BEFORE A BOARD OF INQUIRY
EAST WEST LINK PROPOSAL

IN THE MATTER of the Resource Management Act 1991 (**RMA**)

AND

IN THE MATTER of a Board of Inquiry appointed under s149J RMA to consider notices of requirement and resource consent applications made by the New Zealand Transport Agency (**NZTA**) in relation to the East West Link roading proposal in Auckland.

SUMMARY OF EVIDENCE OF DR BRUCE WILLIAM LANG GRAHAM FOR MERCURY NZ LIMITED
Air Quality
DATED 31 JULY 2017

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Summary of evidence

1. Mercury NZ Limited (**Mercury**) holds a current implemented regional air discharge consent which authorises the release of contaminants, including nitrogen oxides (**NOx**), into air from thermal power station activities (**Southdown Power Station**) at Mercury's Southdown site (**Southdown Site**). When operating, the Southdown Power Station was a significant source of NOx for the Auckland region, although motor vehicle emissions are by far the largest source.[1]

2. Mercury's air discharge permit includes conditions which provide that certain effects should not occur beyond the boundary of Mercury's site at Hugo Johnston Drive. The proposed East West Link proposal will pass through that site, which raises the potential for users of the new road and shared pathway to be adversely affected by the power station emissions. On the basis of modelling assessments carried out for the Southdown Power Station in 2012, I do not currently believe that the effects of NOx emissions from the Southdown Power Station on road/shared pathway users would be significant.

The East West Link proposal would make it more onerous for holders of existing air discharge permits to renew, or vary, those permits

3. Conversely, the proposed changes to the roading network in and around the Southdown Site would definitely result in changes to background air quality. In particular, a significant portion of the traffic currently using Nielsen St, Church St and Great South Rd would be relocated to the southern side of the area bounded by those roads, which would lead to an increase in background NOx levels in the Southdown area when winds are blowing from the south or south-west.

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[1] As set out in paragraph 17 of my evidence, in 2012, when the Southdown Power Station was operating, at a regional level, the Southdown Power Station emissions were estimated to account for about 4.5% of total annual NOx emissions across the whole of Auckland, while motor vehicles were responsible for about 75% of the total.

4. In my opinion, this would mean it would be more onerous for Mercury, and other businesses which currently have consented discharges in the area, to renew or vary their air discharge permits.

5. I understand that, following Ms Needham providing evidence, the Board of Inquiry has asked for further clarification as to why I hold this opinion. I provide that clarification at paragraphs 9-27 below.

Concerns in relation to dust and asbestos

6. Dust from the construction of the East West Link could have significant adverse effects on equipment and structures at the Southdown Site.

7. There are also public health and safety concerns around the NZTA's proposal to remediate an area in Hugo Johnston Drive which is known to be contaminated with asbestos. Further, it is highly likely that asbestos will be discovered at other sites disturbed by the East West Link project that are not currently identified as contaminated sites.

8. I understand that discussion on these two issues has progressed since I prepared my evidence. At paragraphs 28-31 below, I briefly set out my opinions in the context of where discussions on those issues have now reached.

Clarification of my concern regarding the effect of the East West Link proposal on existing consent holders' ability to renew, or vary, their air discharge permits

9. In Mercury's case the air quality effects of the East West Link will have to be considered whenever it decides to re-start the Southdown Power Station. This is because general condition 1 of Mercury's air discharge consent requires that:

> *… No alterations shall be made to the plant or processes that do not, or are not likely to, comply with the provisions of this consent, …*

10. As set out in James Flexman's evidence, to restart the power station (without the East West Link being constructed in the location NZTA currently proposes) Mercury would need to (1) procure and install 3 gas turbine engines; (2) replace the steam injection system (for NOx control) for two of the gas turbine

units with a high pressure water injection system; and (3) install a water treatment plant for those two gas turbine units. Under condition 1 of Mercury's air discharge permit, a revised assessment would be necessary to confirm that the effects of the emissions from the plant with those changes made would remain within the envelope of effects provided for under the discharge consent. On the basis of the proposed changes, I expect that this would be so.

11. If any further changes were required for the Southdown Power Station to re-start due to the East West Link being situated in the location NZTA currently proposes, those changes would also need to be assessed to determine whether or not the effects of emissions from the plant would remain within the envelope of effects allowed by the existing air discharge permit.

12. The maximum allowable concentration of nitrogen dioxide (**NO_2**) under the New Zealand National Environmental Standard for Air Quality (**NES**) is 200 $\mu g/m^3$ (as a 1-hour average).

13. When Mercury applied to renew its air discharge consent for the Southdown Site in 2012, a dispersion modelling assessment showed that the maximum ground level concentrations of NO_2 as a result of emissions from the Southdown Power Station would account for up to 33% of the 200 $\mu g/m^3$ NES limit (i.e. 33% x 200 = 66 $\mu g/m^3$).

14. Auckland Council has a series of default background levels for NO_2 that it requires consent applicants to include in their modelling assessments.[2] Different default levels are applied to different parts of the region, and for most of the Auckland urban area the default level is 75 $\mu g/m^3$ (1-hour average). The only exceptions are for sources located within 150 metres of a regional arterial road or within 300 metres of a motorway or strategic arterial, for which a site-specific background assessment is required.

15. When the Mercury consent was renewed in 2012 the Southdown Power Station site was considered to be in the general Auckland urban area for the

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[2] Auckland Council, 2014. Use of Background Air Quality Data in Resource Consent Applications. Auckland Council Guideline Document No. 2014/01.

purposes of a background determination. Adding the 66 µg/m^3 maximum ground level concentration for NO_2 determined for the power station discharges to the 75 µg/m^3 default background level gave a total impact of the Southdown Power Station of 71% of the NES limit (66 + 75 = 141 µg/m^3 = 71% of 200 µg/m^3). This was considered acceptable by Auckland Council for the purposes of renewing the Southdown Power Station air discharge consent.

16. I should note here that as a general principle, individual discharges should not be permitted to utilise the full allowance for air quality in any area. In other words, they should not be allowed to discharge up to 100% of the level allowed under the NES. This is especially so for the Auckland urban area where there can be numerous competing demands (current and potential) on the air resource. In my view the 71% impact of the Southdown Power Station was very close to the limit of acceptability for an individual source within the Southdown area.

17. The development of the East West Link would introduce a significant change to the above situation in that the Southdown Power Station site would be reclassified as being within 150 metres of a regional arterial road. As a result, if the East West Link proposal was constructed where NZTA currently proposes, the background determination would have to be based on a site-specific assessment in any future assessment of the discharges from the power station. The most effective way of doing this assessment would be with real-time monitoring data collected in the vicinity of the Southdown Site.

18. Of course, one might try to argue that monitoring is not really necessary because the default background levels are conservative (i.e. intentionally set at a high level) and there is information available from other Auckland locations that shows what we might expect for the Southdown Site. However, there are difficulties with that approach as I will explain, using the Otahuhu Study (referred to in Technical Report 9 to the NZTA's applications) as an example.

19. The maximum NO_2 concentrations measured at a monitoring station next to State Highway 1 in the Otahuhu Study was 80.8 µg/m^3 (1-hour average) and the maximum concentrations measured at another monitoring station 150 metres to the east of SH1 was 54.9 µg/m^3 (1-hour average). These results could be adjusted to allow for the projected differences in traffic volumes

between SH1 and the East West Link[3], and also the differences in the proportion of heavy vehicles projected to use those roads.[4] However, the other necessary adjustment that cannot easily be made, is for the effect of the proposed intersection between Hugo Johnston Drive and the East West Link. That will result in much higher NO_2 concentrations than those that would be measured at an equivalent motorway site with free-flowing traffic.

20. There are also difficulties in determining the proportion of the peak roadside monitoring results that should be incorporated into the assumed background. I stated in paragraph 21 of my evidence that the peak impacts from the Southdown Power Station and the East West Link would occur under markedly different meteorological conditions. That is correct. But I should possibly also have said that there will be other weather conditions intermediate between the two extremes when the discharges from the two sources will combine to a significant extent. The combined effect of the two sources will be less than the sum of the two maxima but there is no easy way of estimating the actual level of the combined effect. The most effective way to determine that would be by combining the modelling results for the Southdown Power Station with real-time results collected from a monitoring site located generally in the vicinity of both the power station and the road.

21. Another aspect that might be considered here is the relative magnitude of the Southdown Power Station emissions and those predicted for the East West Link, and how that relates to the potential effects at ground level. As stated in my evidence, the total mass emission rate of NOx from the Southdown Power Station was around 4.6 tonnes per day, when operating at full load. By comparison, Ms Needham indicated that the NOx emissions from the East West Link in the vicinity of the Southdown site would be only around 8 kilograms per day[5], although I am not sure as to how she arrived at that figure.

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[3] Approximately 120,000 vpd on SH1 versus 30,000 vpd on the East West Link.

[4] Approximately 5% heavy vehicles on SH1 versus 11% on the East West Link.

[5] C. Needham, hearing summary statement, paragraph 8.

22. Whatever the actual difference between the two sources, it has to be related to the potential effects of the emissions at ground level. The Southdown Power Station emissions will be dispersed for distances of up to about 5 kilometres away from the source, which has the effect of significantly reducing the potential ground level effects in any specific location. By comparison, roadway emissions are only dispersed over a distance of several hundred metres so the potential reduction in ground level effects will be much less.

23. It is not appropriate to simply combine the information given in the previous two paragraphs to draw a conclusion about the relative ground level effects of the two sources. In reality these will vary markedly from one location to another with, for example, the roadway contributions being more significant closer to the road. Once again, the most effective way to quantify the relative contributions would be through a combination of modelling and monitoring.

Conclusions on the need for air monitoring

24. If the East West Link proposal was constructed where it is currently proposed, Mercury would have to assess whether or not any operational changes it makes at the Southdown Site would require formal variation of the consent (in accordance with condition 1 of its consent). To do so, it would need to know the background concentration of NO_2 with the East West Link in place. Auckland Council might not be willing to apply the default background concentration of 75 $\mu g/m^3$ (1-hour average), and a site-specific background determination would be required, using air monitoring.

25. If NZTA is not required to undertake air quality monitoring, Auckland Council is likely to require Mercury, and/or any other nearby businesses, when seeking to renew or vary their air discharge permits, to incur the costs of undertaking monitoring to determine the levels of NO_2 present with the East West Link in place. In effect, this would require those applicants to bear the costs of determining the effects of the East West Link project on the current air quality.

26. In my opinion, this is background monitoring that Auckland Council would be unlikely to require if it were not for the East West Link proposal. Therefore, if consent is granted for the East West Link, I consider that it would be

appropriate for NOx monitoring in the area to be carried out by NZTA as part of that proposal.

27. Further, at the air quality expert witness caucusing, on 26 May 2017, all the air quality experts, including Ms Needham, agreed that there would be benefits in undertaking localised NOx monitoring for the Onehunga/Southdown area.

Air quality conditions to address Mercury concerns

28. I understand that following cross-examination of Ms Needham and Ms Hopkins, the Board has directed the planning witnesses for Mercury and NZTA to undertake planning caucusing to develop site specific conditions to address Mercury-related issues.

29. In my opinion those conditions need to:

    (a) provide for measures to be adopted to avoid, as far as practicable, the effects of dust on equipment and structures at the Southdown Site;

    (b) identify contingency measures to address verified effects on Mercury assets in the event of a dust process malfunction or an accidental dust discharge; and

    (c) require NZTA to undertake air quality monitoring as discussed above.

Effects of work involving asbestos on people who are not NZTA workers

30. I was present at the Board of Inquiry hearing when Mr Bickers raised questions with Ms Needham as to whether asbestos issues would be adequately covered by the requirements of Health and Safety at Work legislation. I believe that this is true in relation to any NZTA workers (including contractors) who would, for example, be appropriately trained and required to wear personal protective equipment while working with contaminated materials.

31. However, Mercury's concern relates to the potential effects on people offsite (i.e. people who are not NZTA's workers) who would not be similarly protected. I continue to be of the opinion that it would be valuable for the general construction management plan required under NZTA's proposed conditions to include some level of information on how the effects of works involving

asbestos on the wider environment (including people) will be addressed. Inclusion in the general construction management plan would help to ensure that information on the potential risks of, and the proposed control measures for, asbestos were more readily available to all parties involved with the overall works programme, rather than just those working on the site remediation activities.

Bruce William Lang Graham

31 July 2017