Independent expert advice: Underground Mine Stage 3 Extension Project (SSD 10269) Public Hearing

Dr Patrick Harris, Senior Research Fellow and Deputy Director, Centre for Health Equity Training, Research and Evaluation, UNSW.

Statement of expertise

I provide this advice as an expert in public health and public policy[1], with particular expertise in infrastructure and environmental assessments including of coal mines. I provide this advice in response to an expert brief from Environmental Defenders Office, acting on behalf of Lock the Gate which is attached as Appendix 1 to this report.

I am also the President of the NSW Branch of the Public Health Association of Australia. The evidence I provide here in part A is from the published literature linking health and climate change. Parts B and C incorporates that evidence as well as my extensive understanding of the coverage of health and wellbeing impacts in Environmental Assessments in NSW, which I have been investigating and publishing about for over a decade.

I have never taken any payment for services to particular industry or advocacy organisation in relation to the advice I provide here. I have provided paid independent advice about health impacts to the IPIECA to inform their guidance on considering health in environmental assessments.

a. Please describe the current state of knowledge in relation to any health impacts in NSW, Australia and globally that are predicted to arise as a consequence of climate change.

Rising global temperatures, extreme weather events, changes to rainfall and rising sea levels are all associated with a range of adverse health impacts. These impacts increase the incidence of heat related illness and heart failure, water borne illnesses, and pose risks to our food supply by affecting food quality (nutrient value) and quantities (reduced agricultural yields).

Extreme weather ranging from increased rainfall, high humidity, damaging winds and extreme heat also creates optimal conditions for mosquito borne diseases (also known as vector borne diseases) like dengue and Ross River virus, which can have debilitating health effects.

Climate change also impacts biodiversity and affects habitats for other species. Together with land use changes (such as land clearing for agriculture or urban development) this leads to further habitat loss and altered ecosystem functions, which can increase the risk of zoonotic disease transmission (diseases that jump from animal to humans - like COVID-19)[2].

Climate change also increases ground level ozone - an air pollutant - as well as air allergens, which increases risk of heart problems, stroke, asthma, and other respiratory diseases. Air pollution from burning fossil fuels can also result in neurological, kidney and urinary tract conditions, blood/immune diseases, and cancer[3].

Increases in environmental degradation and more extreme weather events can lead to social and economic impacts that adversely affect our wellbeing. This includes forced migration, conflict, mental health, loss of jobs

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[1] https://scholar.google.com/citations?user=GdOzg7oAAAAJ&hl=en

[2] White, R (2020) Emerging zoonotic diseases originating in mammals: a systematic review of effects of anthropogenic land-use change, Mammal Review, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7300897/pdf/MAM-9999-na.pdf

[3] Denham et al 2019 Denham, A., Willis, M., Zavez, A., & Hill, E. (2019). Unconventional natural gas development and hospitalizations: evidence from Pennsylvania, United States, 2003–2014. *Public Health*, 168, 17-25. https://doi.org/10.1016/j.puhe.2018.11.020; McCarron, (2018). Air Pollution and human health hazards: a compilation of air toxins acknowledged by the gas industry in Queensland's Darling Downs. *International Journal of Environmental Studies,* 75(1), 171-185. https://doi.org/10.1080/00207233.2017.1413221; Werner et al., (2018) Examination of Child and Adolescent Hospital Admission Rates in Queensland, Australia, 1995–2011: A Comparison of Coal Seam Gas, Coal Mining, and Rural Areas. *Maternal And Child Health Journal*, 22(9), 1306-1318. https://doi.org/10.1007/s10995-018-2511-4

and income, and degradation of living conditions, all of which increase social inequities (for example, where people cannot afford home insurance or to move to a place of safety. The issues are outlined in Figure 1[4].

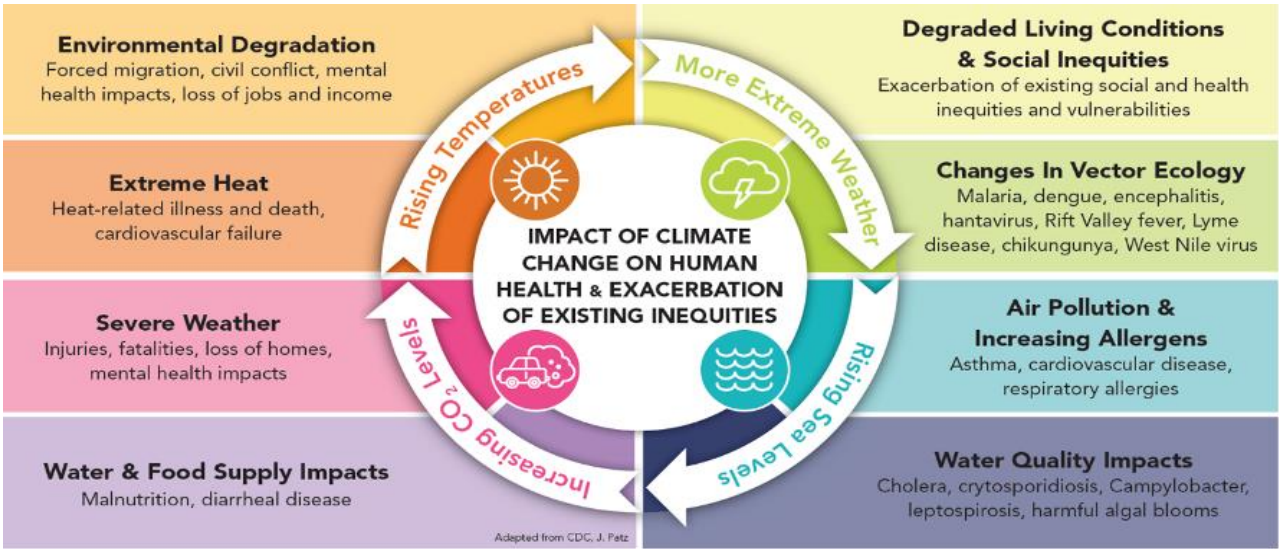

Figure 1 Climate Effects on Health (CDC 2021) This information can also be found on CDC's website at https://www.cdc.gov/climateandhealth/effects/default.htm

International evidence

The most recent publication from the Lancet 'Countdown on health and climate change' provides the following evidence of the health impacts from climate change across countries across the UN-defined human development index (HDI)[5]:

Indicator	Headline findings
1. Health and heat	*1.1 vulnerability to the extremes of heat: although vulnerability to heat in the low and medium HDI country groups is 27–38% lower than in the very high HDI group, it is increasing in all groups and, since 1990, it has increased by 19% in the low HDI group and by 20% in the medium HDI group*
	1.2 *exposure of vulnerable populations to heatwaves: children younger than 1 year were affected by 626 million more person-days of heatwave exposure and adults older than 65 years were affected by 3·1 billion more person-days of heatwave exposure in 2020 than in the 1986–2005 average*
	1.3. heat and physical activity: the past four decades saw an increase in the number of hours in which temperatures were too high for safe outdoor exercise, with people in the low HDI country group having an average loss of 3·7 h of safe exercise per day in 2020
	1.4. change in labour capacity: 295 billion hrs of potential work were lost due to extreme heat exposure in 2020, with 79% of all losses in countries with a low HDI occurring in the agricultural sector
	1.5 heat and sentiment: exposure to heatwave events worsens expressed sentiment, with a 155% increase in negative expressions on Twitter during heatwaves in 2020 from the 2015–19 average
	1.6 heat-related mortality: heat related deaths in people older than 65 years reached a record high of an estimated 345 000 deaths in 2019; between 2018 and 2019, all WHO regions, except for Europe, saw an increase in heat-related deaths in this vulnerable age group
	wildfires: nearly 60% of countries had an increase in the number of days people were exposed to very high or extremely high fire danger in 2017–

[4] Center for Disease Control (CDC) 2021, Climate Effects on Health. This information can also be found on CDC's website at https://www.cdc.gov/climateandhealth/effects/default.htm

[5] Romanello, M., McGushin, A., Di Napoli, C., Drummond, P., Hughes, N., Jamart, L., . . . Arnell, N. J. T. L. (2021). The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future. *398*(10311), 1619-1662.

health and extreme weather events	*20 compared with 2001–04, and 72% of countries had increased human exposure to wildfires across the same period*
	drought: in 2020, up to 19% of the global land surface was affected by extreme drought in any given month
	lethality of extreme weather events: the past 30 years have seen statistically significant increases in the number of extreme weather events; however, only the low HDI group had a statistically significant increase in the number of people affected by these events
climate-sensitive infectious diseases	*climate suitability for infectious disease transmission: in 2011–21, the area of coastline suitable for* Vibrio *bacterial transmission has increased by 35% in the Baltics, 25% in the Atlantic Northeast, and 4% in the Pacific Northwest; the number of months suitable for malaria transmission increased by 39% between 1950–59 and 2010–19 in highland areas of the low HDI group*
	vulnerability to mosquito-borne diseases: although vulnerability to arboviruses transmitted by A albopictus *and* A aegypti *has decreased across all countries since 2000, people in countries in the low HDI group are still the most vulnerability on average*
food security and undernutrition	*terrestrial food security and undernutrition: crop yield potential continues to follow a downward trend, with 6·0% reduction in the crop yield potential of maize, 3·0% for winter wheat, 5·4% for soybean, and 1·8% for rice, relative to the 1981–2010 average crop yield potential*
	marine food security: in 2018–20, nearly 70% of countries showed increases in average sea surface temperature in their territorial waters compared with in 2003–05, reflecting an increasing threat to their marine food productivity and marine food security
migration, displacement, and rising sea levels	*there are currently 569·6 million people settled lower than 5 m above sea level who could face risks from the direct and indirect hazards posed by the rising sea levels*

Australia and NSW

The impacts of climate change are evident in Australia and NSW as seen from heat, air pollution, bushfires, and floods. Recent experiences in Australia include: air pollution (showing particularly high levels in 2018 but almost daily for Ozone), extreme heat in summer (2019 Penrith was the hottest place on earth), bushfires in 2019, and 2020 and floods in 2019, 2020 and 2021. These three climate related issues have significant impacts on health and wellbeing, particularly mental health. The end of the bushfire devastation in March 2020 coincided with flooding and the beginning of the COVID-19 pandemic, creating overlapping and back to back social economic and environmental crises in NSW.

Heat

Climate change is driving longer, hotter, and more intense heatwaves in Australia[6]. Climate change is increasing temperatures in the day and night time. The number of heatwaves (classified as periods of three or more consecutive days of high maximum and minimum temperatures which are unusual for that location) are becoming more frequent, longer and hotter,[7] and small changes in average temperatures can result in extreme heat overall[8].

Heatwaves have killed more Australians than any other extreme weather event[9]. Although there are some people who are more at risk than others in a heatwave, anyone, even the fit and healthy can succumb to heat.

[6]Climate Council. 2014. Heatwaves: Hotter, longer, more often. Steffen W, Hughes L and Perkins S. Retrieved 19th Sept 2021 from http:// www.climatecouncil.org.au/uplo ads/9901f6614a2cac7b2b888f55b4dff9cc.pdf.

[7] WSROC (2020) Urban Heat Planning Toolkit https://wsroc.com.au/projects/project-turn-down-the-heat/turn-down-the-heat-resources-2

[8] Bureau of Meteorology Understanding heatwaves Retrieved 19th Sept 2021 http://www.bom.gov.au/australia/heatwave/knowledge-centre/understanding.shtml

[9] Coates L, Haynes K, O'Brien J, McAneney J and de Oliveira FD. (2014). Exploring 167 years of vulnerability: an examination of extreme heat events in Australia 1844–2010. Environmental Science & Policy. 42:33-44

There are at least twenty-seven ways a heatwave can kill you through damage to the brain, heart, intestines, kidneys, liver, lungs, and pancreas[10]. Our bodies are designed to work at between 35.6 to 37.8 ˚C. We need to maintain a stable internal temperature to survive. To combat heat, our bodies' thermostat, the hypothalamus in the brain, signals the body to make us sweat. Our ability to sweat can be affected by humidity (sweat cannot evaporate because the moisture in the air is higher than in our body so the heat stays inside us making us hotter), air movement around us, medications (some medications can be less effective or more toxic when exposed to and stored in high temperatures, others may affect the way our body sweats, regulates temperature, or decrease our ability to feel thirsty), pre-existing medical conditions can be made worse by heat[11].

Heat stress and heat stroke are very dangerous to our health. Heat stroke is a medical emergency. When our body temperature starts to rise and we cannot effectively cool down several physiological changes take place. We may get a heat rash, we start getting cramps, swelling of the hands and legs, and start to feel lightheaded, dizzy, and exhausted[12]. With a body temperature above 40.5 degrees we experience headache, intense thirst, dry hot skin, confusion, poor coordination, slurred speech, aggressive bizarre behaviour, seizure, and coma.[13] Heat stroke if not successfully treated can be fatal.

Who is the most vulnerable to heat?[14]

Infants and children	the elderly	pregnant women and breastfeeding
outdoor workers/ sports activities	the isolated, poor, and homeless	those with pre-existing medical conditions – cardiac, respiratory, kidney failure, diabetes, quadriplegia, mental illness.

In Sydney, temperatures on some playground equipment and surfaces have been observed to be in excess of 80 degrees[15]. Extreme heat events also present a risk to critical infrastructure including road, rail, and electricity generation. Power outages as experienced in the Western Sydney during heatwaves increase the risk of heat stress[16] and also increases the risk of gastrointestinal infections (such as *Salmonella gastroenteritis*) due to food spoilage due to poor refrigeration[17]. Trains struggle to provide air conditioning, tracks expand, and commuters may have a longer travel time as train drivers activate speed restrictions during hot weather[18]. Hospitalisation increases during heatwaves putting extra demand on emergency departments and ambulance services. The number of emergency department presentations in NSW is on an upward trend[19].

Air pollution

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[10] Mora et al. (2017) Twenty-Seven Ways a Heat Wave Can Kill You - Deadly Heat in the Era of Climate Change; Circ Cardiovasc Qual Outcomes. DOI: 10.1161/CIRCOUTCOMES.117.004233

[11] NSW Government (2020) Beat the Heat - Information for Health Professionals. Retrieved 19th Sept, 2021 from: https://www.health.nsw.gov.au/environment/beattheheat/Pages/information-for-health-professionals.aspx

[12] Hanna, E &Tait, P (2015)Limitations to Thermoregulation and Acclimatization Challenge Human Adaptation to Global Warming. Int. J. Environ. Res. Public Health 2015, 12

[13] Dr Kim Loo, 2021, The Health impacts of Climate Change and air pollution from burning fossil fuels. Presentation at the Increasing Resilience to Climate Change Workshop 14th July 2021, Western Sydney Health Alliance & Climate and Health Alliance. Presentation available on request.

[14] NSW Government (2020) Beat the Heat - Information for Health Professionals. https://www.health.nsw.gov.au/environment/beattheheat/Pages/information-for-health-professionals.aspx

[15] Pfautsch S., Wujeska-Klause A. (2021) Guide to climate-smart playgrounds – research findings and application. Western Sydney University, 60 p

[16] Ogge, M Browne, B and Hughes, T (2018) HeatWatch Extreme heat in Western Sydney. Australia Institute Retrieved Sept 24th, 2021, from https://australiainstitute.org.au/wp-content/uploads/2020/12/Western-Sydney-Heatwatch-WEB.pdf

[17] DEA (2016) Heatwaves & Health In Australia - Fact Sheet. Retrieved 24th Sept,2021 from https://www.dea.org.au/wp-content/uploads/2017/02/DEA_Heatwaves__Health_Fact_Sheet_06.pdf

[18] RailSafe (2018) Speed restrictions during hot Weather. Retrieved 24th Sept, 2021 from https://railsafe.org.au/__data/assets/pdf_file/0017/32255/NGE-210-Speed-restrictions-during-very-hot-weather-WOLO-V3.1.pdf

[19] See HealthStats NSW. Temperature related problems, presentations in emergency departments 2010-2019. http://www.healthstats.nsw.gov.au/Indicator/env_heated/env_heated?&topic=Environment&topic1=topic_env&code=env

In Australia it is estimated that between 1n325[20] and 4n884 people[21] have died prematurely due to breathing in air pollution.

After the 2019/2020 bushfires, air pollution from bushfire smoke is estimated to have caused 417 deaths, 1,124 hospitalisations for heart problems, 2,027 for respiratory problems and 1,305 for asthma[22]. Estimates of health cost of premature deaths due to air pollution ranges in Australia from $11 billion to $24 billion per year[23].

Air pollution is not only an issue for human health; it affects water quality, crop yields, affects local climate and weather patterns and even the efficiency of solar panels as sunlight cannot fully penetrate through smog[24]. Air pollution can be a result of climate change, but as some air pollutants can accelerate warming and therefore air pollution also drives climate change[25].

Children's health is impacted by exposure to nitrogen dioxide (which is a major traffic-related pollution) and includes increased risks of asthma-like symptoms (in particular, wheeze), increased airway inflammation and reduced lung volumes, particularly at night[26]. Short term effects negative effects on children's breathing after exposure to Ozone have also been recorded in primary school children[27]. Air pollution from power stations on the Central Coast and Lithgow has been detected in Richmond, in the Hawkesbury LGA, and contributed 14% to 38% of the fine particles in the air. The power station air pollution included secondary sulphate which is a common element that comes from cars, coal and industry and aged sulphur, a mix of sodium, sulfur and black carbon, that comes from the interaction of sea salt and sulfur pollution[28]. In the same report, health burdens reported associated with power station pollution include premature death from heart disease and stroke, babies born with low birth weight, and new cases of diabetes[29].

Floods

Floods are a common natural disaster in Australia and compared to other natural hazards can do the most damage. We worry about floods not only because they have significant social and economic costs but because they also impact our health with short and long term effects. These impacts are felt from individuals and communities to infrastructure and essential services to industry sectors such small business, agriculture and tourism. Health effects include:

- injuries (including falls, exposure to fallen electrical wires, being struck by falling debris or objects moving quickly, and mudslides/landslides)
- bites and injuries caused by displaced wild animals, for example, snakes, spiders, reptiles and rodents in floodwaters
- exacerbated respiratory diseases such as asthma caused by compromised indoor air quality in previously flooded buildings (eg from mould)
- increased incidence of mosquito-borne diseases several weeks after heavy precipitation if land use configurations support larval development, particularly if the event ends a dry spell
- waterborne diseases and infections of the eye, ear, nose, throat, or skin caused by compromised water quality following flooding events
- flooding and/or sewage overflow can cause contamination of drinking water, as well as natural water sources such as creeks, rivers and the ocean

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[20] Watts et al. (2021) The 2020 report of the Lancet Countdown on health and climate change: responding to converging crises, The Lancet; 397: 129–70

[21] Hanigan, I.C.; Broome, R.A.; Chaston, T.B.; et al. Avoidable Mortality Attributable to Anthropogenic Fine Particulate Matter (PM2.5) in Australia. Int. J. Environ. Res. Public Health 2021, 18; 254. https://doi.org/10.3390/ijerph18010254

[22] Arriagada N., Palmer, A., Bowman D., et al. , Unprecedented smoke-related health burden associated with the 2019-20 bushfires in eastern Australia, Medical Journal of Australia, 213 (6): 282-283. || doi: 10.5694/mja2.50545

[23] Dean, A and Green, D (2017) Climate Change, Air Pollution and Health in Australia, UNSW Sydney, Grand Challenges, Sydney Australia.

[24] Seddon, J Contreras, S Elliott,B (2019) 5 Under-recognized Impacts of Air Pollution.World Resources Institute. Retrieved 30th Sept 2021 from https://www.wri.org/insights/5-under-recognized-impacts-air-pollution

[25] Dean, A and Green, D (2017) Climate Change, Air Pollution and Health in Australia, UNSW Sydney, Grand Challenges, Sydney Australia.

[26] Australian Child Health and Air Pollution Study (ACHAPS) Final Report (2012) http://www.nepc.gov.au/system/files/resources/8f043cf5-a911-c1c4-8d3d-143ed55cb112/files/achaps-final-report-may2012.pdf

[27] Jalaludin, B., Chey, T., O'Toole, B. I., et al. (2000) Acute effects of low levels of ambient ozone on peak expiratory flow rate in a cohort of Australian children. International Journal of Epidemiology, 29, 549-557

[28] Ewald, B(2018) The health burdens of fine particle pollution from electricity generation in NSW. https://www.envirojustice.org.au/wp-content/uploads/2018/11/Ewald_B_2018_The_health_burden_of_fine_particle_pollution_from_electricity_generation_in_NSW.pdf

[29] Ibid.

- other communicable diseases, including hepatitis A and E, leptospirosis, and parasitic diseases from water quality
- infected wounds from pathogens such as Aeromonas (as well as the more common staphylococcal and streptococcal infections) from traumatic water-immersed wounds
- social disruption and population displacement causing anxiety and distress
- mental health (short- and long-term issues such as post traumatic stress disorder[30]). Mental health impacts affect individual and community resilience
- flood exposure may also increase suicidal ideation
- difficulty accessing usual medications/health care and breakdown of routine health care services.[31,32,33]

Severe urban flooding is an increasing problem facing Australia. For instance in March 2021 all Western Sydney was impacted by flooding. An estimated 3,000 people needed to be evacuated, particularly those living near the Sackville Bathtub and the foot of the Blue Mountains[34,35]. Just this week (Feb 2022) Sydney and the central coast are experiencing climate change related heavy rain that risks the health and safety of the community.[36]

Bushfires

Bushfire conditions are now more dangerous than in the past and what was thought to have worked to control fires is becoming less effective as the climate changes[37]. The risks to people and property have increased and fire seasons have lengthened, this means there is a longer exposure time to the health risk of bushfires. The length of the fire season and the repeated threat of bushfire was a significant factor that influenced people's health and wellbeing in 2019/2020. In addition to the health impacts, people who were affected by these fires experienced a range of issues including power and mobile phone outages, evacuation and displacement, difficulties accessing evacuation services, and later welfare support[38].

As previously stated there is no safe level of air pollution. Bushfire smoke is particularly toxic because the particles that come from soot and ash are so small they penetrate deep into the lungs. They are also able to enter the bloodstream and affect different body systems, including the heart[39]. Smoke from bushfires, such as the bushfires in 2019-2020, can reach levels up to 10 times hazardous air quality levels[40]. It is estimated that 417 deaths are associated with the 2019/2020 bushfires, with 1124 hospitalisations for cardiac and 2027 for respiratory problems and 1305 presentations to emergency departments for asthma related illness[41]. The impact of the smoke extended beyond Australia and reached the Antarctic and impacted air quality in New Zealand, and South America[42].

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[30] Black Dog Institute (2021) Mental health impacts of floods https://www.blackdoginstitute.org.au/wp-content/uploads/2021/03/Mental-Health-Impact-of-Floods.pdf

[31] DEA (2017)Severe Storms , floods and your health: Fact Sheet https://www.dea.org.au/wp-content/uploads/2017/03/DEA-Storms-Flood-Fact-Sheet_web.pdf

[32] Houghton, A and Castillo-Salgado, C (2017) Health Co-Benefits of Green Building Design Strategies and Community Resilience to Urban Flooding: A Systematic Review of the Evidence; International Journal of Environmental Research and Public Health, 14, 1519; doi:10.3390/ijerph14121519

[33] https://www.health.nsw.gov.au/Infectious/alerts/Documents/flood-disease-risks-clin-alert-20210325.PDF

[34] https://www.abc.net.au/news/2021-03-22/nsw-flooding-forces-evacuations-and-school-closures/13266072

[35] Hubble, T (2021) Not if but when - Sydney can expect more flood disasters. University of Sydney. https://www.sydney.edu.au/news-opinion/news/2021/04/15/sydney-floods-not-if-but-when-sydney-can-expect-more-disasters-hawkesbury-nepean.html

[36] https://www.smh.com.au/environment/weather/rain-in-sydney-expected-to-intensify-on-the-weekend-20220225-p59zjq.html

[37] Independent Bushfire Group 2020 Reducing the costs and impacts of bushfires . For the Emergency Leaders for Climate Action and the Climate Council. https://emergencyleadersforclimateaction.org.au/wp-content/uploads/2020/08/reducing-costs-impacts-bushfires-independent-bushfire-group-summary.pdf

[38] Citation: Whittaker J, Haynes K, Wilkinson C, Tofa M, Dilworth T, Collins J, Tait L & Samson S (2021) Black Summer – how the NSW community responded to the 2019-20 bushfire season, Bushfire and Natural Hazards CRC, Melbourne

[39] Cowie, C.T.; Wheeler, A.J.; Tripovich, J.S.; Porta-Cubas, A.; Dennekamp, M.; Vardoulakis, S.; Goldman, M.; Sweet, M.; Howard, P.; Johnston, F. Policy Implications for Protecting Health from the Hazards of Fire Smoke. A Panel Discussion Report from the Workshop Landscape Fire Smoke: Protecting Health in an Era of Escalating Fire Risk. Int. J. Environ. Res. Public Health 2021, 18, 5702. https://doi.org/10.3390/ijerph1811570

[40] Walter et al (2020) Health impacts of bushfire smoke exposure in Australia. Respirology. 25 (5) 495-501doi: 10.1111/resp.13798

[41] Johnston, F Borchers-Arriagada,N Morgan,G Jalaludin,B Palmer,A Williamson,G Bowman, D (2020) Unprecedented health costs of smoke-related PM2.5 from the 2019–20 Australian megafires. Nature Sustainability. 4,42-47

[42] UNEP (2020) Ten impacts of the Australian bushfires. Https://www.unep.org/news-and-stories/story/ten-impacts-australian-bushfires

The health system in Australia was unprepared and not equipped to deal with the bushfires[43]. Smoke-related health costs of the 2019-20 fire season are estimated to be $1.07b in NSW[44].

Bushfires present a number of health risks such as:

- burns
- dehydration and heat exhaustion
- breathing difficulties from smoke inhalation
- short-term and extended exposure to high levels of air pollution can be associated with adverse health effects
- itchy eyes, runny nose, sore throat
- increased risks to people with cardiac and respiratory conditions
- mental health, including new and increased symptoms of anxiety and depression
- sustained exposure to bushfire smoke reduces everyday activities, particularly for people with asthma[45]
- short-term physical and mental health impacts
- increased hospital emergency department presentations for respiratory problems during the bushfire season

Most vulnerable include:

- people with respiratory diseases such as asthma, bronchitis or emphysema
- people with heart disease
- people with diabetes
- pregnant women
- children and young people
- elderly people (especially those over 65 years)[46].

International evidence coal mining and health

The impacts of coal mining on human health are well known and mostly negative[47]. These impacts range from direct to indirect impacts. Local impacts include reduced access to and affordability of housing, growth in traffic and motor vehicle accidents and declining air quality leading to increased cardiovascular and respiratory disease, lung cancer, and premature death[48]. The connections between mental health and coal mining have also been acknowledged[49]. While coal mines may generate economic and employment benefits, the distribution of positive and negative impacts is geographically and temporally uneven[50].

b. In your opinion, has the environmental assessment for the Project adequately considered any health impacts arising as a consequence of the Project's contribution to climate change?

Taken against the evidence provided in part A above, the Assessment Report inadequately considers the connection between health impacts and the Project's contribution to climate change.

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[43] Global Climate and Health Alliance (2021) The Limits of Livability. https://climateandhealthalliance.org/forest-firesmoke-health-climate/

[44] Johnston, F Borchers-Arriagada,N Morgan,G Jalaludin,B Palmer,A Williamson,G Bowman, D (2020) Unprecedented health costs of smoke-related PM2.5 from the 2019–20 Australian megafires. Nature Sustainability. 4,42-47

[45] Asthma Australia

[46] Porta Cubas A, Johnston F, Wheeler A, Williamson G, Cowie C, Tham R et al. 2019. Bushfire smoke:What are the health impacts and what can we do to minimise exposure? Glebe: Centre of Air Pollution Energy and Health Research; and National Centre for Epidemiology & Population Health Research School of Population Health College of Health & Medicine (2020) How to protect yourself and others from bushfire smoke.Fact Sheet. https://rsph.anu.edu.au/phxchange/communicating-science/how-protect-yourself-and-others-bushfire-smoke ; Australian Institute of Health, Welfare. Australian bushfires 2019–20: exploring the short-term health impacts. Canberra: AIHW; 2020

[47] E. Morrice and R. Colagiuri, "Coal mining, social injustice and health: A universal conflict of power and priorities," *Health & Place,* vol. 19, pp. 74-79, 2013; T. Schrecker, A.-E. Birn, and M. Aguilera, "How extractive industries affect health: Political economy underpinnings and pathways," *Health & place,* vol. 52, pp. 135-147, 2018; W. M. Castleden, D. Shearman, G. Crisp, and P. Finch, "The mining and burning of coal: effects on health and the environment," *Medical Journal of Australia,* vol. 195, no. 6, pp. 333-335, 2011; J. Cortes-Ramirez, S. Naish, P. D. Sly, and P. Jagals, "Mortality and morbidity in populations in the vicinity of coal mining: a systematic review," *BMC Public Health,* vol. 18, no. 1, p. 721, 2018/06/11 2018.

[48] E. Burt, P. Orris, and S. Buchanan, "Scientific evidence of health effects from coal use in energy generation," *Chicago and Washington: School of Public Health, University of Illinois and Health Care Without Harm,* 2013.

[49] N. Higginbotham, S. Freeman, L. Connor, and G. Albrecht, "Environmental injustice and air pollution in coal affected communities, Hunter Valley, Australia," *Health & Place,* vol. 16, no. 2, pp. 259-266, 2010/03/01/ 2010.

[50] D. Franks, "Social impact assessment of resource projects," *International Mining for Development Centre,* vol. 3, 2012.

The report makes seven explicit references to human health: four concern the health sector / health services (no impact predicted or supporting continued service provision); three concern the health of the environment (not human health) as part of ecologically sustainable development (ESD).

Climate is mentioned 39 times. Connections to human health are not made. For instance, there is no evidence to back up the following claim on page A5 – which is insufficient in its consideration of impacts happening now on our current health and wellbeing.

> *'The Department acknowledges that the mining of coal and its combustion is a major contributor to anthropogenic climate change, which has the potential to impact future generations. The Department considers that the Project's direct GHG emissions (i.e. Scope 1 and Scope 2) are significant but would constitute a very small contribution towards climate change at both the national and global scale.*

The section (p.54-67) on greenhouse gas emissions does not connect climate change emissions from the Project and human health. Not only is health absent, but no connections are made from the project to a changing climate in relation to the core indicators and dimensions described in section A above.

The Development Consent document insufficiently considers the evidence presented in section A above. That document makes four references to health. One is in the glossary concerning actual or potential harm to heath and safety. P 12 makes two references to particulate matter and health risks of tenants and land owners occupying local properties impacted by the mine (including medical professionals using air quality monitoring data when considering risks with occupying property). P 33 refers to a fact sheet from NSW Health about mine dust as part of considering noise or air quality exceedances. P 17 refers to the health of streams and riparian vegetaton be included in the surface water management plan (flooding is not mentioned).

c. Provide any further observations or opinions which you consider to be relevant.

The lack of connection to any evidence presented in section A demonstrates the inadequacy of the current policy environment and the EA process.

Dr Patrick Harris
25 February 2022

Appendix 1

Environmental Defenders Office

21 February 2022

Dr Patrick Harris
Senior Research Fellow and Deputy Director
Centre for Health Equity Training, Research and Evaluation

By email: [redacted]

CONFIDENTIAL AND PRIVILEGED

Dear Dr Harris

Brief to Expert – Narrabri Underground Mine Stage 3 Extension Project (SSD 10269) Public Hearing

1. We act for Lock the Gate in relation to the proposed Narrabri Underground Mine Stage 3 Extension Project (SSD 10269) (**Project**) by Narrabri Coal Operations Pty Ltd.

2. The Narrabri Coal Mine, is an existing underground thermal coal mine located approximately 25 kilometres (**km**) south-east of Narrabri and approximately 60 km north-west of Gunnedah. Coal production using bord and pillar and partial extraction methods commenced in 2010. Stage 2 of the existing mine has been extracting coal by longwall methods since June 2012 and allows for the production and processing of up to 11 million tonnes per annum (**Mtpa**) of run-of-mine (**ROM**) coal until 26 July 2031. The Project proposes to continue longwall mining in a major southern extension area until 2044. The Project also seeks the continued use of existing underground and surface infrastructure, including use of the existing Coal Handling and Preparation Plant (**CHPP**) at 11 Mtpa.

3. The Project has now been referred to the Independent Planning Commission (**IPC**) for determination with a public hearing. Our client wishes to ensure the IPC receives independent expert advice on the Project. Accordingly, our client wishes to retain your services to act as an expert to provide an expert report for submission to the IPC.

Primary purpose to provide independent expert advice

4. We note as a preliminary matter that our primary purpose in briefing you to prepare your report is to provide independent expert advice in your area of expertise. We do not ask you to be an advocate for our client. You are requested to prepare an independent report that is clear and well-written.

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5. In this respect, we draw your attention to Division 2 of Part 31 of the *Uniform Civil Procedure Rules 2005* (**UCPR**), and the Expert Witness Code of Conduct (**Code of Conduct**) contained in Schedule 7 of the UCPR, both of which govern the use of expert evidence in NSW Courts (**attached**). We understand that the IPC public hearing is not a Court proceeding, however, we are of the view that the same Code of Conduct should be adhered to in this instance.

6. In particular, clause 2 of the Code of Conduct states that:

   "An expert witness is not an advocate for a party and has a paramount duty, overriding any duty to the party to the proceedings or other person retaining the expert witness, to assist the court impartially on matters relevant to the area of expertise of the witness."

7. Your expert report must contain an acknowledgment that you have read the Expert Witness Code of Conduct and that you agree to be bound by it.

8. Your expert report will be used as evidence in chief of your professional opinion. Information of which you believe the decision maker should be aware must be contained in your expert report.

9. In providing your opinion to the decision maker you must set out all the assumptions upon which the opinion is based. This may include, for example, facts observed as a result of fieldwork or 'assumed' facts based on a body of scientific opinion. If the latter, you should provide references which demonstrate the existence of that body of opinion.

10. Your expert report must also set out the process of reasoning which you have undertaken in order to arrive at your conclusions. It is insufficient for an expert report to simply state your opinion or conclusion reached without an explanation as to how this was arrived at. The purpose of providing such assumptions and reasoning is to enable the decision maker and experts engaged by other parties to make an assessment as to the soundness of your opinion.

Overview of work requested

11. We request that you undertake the following work:

    a. review the documents listed below; and
    b. prepare a written expert report that addresses the issues identified below ('Issues to address in your expert report'), and ensure that the work is prepared in accordance with Part 31, Division 2 of the UCPR.

Documents

12. We enclose the Code of Conduct and Part 31 Division 2 of the UCPR.

13. Full Project documentation is available at the following websites:
    a. NSW Government Planning Portal: https://www.planningportal.nsw.gov.au/major-projects/project/10731

b. IPC: https://www.ipcn.nsw.gov.au/projects/2021/12/narrabri-underground-mine-stage-3-extension-project-ssd-10269.

14. The following documents relating to the Project are provided for your particular consideration:

Department's Assessment Report

a. Department's Assessment Report (pp. vi-xv, 54-67): https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-10269%2120220119T051727.890%20GMT
a. Recommended Conditions: https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-10269%2120220119T051728.236%20GMT.

15. Please let us know as soon as possible if you require further information for the purpose of giving your expert opinion.

Issues to address in your expert report

16. We ask that your report addresses the following questions:

a. Please describe the current state of knowledge in relation to any health impacts in NSW, Australia and globally that are predicted to arise as a consequence of climate change.
b. In your opinion, has the environmental assessment for the Project adequately considered any health impacts arising as a consequence of the Project's contribution to climate change?
c. Provide any further observations or opinions which you consider to be relevant.

Key dates

17. EDO will be grateful to receive your written comments on the Project before **5pm AEDT on Thursday 24 February 2022**.

Duty of confidentiality

18. Please treat your work as strictly confidential until your expert report is provided to the IPC, unless authorised by us.

Fees and Terms

19. Thank you for agreeing to provide your advice in this matter on a pro bono (volunteer) basis. EDO relies on experts such as you to assist in matters with very little financial compensation.

20. Please note the following terms:

a. your work will only be used by EDO to relation to this matter;

b. our client may choose to make your expert advice publicly available. Any public release of your report, whether by our client or by way of publication on the IPC's website, may result in disclosure of any works in your report over which you may claim copyright;

c. EDO will take all reasonable steps to prevent your work being used for purposes other than that mentioned above, but we accept no responsibility for the actions of third parties;

d. regardless of the above points, EDO may choose not to use your work; and

e. you will not be covered by the EDO's insurance while undertaking the above tasks.

21. If you would like to discuss this brief further, please contact the author on (02) 9262 6989 or email [redacted]

We are grateful for your assistance in this matter.

Yours sincerely
Environmental Defenders Office

[redacted]

Matt Floro
Special Counsel

Reference number: S2602