

Air Quality – Implications of New WHO Air Quality Guidelines

Submissions on behalf of North Somerset Council

1. Dr Broomfield explained in his proof of evidence that:
 - a. The Human Health chapters of the ES (CD2.5.42) and ES Addendum (CD2.20.1 Chapter 9) do not present a full picture of health impacts of the proposed development due to increases in air pollution, since they do not recognise that adverse health impacts arise even at levels below current air quality standards and objectives¹.
 - b. There is well established evidence that establishes that harm to human health is caused at levels of exposure lower than UK air quality limit values/standards².
 - c. The proposed development would give rise to increases in air pollution, and as a result, increased harm to human health.
 - d. The proposed development would be contrary to national and development plan policy because it does not deliver an improvement in health.
2. Mr Pyper in his evidence on behalf of BAL relied upon the air quality impact assessment and explained that³

“I accept that there is some increase in emissions of air pollutants and consequently some increase in risk to health. I do not accept that this results in a significant population level health effect.”
3. Mr Pyper’s view was based upon his understand that exposure to ground level concentrations below air quality objectives/standards represents exposure to levels of pollution which “are acceptable in terms of their effect on population health”⁴.
4. On the 22nd September 2021 the WHO has now published its new Air Quality Guidelines 2021. The document explains that:

“The overall objective of the updated global guidelines is to offer quantitative health-based recommendations for air quality management, expressed as long- or short-term concentrations for a number of key air pollutants. **Exceedance of the air quality guideline (AQG) levels is associated with important risks to public health.**”⁵
5. Thus, the WHO has concluded that exposure to ground level concentrations at levels above the AQG levels in the 2021 Guidelines results in an “important risk to public health” arising.

¹ Broomfield Proof para 70

² For example Broomfield proof para 37, 76 (NO₂), 86 (PM_{2.5})

³ Pyper proof pdf p 39 para 5.2.29

⁴ Pyper proof para 4.3.39-42

⁵ WHO Air Quality Guidelines 2021 p 17(pdf) internal p. xv

6. The AQG levels are set out in Table 0.1 of the WHO Air Quality Guidelines 2021⁶. In respect of NO₂, PM₁₀ and PM_{2.5} the AQGs are markedly lower (i.e. more demanding) than the UK AQO. As a result, and on a basis which is consistent with Dr Broomfield's evidence to the Inquiry, the WHO Guidelines establish that exposure to ground level concentrations at or below the UK Air Quality Objectives/Standards will give rise to "important risks to public health". This further supports Dr Broomfield's evidence (para 124) that "the proposed development would give rise to increases in air pollution. While these increases do not result in new exceedances of existing air quality standards/objectives, they would nevertheless constitute a worsening of air quality, and would result in increased health burdens for the local population."

Methodology

7. The significance criteria adopted by the applicant are explained in the ES CD2.5.20 page 44 Table 8D.11. This requires combining the percentage the process contribution of a limit value with the percentage of total emissions of that same limit value. In essence the higher both percentages are the greater the level of significance
8. BAL's methodology in the ES/ESA compares the PC and PEC against UK Air Quality Objectives which are significantly above the levels which the WHO Guidelines 2021 indicate are the threshold for the onset of important risks to public health. The assessment methodology used in the ES/ESA adopts the approach set out in Guidance by IAQM/EPUK. It involves comparing the PC and PEC against an Air Quality Assessment Level (AQAL). The IAQM guidance explains at paragraph 6.32

"One advantage of this approach is that it avoids the need for individual pollutants to have their own tailored method of assessment. Since air quality standards are set on the basis of harm, it is reasonable to assume that the degree of harm is represented by the margin by which the AQAL is exceeded."

9. The IAQM approach is thus intended to enable the assessment of the significance of changes in ground level concentrations by reference to the risk to human health such changes present. While the IAQM guidance envisages that air quality objectives, EU limit/target values or Environment Agency guidelines should be used as AQALs, this guidance predates the update to the WHO Guidelines which have significantly advanced our understanding of the risks to human health posed by air pollution. On this basis, in addition to the assessment presented in the ES/ESA, it is relevant to rework the methodology by applying the WHO Guidelines 2021 AQGs as the AQALs since these are thresholds above which important risks to human health arise.
10. If BAL's methodology is reapplied comparing the PC and PEC against the relevant WHO Guidelines 2021 AQGs a very different conclusions as to significance of impacts are reached.

Nitrogen Dioxide

11. The annual mean AQG for nitrogen dioxide is 10 µg/m³ compared the UK annual mean limit value of 40 µg/m³. BAL has forecast the ground level concentrations of NO₂ in 2030, with a

⁶ WHO Air Quality Guidelines 2021 p19(pdf) internal p. xvii

summary of results in the ESA CD22.1 page 100 Table 7.1 and full results in the ESA CD22.5 Table 7A.1.

12. The process contributions identified in these Tables (i.e. the contribution the development would make to environmental concentrations of NO₂) range from -0.56 to 3.1 µg/m³. As a percentage of the WHO AQG of 10 µg/m³ this means a range of between -5.6% and 31%. Of the 385 receptors listed, 63 have a percentage of PC against the WHO AQG of above 10%.
13. The predicted total contributions (PEC) identified in these Tables (i.e. the total ground level concentration from all sources including the proposed development) range from 5.1 to 29.03 mg/m³. As a percentage of the WHO AQG of 10 mg/m³ this means a range of between 51% and 290%, with 212 of the 385 receptors listed having a PEC above 100% of the WHO AQG. The total ground level concentrations with the proposed development at 31 receptors are predicted to be more than twice the WHO AEG threshold. This means that the level of exposure to NO₂ at many locations will be significantly above a level which the WHO Guidelines represents an important risk to health.
14. In BAL's methodology, where the PEC contribution is above 110% and the PC contribution 1.5% or above, BAL's methodology identifies a substantial impact at this location. 151 of the 385 receptors examined accordingly are forecast to experience a substantial impact when the methodology is reapplied using the health based AQG identified by the WHO for annual mean NO₂ levels.

PM10

15. The annual mean AQG for PM10 is 15 µg/m³ compared to the UK annual mean limit value of 40 µg/m³. BAL has forecast the annual mean exposure to PM10 with the proposed development in 2030, with a summary of results in the ESA CD2.21 p103 Table 7.2 and full results in the ESA CD22.5 Table 7A.2.
16. The process contributions identified in these Tables range from -0.40 mg/m³ to 0.81 mg/m³. As a percentage of the WHO AQG this represents ranges from -2.7% to 5.4%. Of the 133 receptors, 5 have PC contributions of 2% or more.
17. The PEC identified in the table ranges from 10.6 to 17.38 mg/m³. As a percentage of the WHO AQG of 15 mg/m³, this represents a range of 71% to 116%. 15 out of 133 receptors have PECs at levels of 100% of the WHO AQG or above. Thus predicted ground level concentrations of PM10 at 15 out of 133 locations are predicted to be above a level which WHO Guidelines represents as an important risk to health.
18. The criteria in ES CD2.5.20 page 44 Table 8D.11 were used by the applicant to identify where a moderate to substantial impact will arise. 15 of the 133 receptors would experience at least a moderate impact when the methodology in the ESA is reapplied using the health based AQG identified by the WHO for annual mean PM10 levels.

PM2.5

19. The annual mean AQG for PM2.5 is 5 µg/m³ compared to the 25 µg/m³ AQAL adopted in the ESA. BAL has forecast the annual mean exposure to PM2.5 with the proposed

development in 2030, with a summary of results in the ES CD2.21 p104 Table 7.3 and full results in the ESA CD22.5 Table 7A.3.

20. The process contributions identified in these Tables range from -0.22 µg/m³ to 0.49 µg/m³. As a percentage of the WHO AQG this represents ranges from -4.4% to 9.8%. Of the 133 receptors, 44 would have PC contributions of 2% or more. The PEC levels range from 6.7 to 10.15 µg/m³ i.e. a PEC percentage ranging from 135% to 203%. In other words, with the proposed development in place at 2030 all of the receptors will experience ground level concentrations above the level that WHO Guidelines identifies as giving rise to an important risk to health.
21. In BAL's methodology, where the PEC contribution is above 110% and the PC contribution 1.5% or above, BAL's methodology identifies a substantial impact at this location. 58 of the 133 receptors examined are forecast to experience a substantial impact, and a further 54 to experience a moderate impact, when the methodology is reapplied using the health based AQG identified by the WHO for annual mean PM_{2.5} levels.

Conclusions

22. The WHO Guidelines provide further confirmation that the proposed development will give rise to an increase in important risks to public health compared to the position if planning permission were refused. This is entirely supportive of the approach identified by Dr Broomfield in his evidence but is entirely contrary to the approach adopted by BAL which has been directed to the question of compliance with existing limit values.
23. As a result, it can be concluded that the proposed development would give rise to an increase in important adverse risks to the health of those living around the airport which have not been demonstrated to be mitigated to acceptable levels. The WHO Guidelines therefore reinforce the conclusion that the proposed development is contrary to national aviation policy, the NPPF and Policies CS3, CS23 and CS26 of the Core Strategy.

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