Expert Report – Dr Ben Ewald, B.Med, PhD.

Prepared for T4 PAC Meeting

25 August 2014

Introduction

1. This report has been prepared in response to a request from EDO NSW for independent expert advice on any impacts of the proposed development of a fourth terminal at Kooragang Island (**T4**) on public health. A copy of my expert brief is provided in Appendix 1 to this report.

2. My relevant expertise is as an epidemiologist experienced in the measurement of health, the exposures that influence health, and assessing the associations between exposures and health outcomes. I teach epidemiology at undergraduate and post graduate level at the University of Newcastle and have done so for fifteen years. A copy of my curriculum vitae is provided as Appendix 2 to this report.

3. The questions asked of me are as follows:

    a. Please describe the relationship between exposure to PM10 and/or PM2.5 and impacts on human health.

    b. In your opinion, please explain the risks, if any, to residents of the Newcastle area associated with existing levels of PM10 and/or PM2.5 as measured by the EPA. In providing this opinion, please comment on the relationship between predicted levels of PM10 and/or PM2.5 and the national health standards set by the National Environment Protection Council.

    c. In your opinion, does the air quality in the Newcastle region currently meet appropriate public health standards? In your response, please consider regional compliance with the *National Environment Protection Measure for Ambient Air Quality, 1998* (**NEPM**).

    d. In your opinion, is noise from the T4 Project likely to have negative impacts on human health? Please explain your reasons for this opinion.

    e. In your opinion, are there human health impacts (other than any discussed above) that are likely to arise from the T4 Project? If so, please explain your reasons for this opinion.

    f. Provide any further observations or opinions which you consider to be relevant from a health perspective, having regard to the circumstances of this matter.

4. I have read the Expert Witness Code of Conduct under the Uniform Civil Procedure Rules 2005 and I agree to be bound by it.

5. I have examined the T4 Response to Submissions, Preferred Project Report (PPR), Appendices O, P, Q, R and D dated September 2013 and the Response to Submissions to the PPR.

Summary

6. Particulate air pollution has an important adverse effect on health, causing both morbidity and mortality. There is no safe level of exposure. Particulate pollution in Australia causes more deaths than road crashes.

7. Existing estimates of health impacts, determined by applying the known risk function for particulate matter smaller than 2.5 microns to ambient air quality in the Newcastle area (assumed to be 5.7µg/m^3 which is lower than measured levels from 2012 and 2013), estimated an annual disease burden of 25 deaths and 296 years of life lost due to PM2.5 exposure in greater Newcastle (estimate by Dr Richard Broom).

8. The proposal to build and operate a fourth coal loader at Kooragang Island would have deleterious effects on the health of people in Newcastle through its negative effect on air quality, and by the noise of its operation. These effects will be both from the operation of the plant onsite, and by the greatly increased movement of trains along the rail corridor to supply the loader. Health impacts from particulate air pollution will be through extra cases of heart and lung disease in adults and lung disease in children. Noise impacts on health include sleep disturbance, and probably cardiovascular disease and altered immune function.

Background

9. The effects of inhaled particulate matter on human health have been studied in many populations, mostly in the USA and Europe. The original studies were in places with severe pollution such as London in the 1950s, or Utah valley where a steel works operated in a valley prone to temperature inversions. In these high pollution environments there were substantial impacts on health that were easy to notice, such as the 4000 excess deaths during the 5 to 9 December "*pea soup smog*" in London in 1952. Over subsequent decades cohort studies with hundreds of thousands of people have demonstrated that air pollution causes death and disease at much lower levels, and it is now generally thought that there is no safe lower limit for particulate matter smaller than 2.5 microns (PM2.5) (Pope Iii C and et al. 2002) (Pope, Burnett et al. 2009).

10. Particulate air pollution is categorized by its size, as this determines its deposition in the human respiratory tract. Particulate matter with an aerodynamic diameter of 10 microns and less is known as PM10, while that with diameter less than 2.5 microns is PM2.5, sometimes called "fine particulates". These are overlapping definitions, so PM2.5 is included in PM10. Some studies have examined only the particles in the range 2.5 microns to 10 microns, indicated by PM2.5-10, and called the "coarse fraction". Particles are sometimes measured

without regard to size, known as Total Suspended Particulates (**TSP**). The even finer particles at 0.1 microns are known as ultrafine particles. Ultrafine particles are not discussed further in this report as there is insufficient information about the health impacts of these. As a rule, older research examined bigger particle sizes, with the focus on fine particles developing as their importance was realised, and better measurement instrumentation developed.

11. In the human respiratory tract the biggest particles are trapped in the nose, so only the particles 10 micron and below reach the larynx, trachea, bronchi and further into the lung, hence are referred to as respirable. PM2.5 reaches all the way to the alveoli where gas exchange occurs, and chemical components of the particles can enter the blood stream.

12. The health effects of air particulates were recently reviewed for the European office of the World Health Organisation, known as the Revihap project. To quote the Revihap report, question 5, page 9 *(REVIHAAP 2013)*:

    > *In the absence of a threshold and in light of linear or supra-linear risk functions, public health benefits will result from any reduction of PM2.5 concentrations whether or not the current levels are above or below the limit values.*

13. Air toxins can have acute and/or chronic effects, so the exposure measures are defined over a time period.

14. Acute effects are studied by comparing deaths or hospitalisations on bad air days with those on good air days. Such studies have been done in many places and show remarkably consistent results.

15. Carbon monoxide (**CO**) for instance is an acute poison. If you sleep with a charcoal burning room heater with the windows shut you may be dead in 2 hours, but if you have a low level all year it has no effect.

16. To reflect the different acute and chronic toxicities, air quality standards are set over a time period. Acutely toxic exposures are regulated as a 1 hour, 8 hour or 24 hour average, while chronic exposures are regulated as annual average exposures. For example, the CO exposure standard is set for an 8 hour average (**NEPM 2003**).

17. Chronic effects are described by cohort studies in which a large population sample is examined at recruitment and followed up for many years, comparing the health experience of those living in places with good or bad air. These studies have great complexity, as they must adjust for other exposures such as smoking and socioeconomic status, and for the change in air quality over time. Because the health effects are individually small these cohorts must include very large samples. For instance the American Cancer Study followed 1.2 million people, of whom 500,000 lived in places with adequate air quality records. The chronic effects are five to ten times greater than the acute effects, and the mortality impact is mostly through cardiovascular disease, although respiratory disease is also increased.

18. Acute effects are easier to study than chronic effects. To study the acute, reversable effects effects of air pollution on asthma attacks the typical design is

to compare hospital admissions on good air days with bad air days. However, this type of study will not show long term effects as these impacts are ongoing and won't be detected through studies that compare hospital admissions in this way.

19. In Australia, air quality standards are set at a national level by the National Environment Protection Measure (Ambient Air Quality) (NEPM) and implemented by state-based decision makers. On 31 July 2014, the National Environment Protection Council published a variation to the NEPM which is now in a public consultation phase. The old and new standards for PM are summarised in Table 1 below.

Table 1: Old and new NEPM standards for particulate matter.

Particle size	**Old standard**	**New standard**	**Allowed exceedences**
PM 10 daily	50 µg/m^3	40 or 50 *	5 / year *
PM10 annual	none	20	Nil
PM2.5 daily	25 µg/m^3 advisory	25 compulsory	Nil
PM2.5 annual	8 µg/m^3 advisory	8 compulsory	Nil

* Issues under consideration during the public consultation are the best level for the 24 hour PM10 standard, and the form of the standard, ie whether there will be a set number of allowable exceedences or a natural events rule allowing for days with dust storms or bushfires.

20. In my opinion, the new standards are long overdue, and will be in place before the construction of T4 commences.

(1) Please describe the relationship between exposure to PM10 and/or PM2.5 and impacts on human health

21. Current scientific thinking about air pollution, as expressed by Dr C. Arden Pope III, one of the world authorities on the health effects of air pollution, during a recent visit to Newcastle, is that the health effects of PM2.5 occurs even at very low levels, and there is no threshold at which they can be considered safe (Pope, Burnett et al. 2009).

22. An increase in particulate pollution, even below the current NEPM standard, will cause an increased health burden on the population exposed. The increased risk for each individual is small, but as every person in the community is exposed it becomes a significant health problem. Evidence for the lack of a threshold is strongly supported by the 2002 analysis by Schwartz of the Harvard Six Cities Study, showing an effect of PM2.5 on deaths that was linear right down to 2µg/m^3 (Schwartz, Laden et al. 2002). Estimates of the concentration- response relationship is in the range of 3% to 15% increase in mortality for every 10µg/m^3 increase of annual mean PM2.5. The estimate from the highest quality research is of 6% for every 10µg/m^3 increase. Examples of this research include Cesaroni et al (2013) in Rome – for every 10µg/m^3 increase in PM2.5 there was a 3%

increase in non-accidental mortality and 10% increase in Ischemic heart disease mortality (Cesaroni 2013). This was independent of NO2 impacts on mortality indicating that these pollutants have independent effects. In the UK, 1% increase in premature mortality for every 1µg/m^3 increase in PM2.5 (chronic exposure) – note this is 10% for every 10µg/m^3 (Yim 2012). In Canada, the association was 15% increase in non-accidental mortality and 30% increase in Ischemic heart disease mortality for every 10µg/m^3 increase in PM2.5 (Crouse 2012).

23. Quite by chance, recruitment to the international MONICA study of heart disease was underway in Augsburg, Germany in 1985, when a patch of severe air pollution drifted across from Eastern Europe pushing up TSP from 48 to 98µg/m^3 for 13 days. A population representative sample of healthy men were having extensive health checks including blood samples. During the bad air days there was a significant increase in blood viscosity, in heart rate, and in CRP, an indicator of systemic inflammation (Peters 2001). In other work it has been shown that heart rate variability in response to air pollution is genetically determined with certain gene variants conferring protection. Recent work published in the journal Science (Feb 2014) shows blocking of excitation-contraction coupling by blocking potassium and calcium channels in cardiac myocytes by polycyclic aromatic hydrocarbons (PAH). Although this work was done in fish, humans have similar biochemical channels. PAH are widespread in air pollution, and can be absorbed directly from the lungs into the blood stream. This implies that induction of arrhythmias by PAH is a possible mechanism for the association of PM2.5 with cardiovascular mortality (Brette 2014).

24. Health effects of the coarse fraction of PM10 were reviewed by Brunenkreef and Forsberg (2005), showing that although there were statistically significant associations with mortality in some studies, in others there was no association. Effects on morbidity however are more consistent, showing that in studies of Chronic Obstructive Pulmonary Disease, and asthma hospital acute admissions effects were as big or bigger than the effects of fine PM, in the range of 1% to 7% increase in hospital admissions per 10µg/m^3 increase in coarse PM10 (Brunekreef and Forsberg 2005).

Particulate Matter and T4

25. Newcastle and the Hunter only experiences air quality problems from particulates, not other chemicals listed as pollutants under NEPM.

26. Particulates are made up of many different things, with greater and lesser toxicity. This is sometimes brought up as a reason to not worry about air pollution, but the original epidemiologic research was done on similar mixtures. It is analagous to cigarette smoke, a mixture of 4,000 chemicals, of which possibly half are harmless, but this does not alter the validity of the health damage from breathing the mixture.

27. The chronic effects of PM2.5 are about 10 times greater than the acute effects.

28. The levels of PM chosen as air quality standards in NEPM and used as a basis of comparison in the T4 assessment are not claimed to be safe, but are regarded as being acceptable risk. Many studies have demonstrated air pollution impacts on health at levels well below the current standards. The standards have been

progressively lowered as the science is better understood. The current NEPM, introduced in 2003, was based on available science at the time and was reviewed in 2011. Recommendation 7 of that review proposes the introduction of an annual standard for PM10, and recommendation 23 proposes to monitor and report the coarse particle fraction, ie PM2.5-10. As shown in Table 1 above, the National Environment Protection Council is proposing to amend the NEPM standard to include a limit for annual average PM10 of 20µg/m^3.

Current impacts on health in Australia

29. The best estimate of the current disease burden from air pollution of all kinds is 3,000 deaths per year. This was recently estimated as 1,590 deaths due to PM2.5 alone in the cities of Perth, Melbourne, Sydney and Brisbane (Summary for policy makers, current NEPM amendment documentation).

30. If approved, T4 will impact on the health of the people of Newcastle, as described below.

<u>(2) In your opinion, please explain the risks, if any, to residents of the Newcastle area associated with existing levels of PM10 and/or PM2.5 predicted for the T4 Project. In providing this opinion, please comment on the relationship between predicted levels of PM10 and/or PM2.5 and the national health standards set by the National Environment Protection Council.</u>

<u>(3) In your opinion, does the air quality in the Newcastle region currently meet appropriate public health standards? In your response, please consider regional compliance with the National Environment Protection Measure for Ambient Air Quality, 1998 (NEPM)</u>

31. Existing air quality in Newcastle as recorded by the three EPA ambient air monitoring stations is shown in Table 2 as annual averages. The Newcastle site referred to in the table is at a sports field close to the CBD, Wallsend is a western suburb away from the rail line where the monitor is at the public swimming pool, and Beresfield is a western suburb where the monitor is at a high school, close to the coal rail line.

Table 2. Results of EPA air monitoring in Newcastle.

Annual averages	Wallsend PM10	Newcastle PM10	Beresfield PM10	Wallsend PM2.5	Beresfield PM2.5
2003	18.1		19.1	6.6	6.2
2004	18.7		20.9	6.7	7.8
2005	18.2	21.6	20.3	6.5	6.8
2006	18.5	21.1	21.3	6.4	6.8
2007	17.3		20.4	5.8	6.3
2008	15.4	20.6	18.5	5.9	6
2009	26.7	31.3	28.7	8	8.6
2010*	14.9	18.7	16.6	4.7	6
2011	14.2	19.1	17.2	4.8	5.5
2012	14.9	20.6	21.4	5.1	8
2013		22.6	21.5	7.6	8.3
Average	**17.4**	**22.0**	**20.7**	**6.0**	**6.9**

*Note for Table 2: 2010 was chosen as the baseline year for T4 modelling.

PM2.5 Effects from T4

32. The existing levels of air quality shown in Table 2 above show that it is expected a current health burden from existing particle pollution would exist. Dr Richard Broome, deputy director for Environmental Health Branch of NSW Health applied the known risk function for PM2.5 to ambient air quality and estimated an annual disease burden of 25 deaths and 296 years of life lost due to PM2.5 exposure in greater Newcastle (public lecture, Newcastle, September 2013). This was based on a year with average PM2.5 of 5.7, which is considerably lower than 2012 or 2013.

33. Modelled effects of T4 on PM2.5 (Table 35, Preferred Project Report (PPR) Appendix O) showed that with a coal throughput of 70Mtpa, the predicted annual average PM2.5 increased by only 0.1 to 0.6µg/m^3. However, a major source of PM2.5 is the diesel burnt by locomotives. I believe the model shown in the PPR seriously underestimates the amount of PM2.5 that would be released, due to its use of the following inputs:

- The model includes only rail locomotives while they are within the T4 project area, the last 2 km of a 90 km journey. No consideration is given to locomotive emissions while hauling wagons along the rail corridor from the mines.

- It is assumed that each train carrying 7,200 tonnes will use two locomotives, while it is standard current practice for these trains to have three locomotives (Environ- Appendix A of Appendix O, page 73).
- My conversations with train drivers suggest that a two hour turnaround on Kooragang Island as modelled is overly optimistic, and that this often takes three or four hours.

34. Regional air quality for annual PM2.5 at Beresfield is already over the NEPM annual limit of 8µg/m^3. The current air at the suburbs around T4 is likely to be no better. In my opinion even if the increase is as small as claimed, the additional particulate matter will likely ensure that every year is over the NEPM standard for annual PM2.5. Expected health effects from this will be increased heart disease, lung cancers and increased total mortality.

PM10 Effects from T4

35. The modelling presented in Appendix O estimates the additional particulate air pollution exposure at 10 residential areas adjacent to the Kooragang industrial area. Increases in annual PM10 due to T4 range from 0.2 to 2.5µg/m^3. The EIS claims that the resultant cumulative air quality will be less than 30µg/m^3. There are three problems with this:

- The scientific evidence on air pollution effects means that the increase will have a detrimental effect on heart and lung health even within any standard.
- The 30µg/m^3 level is an outdated standard that will soon be lowered to 20µg/m^3.
- The baseline is unrealistically low. Baseline levels for the 10 residential areas are suggested to be between 17.6 and 19.6µg/m^3. In my opinion, this is not credible as the eight year average at Newcastle is 22.0 and at Beresfield is 20.7. Both those monitoring stations are considerably further from heavy industry than the modelled receptor suburbs.

<u>Table 26, from Appendix O: Predicted incremental and cumulative annual average PM10 concentrations- scenario 2 – 25Mtpa operations and construction with added columns</u>.

Locations	T4 only	Baseline	Cumulative	**Realistic baseline**	**Realistic cumulative**
RO1 Fern Bay	0.3	18.5	18.8	**21.4**	**21.7**
RO2 Stockton Hosp	0.4	18.9	19.4	**21.4**	**21.8**
RO3 Stockton N.	0.4	19.6	20.1	**21.4**	**21.8**
RO4 Stockton	0.2	17.6	17.9	**21.4**	**21.6**
RO5 Carrington	0.4	18.3	18.7	**21.4**	**21.8**
RO6 Mayfield E.	0.8	18.8	19.6	**21.4**	**22.2**
RO7 Mayfield	1.1	18.9	20.1	**21.4**	**22.5**
RO8 Mayfield W.	1.5	18.6	20.1	**21.4**	**22.9**

RO9 Warabrook	1.6	18.4	19.9	**21.4**	**23.0**
R10 Sandgate	2.5	18.8	21.2	**21.4**	**23.9**

36. Newcastle's air quality already exceeds the new annual standards for PM10, and the extra PM10 from construction and operations of T4 will make it more difficult for air quality to be brought down to the standard.

37. The PPR Table 5, page 17 of Appendix O 'Assessment of Air Quality' shows baseline air quality at the 10 modelled receivers with annual average PM10 of 17.0 to 17.7µg/m^3. This is notably below the observed ambient air quality as shown in table 2, with all Newcastle readings and most Beresfield readings above this level. The Appendix also notes that existing projects in the planning pipeline are likely to result in additional annual average PM10 are in the range of 0.7 to 2.6. The annual increase in PM10 from T4 are claimed to be in the range 0.2 to 2.2 with the application of extensive dust suppression techniques.

38. The PM10 releases from coal handling and stockpiling assume best practice dust suppression, however community faith in these measures is low as they may not be implemented once the plant is in operation (see Figure 1).

39. To quote Appendix O Executive Summary (Page 4).

    The dust management and monitoring measures set out in the EA for the project's construction and operations are appropriate for the modified design. These include best practice measures such as reactive / predictive air quality control system that incorporates real time particulate matter monitoring.

40. The air pollution control measures in Table 15, Appendix O mentions extra water spray on dusty days but does not include ceasing operations during extreme dusty conditions. Figure 1 below shows an existing Kooragang coal facility operating on 17 October 2013, a day with a strong dry westerly wind, carrying dust from operations to the close suburb of Stockton. On that day, EPA monitoring shows the 24 hour average PM10 upwind of the Kooragang coal loader at Wallsend was 50.7µg/m^3 and downwind at Fullerton St Stockton was 75µg/m^3. Existing practice by the proponent does not protect vulnerable adjacent residents. If T4 is allowed to proceed the license should include prompt cessation of operations when local dust monitoring indicates a problem, or when wind speed exceeds set thresholds.

Figure 1: Existing coal loader on Kooragang Island operating on 17 October 2013

Choice of Appropriate PM10 standard:

41. There is no annual PM10 level specified in the current NEPM, although the revised NEPM, released for public consultation on 31 July 2014, includes the standard of 20µg/m3. The NSW EPA Approved Methods for the Modelling and Assessment of Air Pollutants as revised in 2005, lists a compliance standard of 30µg/m^3 at any exposed receiver. This standard was decided on by the EPA in 1998, apparently because it matched the standard in California at the time. It was adopted in California in 1983, but subsequently revised to 20µg/m^3 in 2002. I have been unable to find any documented evidence as to why 30µg/m^3 should be considered adequate protection for human health in NSW. The World Health Organisation (**WHO**) standard for annual PM10 aligns with the Californian one at 20µg/m^3.

42. Although the modelling for T4, if correct, indicates compliance with an annual average of 30µg/m^3, this is an outdated standard and I expect the standard to be revised downwards during the years of operation of T4.

43. As mentioned, the draft NEPM includes a standard (subject to the outcome of consultation) for annual PM10 of 20µg/m^3.This is consistent with the WHO and current Californian standards. Assessed against this standard, Newcastle and Beresfield are already non compliant for 12 of the 18 annual average values shown in Table 1.

(4) In your opinion, is noise from the T4 Project likely to have negative impacts on human health? Please explain your reasons for this opinion.

Health effects of noise

44. Noise can cause serious health problems and is not just a nuisance. Most of the health impact is from night noise, with its associated sleep disturbance. Epidemiological evidence shows physiological effects from noise at 40dB and health effects from night noise from 40 to 55 dB (as shown in Table 3 from the WHO Night Noise Guideline (Hurtley 2009) reproduced below).

Average night noise level over a year $L_{night, outside}$	Health effects observed in the population
Up to 30 dB	Although individual sensitivities and circumstances may differ, it appears that up to this level no substantial biological effects are observed. $L_{night, outside}$ of 30 dB is equivalent to the no observed effect level (NOEL) for night noise.
30 to 40 dB	A number of effects on sleep are observed from this range: body movements, awakening, self-reported sleep disturbance, arousals. The intensity of the effect depends on the nature of the source and the number of events. Vulnerable groups (for example children, the chronically ill and the elderly) are more susceptible. However, even in the worst cases the effects seem modest. $L_{night, outside}$ of 40 dB is equivalent to the lowest observed adverse effect level (LOAEL) for night noise.
40 to 55 dB	Adverse health effects are observed among the exposed population. Many people have to adapt their lives to cope with the noise at night. Vulnerable groups are more severely affected.
Above 55 dB	The situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a sizeable proportion of the population is highly annoyed and sleep-disturbed. There is evidence that the risk of cardiovascular disease increases.

Table 3: Effects of different levels of night noise on the population's health

What is the appropriate noise standard?

45. The WHO recommended Night Noise Guideline for Europe is $L_{night, outside}$= 40 dB and the Interim Target of $L_{night,outside}$ = 55 dB.

46. The NSW draft planning guideline for wind farms specifies a maximum noise level of 35 dB at any residence, or 5 dB above background noise, with a stipulation that noise from existing wind farms is not counted as background noise.

47. The wind farm guidelines specifically disallow proposals to suggest that their individual proposal only adds a little to existing noise pollution from other wind farms. In contrast, the T4 noise analysis for the rail corridor relies on the argument that existing noise exceeds the target and T4 makes it only a little worse.

48. The ARTC "*guideline rail noise goals*" for 1m from the façade of any residence specifies a maximum noise level of 65 dB daytime and 60 dB at night[*]. Daytime is defined as 7am till 10pm, and night from 10pm till 7am.

49. From a health perspective, noise is noise regardless of the source and there should be one standard for noise pollution from industrial sources. Once the average night noise level is more than 55 dB, there will be an increasing burden on the affected population. I believe that the appropriate standard to reduce adverse health effects is at most the WHO interim night noise standard of 55 dB.

Rail corridor noise

50. Daytime noise already exceeds the ARTC 65 dB goal at houses within 110m of the rail line. The increased train movements required by T4 are predicted to increase average noise levels by 0.5 to 2 dB, which would increase the noise affected zone to 130m.

51. Night time noise exceeds the ARTC goal of 60 dB currently out to a distance of 320m and T4 would increase this to 370m.

52. The ARTC goal is not based on an assessment of health effects, but is an estimate of what they hope is possible.

53. The WHO standard follows health principles based on assessment of observable health effects and is a more suitable basis for interpreting the future health impact of developments.

54. The WHO standard for night noise is $55dB_{L\ night\text{-}outside.}$ The additional trains to supply T4 increases the noise affected zone to 655m on both sides of the rail line, greatly increasing the number of people expected to be adversely impacted by night noise.

55. Generally speaking, noise drops off 6dB for each doubling of distance, which is applicable to a point source such as a single piece of machinery. A line source

[*] This information is taken from Environmental Protection Licence 3142. These are average noise levels, so daytime is LAeq(15 hr) and night time LAeq(9hr) which means : Level A weighted equivalent, averaged over 15 hours, measured outside rather than inside residences

such as a continuously full road drops off at only 3dB per doubling of distance. In the T4 modelling, the point source equation has been used. In my opinion, this is a conservative assumption as a rail line has features of both a point source and a line source. Mathematically expressed the noise drop in decibles = 20 x log (far/near).

Operational noise

56. According to the Noise Assessment at Appendix L to the PPR, Fern Bay and Stockton will have night noise 3dB above the project specific noise limit (PSNL) when stage three of this proposal and the adjacent Kooragang Coal Terminal stage are operating together under certain weather conditions. The modelling presented indicates that there is an existing night time industrial noise problem for these suburbs around Kooragang Island, and that T4 will not be heard above the din. It is my opinion that noise impacts need to be considered collectively to ensure that noise receptors are not exposed to ever increasing amounts of noise.

(5) In your opinion, are there human health impacts (other than any discussed above) that are likely to arise from the T4 Project? If so, please explain your reasons for this opinion

(6) Provide any further observations or opinions which you consider to be relevant from a health perspective, having regard to the circumstances of this matter.

57. I am not aware of any other health effects than those discussed above and I have no other observations to make.

References

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