg P. (2006). Green space, urbanity and health: how strong is the relation? *Journal of Epidemiology and Community Health*, 60(7), 587-592.
- Marmot, M., Friel, S., Bell, R., Houweling, T. A. J. & Taylor, S. (2008). Closing the gap in generation: health equity through action on the social determinants of health. *Lancet*, 372(9650), 1661-1669.
- Mitchell, R & Popham F. (2008). Effect of exposure to natural environment on health inequalities: an observational population study. *Lancet*, 372(9650), 1655-1660.
- Morawska, L., Moore, M.R. & Ristovski, Z.D. (2004) Health Impacts of Ultrafine Particles: Desktop Literature Review and Analysis. Australian Government; Department of Environment and Heritage.
- Morgan, A. & Louis, E. (2009). Key Issues in Graffiti. Research in Practice. *Australian Institute of Criminology*, No. 6
- Passchier-Vermeer, W. & Passchier, W.F. (2000). Noise exposure and public health. *Environmental Health Perspectives*, 108(1), 123-131.
- Pattavina, A., Socia, K.M. & Zuber, M.J. (2016). Economic Stress and Domestic Violence: Examining the Impact of Mortgage Foreclosures on Incidents Reported to the Police. *Justice Research and Policy*, December 16, 147-164.
- Schonfeld, I.S. & Mazzola, J.J. (2015). A qualitative study of stress in individuals self-employed in solo businesses. *Journal of Occupational Health Psychology*, Vol 20(4), 501-513.
- Stenfors., Nordenhall, C., Salvi, S.S., Mudway, I., Sorderberg, M., Blonberg, A., ... Sandstrom, T. (2004). Different airway inflammatory responses in asthmatic and healthy humans exposed to diesel. *European Respiratory Journal*, 23, 82-86.

- Stickgold, R., Hobson, J., Fosse, R. & Fosse, M. (2001) Sleep, learning and dreams: off line memory reprocessing. *Science*, 294(5544), 1052.
- Unruh, M.L., Redline, S., Ming-Wen, A., Buysse, D.J., Nieto, F.J., Yeh, J. & Newman, A. (2008). Subjective and objective sleep quality and ageing in the sleep heart health study. *Journal for the American Geriatrics Society*, 56(7), 1218-1227.
- Xia, H., Gao, F., Wu, X., Zhang, N., De Roeck, G. & Degrande, G. (2009). Running train induced vibrations and noises of elevated railway structures and their influences on the environment. *Frontier Architecture Civil Engineering China*, 3(1), 9-17.
- Zhou, C., Robb, K. (2016). Melbourne Skyrail and railway crossing removal impact property prices. <http://www.domain.com.au/news/melbourne-sky-rail-and-railway-crossing-removal-impact-property-prices-20160219-gmwafb/>