BCA Insight

Bristol Airport Limited

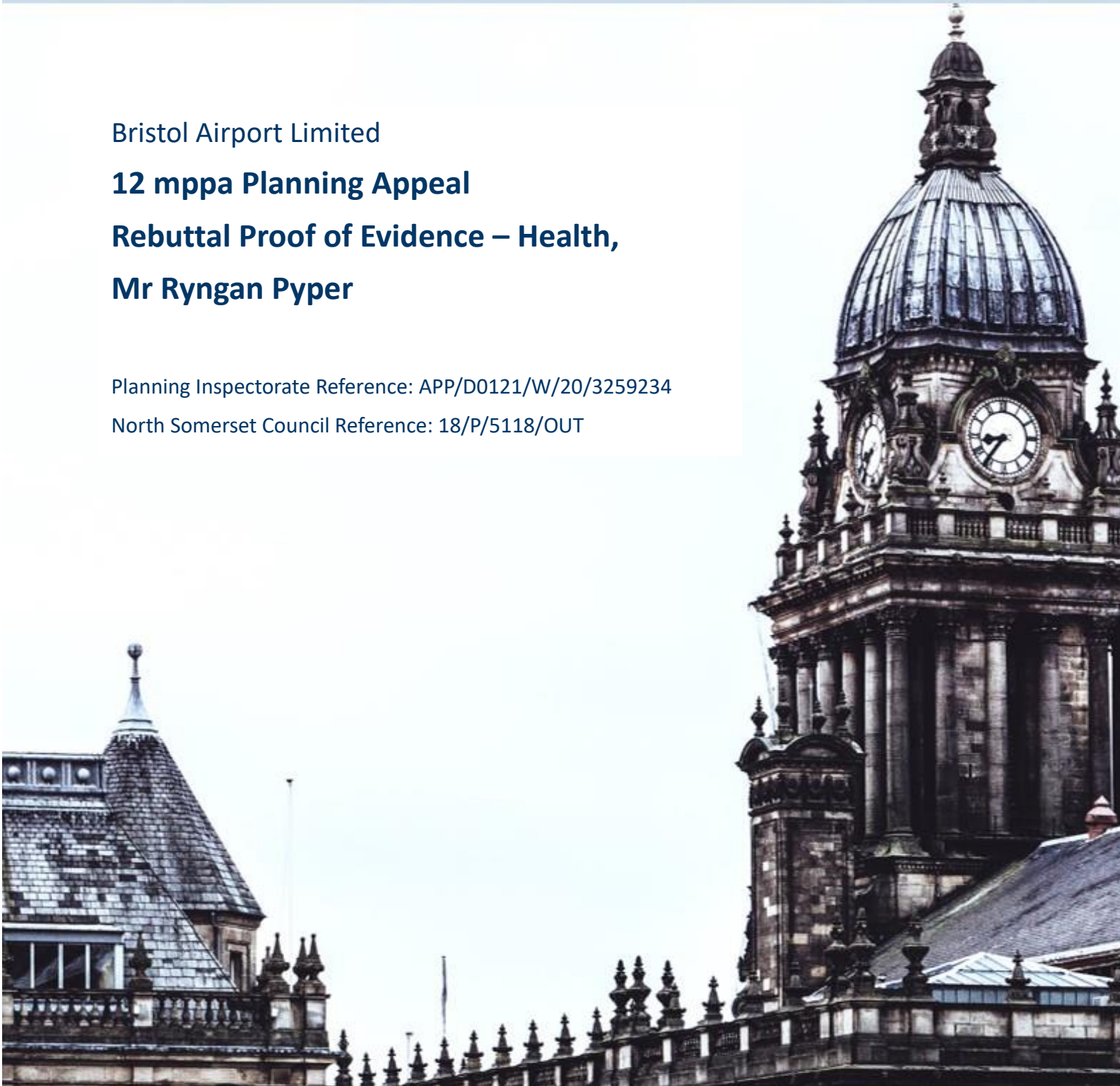
12 mppa Planning Appeal

Rebuttal Proof of Evidence – Health,

Mr Ryngan Pyper

Planning Inspectorate Reference: APP/D0121/W/20/3259234

North Somerset Council Reference: 18/P/5118/OUT



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Prepared by BCA Insight Ltd
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1 Introduction

1.1 Qualifications and Experience

1.1.1 My name is Ryngan Pyper. I am a Director at BCA Insight Ltd and a specialist in delivering health related impact assessments. I work across the fields of public health, environmental science and impact assessment. I am the author of, and on the writing teams for, key academic and practitioner publications on health in Environmental Impact Assessment (EIA)[1,2,3,4]. In my public health training I specialised in epidemiology, health statistics, public health ethics, infection & disease, health & social behaviour, and qualitative methods. A full account of my qualifications and expertise is included in my main Proof of Evidence (POE).

1.2 Scope of Evidence

1.2.1 This Rebuttal relates to an appeal, made by BAL pursuant to Section 78 of the Town and Country Planning Act 1990, against the decision of North Somerset Council (NSC) on 19 March 2020 to refuse planning application reference 18/P/5118/OUT for the development of Bristol Airport to accommodate 12 mppa.

1.2.2 Given the absence of a NSC POE dealing specifically with the public health aspects of the Appeal Proposal, my Rebuttal is limited to specific public health related points made in the POE of Mr Fiumicelli (noise) and Dr Broomfield (air quality) on behalf of NSC.

1.2.3 My Rebuttal references health assessment detail, on the Appeal Proposal, in two previously published documents:

- Chapter 16 of the ES included with the planning application, dated December 2018 (CD2.5.42); and
- Section 9 of the ESA to the ES, dated November 2020 (CD2.20.1).

1.2.4 It also references my main POE on health.

1.2.5 My Rebuttal is structured as follows:

- Section 2.1: responds to points made in the Evidence of Mr Fiumicelli; and
- Section 2.2: responds to points made in the Evidence of Dr Broomfield.

1.3 Summary

1.3.1 In this rebuttal I respond to a number of points made by Mr Fiumicelli in relation to noise and health. The following points summarises Mr Fiumicelli's contention that the ES and ESA conclusions are 'unsafe', and my summary response:

1) Mr Fiumicelli says the assessment has been based solely on an average noise metric. I show this is not the case and that an appropriate and proportionate range of supplementary indicators have been used.

2) Mr Fiumicelli says there has not been an evaluation of the direct cardiovascular effects of noise on health. I show that the EIA health assessment has taken cardiovascular effects into account as part of a qualitative assessment and that this is an appropriate and reasonable level of assessment.

3) Mr Fiumicelli says that there being greater health risk with the Appeal Proposal on its own makes the conclusion that there are not significant adverse effects from noise unsafe. I show that even with a small increase in risk factors it is reasonable to conclude that significant adverse population health effects are unlikely.

1.3.2 Mr Fiumicelli also contends that the ES and ESA conclusions are 'over optimistic'.

4) Mr Fiumicelli says an increase in the number of people experiencing noise above the Significant Observed Adverse Effect Level (SOAEL) in itself constitutes a significant effect. I show that even with the increase in the number of people experiencing noise above the SOAEL it is reasonable to conclude that significant adverse population health effects are unlikely. I show that treating the SOAEL as a hard threshold that triggers a significant population health effect does not reflect the actual change in population health outcomes that would be expected when the SOAEL is experienced by a small minority of the population and the relative change in noise levels is small.

5) Making a similar point, Mr Fiumicelli says that for the effects to be 'acceptable' there cannot be an increase in the size of the population experiencing noise above the SOAEL. I show that the change can, in public health terms, be considered acceptable even with an increase in the size of the population experiencing noise above the SOAEL. I note how the health assessment methods address 'acceptability' as part of 'significance'. I show that acceptability for population health has a wider context than just the SOAEL.

6) Mr Fiumicelli says that when considering noise effects in isolation, this would not contribute to improving the health and wellbeing of the local population. I show that taking one determinant of health in isolation to make this judgement is inappropriate.

1.3.3 In relation to air quality, I also respond to the POE of Dr Broomfield.

7) Dr Broomfield says that the ES and ESA have not recognised the non-threshold effects on nitrogen dioxide (NO_2) and fine particulate matter ($PM_{2.5}$). I show that such effects are clearly discussed and have informed the precautionary conclusions of the health assessment.

8) Dr Broomfield says that when considering air quality effects in isolation, this would not contribute to improving the health and wellbeing of the local population. I show that taking one determinant of health in isolation to make this judgement is inappropriate.

9) Dr Broomfield says that there has not be a cumulative assessment of noise and air quality effects on health. I show that such an assessment was part of the ES and ESA.

2 NSC Case

2.1 Evidence of Mr Fiumicelli

Whether average noise levels are the sole metric of the assessment

2.1.1 The POE of Mr Fiumicelli states (para 10.3) that the ES and ESA significance conclusion are unsafe because:

> *Use of the LAeq,T metric is appropriate, but <u>not as the sole metric</u> against which to assess the significance of noise effects.* [emphasis added]

2.1.2 As set out in my POE (para 4.3.20) the key metrics from the noise analysis to illustrate the population health issues are the size of population exposed to noise levels above which adverse effects on health and quality of life can be detected (LOAEL); or the level above which significant adverse effects on health and quality of life occur (SOAEL). Furthermore, in paragraph 5.2.17 of my POE I confirm that in

addition to the average noise exposure metric, which is the correct policy requirement, other supplementary indicators, including the potential to be highly sleep disturbed and Single Event Level (SEL), have been used to provide context to the changes (see ES para 7.1.5 to 7.1.22).

2.1.3 Whilst the LAeq,T metric is the one referenced in the ES health chapter and ESA health section it is not the sole metric against which the significance of health effects from noise have been assessed.

2.1.4 It is my opinion that the EIA health analysis has had sufficient quantitative metric input from the EIA noise assessment to understand the scale and nature of the change in noise due to the Appeal Proposal. The qualitative health analysis has been able to make a reasonable judgement on the likely population health consequence of such a change. That judgement would be unlikely to change as the result of additional metrics.

2.1.5 In addition to quantitative noise metrics the health assessment conclusions on significance have also been informed by other evidence sources, including scientific evidence, the baseline, local health priorities and the health policy context. This is set out in my main Health POE (sections 4.3 and 4.4).

2.1.6 The POE of Mr Fiumicelli (para 6.78) references the Leeds Bradford Airport EIA for its use of an additional awakenings metric. Paragraph 10.3.89 of that Leeds Bradford Airport ES notes that the Additional Aircraft Noise Objective Awakenings metric "*is considered an additional factor as it does not currently underpin policy making*".

2.1.7 As average noise metrics are not the sole basis of assessment, the absence of additional supplementary metrics, above and beyond those considered, is not a valid reason to suggest that the ES and ESA conclusions are unsafe.

Whether there has been a cardiovascular outcome evaluation

2.1.8 The POE of Mr Fiumicelli states (para 10.3) that the ES and ESA significance conclusion are unsafe because:

> *Established direct impacts of aviation noise on health such as cardiac effects, stroke, hypertension etc. are not evaluated in either the ES or AES noise or human health chapters.* [emphasis added]

2.1.9 Mr Fiumicelli references the EIA health chapter and ESA health section, indicating that he has read them. Mr Fiumicelli does not refute the findings of the health assessment. Mr Fiumicelli limits his response to noting that the methods could have included a further level of assessment of cardiovascular health outcomes. This is not a policy requirement and was not requested by NSC at the scoping stage. The absence of a request for such analysis in the NSC Scoping Opinion indicates that having reviewed the EIA health methods such additional analysis was considered not to be necessary.

2.1.10 The NSC Scoping Opinion (page 16) confirmed that "*The scope and methodology of the health section is generally satisfactory…*". The Scoping Opinion's sole direction was that there be additional reference to noise impacts on health and wellbeing strategies. Such additional references were included as confirmed in ES table 16.2. NSC's March 2020 Committee Report states:

> *"Chapter 16 of the ES examines the impact of the proposed development on human health and wellbeing. It is referred to as a 'Health Impact Assessment' (HIA)…. To assess the HIA, officers consulted with Public Health England (PHE) and the Council's Public Health Team. PHE are a statutory consultee for HIAs and has the expertise to advise on its acceptability. PHE's comments on the application show that it considers that the HIA has been carried out in accordance with good practice and its methodology and scope to assess the likely impacts on health and wellbeing is proportionate to the proposed development."* [emphasis added]

2.1.11 Notwithstanding these points that establish that the scope and methods are acceptable, I would also point out that the health assessment has evaluated cardiovascular health in reaching its conclusions.

2.1.12 Cardiovascular health is a broad term that covers cardiac effects, stroke and other conditions. Hypertension (high blood pressure) is one of many risk factors for cardiovascular disease.

2.1.13 A qualitative assessment of cardiovascular health effects is part of the analysis in the ES health chapter and ESA health section. A qualitative assessment is valid, as noted in the EUPHA/IAIA publication[4] (para 7.2.19):

> *"The consideration of likely significant health effects requires a statement on the way in which a change in a determinant of health can be expected to lead to a change in health outcomes e.g. respiratory health or mental well-being. EIA health analysis should therefore, where possible, describe the predicted health outcomes. This can be qualitatively or quantitatively and should refer to existing scientific evidence."* [emphasis added]

2.1.14 The ES health chapter (para 16.11.13) states the health outcomes most relevant to the assessment include "cardiovascular health". The ES health chapter evaluation of sensitivity (para 16.11.20) takes into account cardiovascular outcomes. The health assessment goes on to consider the scientific literature establishing a link between noise and cardiovascular effects (para 16.11.21), before reaching a conclusion that takes account of the direct impacts of aviation noise on cardiovascular health (para 16.11.22):

> *"The conclusion of the assessment for human health is that the significance of the effect would be negligible for the general population and up to minor adverse (not significant in EIA terms) for vulnerable groups (described above in relation to sensitivity). The conclusion reflects that whilst a low magnitude of change is expected due to the Proposed Development (compared to the future baseline position), the effects would be experienced across a wide area. The small increase in exposure for much of the local population is unlikely to result in a significant population health effect (i.e. not a moderate or high significance score), but equally should not be seen as a negligible effect for those groups more vulnerable to the effects of noise. The operational noise effects should be considered long-term, making an incremental addition to population risk factors for sleep disturbance, cardiovascular outcomes and learning outcomes (at one school). It is noted that the baseline conditions are likely to already be resulting in such influences on health outcomes. In population health terms the change due to the Proposed Development is unlikely to be discernible.* [emphasis added]

2.1.15 The equivalent statement in the ESA is made at paragraph 9.5.19:

> *For noise, the main potential health outcomes are cardiovascular health, mental health conditions (e.g. stress, anxiety or depression), sleep disturbance and cognitive performance in children. The Proposed Development results in a larger population being adversely affected by noise, mainly due to increased night-time noise from airborne aircraft. In the context of existing levels of daytime and night-time noise (due to existing noise issues and the permitted changes that would occur without the Proposed Development), the changes due to the Proposed Development are small. In population health terms, the change due to the Proposed Development is unlikely to be discernible. The operational noise effects should be considered long-term, making an incremental addition to population risk factors for sleep disturbance, cardiovascular outcomes and learning outcomes.* [emphasis added]

2.1.16 Mr Fiumicelli presents the counterpoint to his own argument at paragraph 4.47 of his POE as to why it would not be appropriate or proportionate to undertake a quantitative analysis of cardiovascular outcomes:

> *However, because of the intrinsically relatively low normal incidence of cardiovascular disease in the general population irrespective of noise exposure such quantitative assessments are only possible on large population sizes i.e. several 100,000s of persons, preferably millions. Consequently, it would not be possible to make a meaningful quantitative assessment of the risk to the comparatively few persons the AES recognises will be exposed to increases in aviation noise of more 63 dB LAeq,16 hr or the persons the ES recognises will be exposed to aviation noise of more than 55 dB Lnight.* [emphasis added]

2.1.17 Although WebTAG is raised by Mr Fiumicelli as a quantitative approach, there is no policy requirement to undertake a WebTAG analysis on this application and this was not requested by NSC. WebTAG is a method to quantitatively monetise health impacts. It is best applied to strategic policy level option appraisals rather than at the project level. It is my view that such an analysis would not be proportionate, and I consider it unlikely that such an assessment would change the conclusions of the health assessment.

2.1.18 The EUPHA/IAIA publication, setting good practice for assessing health significance in EIA states:

> *The narrative may be supported by quantitative health methods for those occasions where:*
>
> ● *robust exposure-response functions obtained from high quality epidemiological studies are established;*
>
> ● *effect size and population size make this appropriate; and*
>
> ● *it is proportionate to undertake such analysis.*
>
> *There are a number of concerns and caveats with the use of quantitative methods to estimating potential health effects in the context of project-level impact assessment (90). Firstly, not everything that can be quantified is important and not everything that is important can be quantified. Secondly, while various quantitative methods are available to estimate many health outcomes, they may not be readily applicable within EIA. This is because of the validity implications of applying methods usually employed at the population level, i.e. to large populations, to smaller populations that are affected by a project. Furthermore, there are resource requirement considerations, e.g. cost, time and expertise, that can render the applications of quantitative methods for the estimation of health effects disproportionate to the potential project-related effects.*
>
> *While there are examples of EIAs that included quantitative estimates of health effects, these are the exceptions to the norm.* [emphasis added]

2.1.19 Another valid reason for not singling out cardiovascular health outcomes for quantification within the health assessment is that the scientific evidence base does not establish reliable dose response relationships that would allow for a quantitative measure to be calculated for each of the other determinants of health discussed by the assessment. Not being able to reliably quantify (say) the economic health benefits, on a similar measure to noise or air quality, means there is no way to determine the overall balance of beneficial and adverse effects on an equivalent basis. Furthermore, cardiovascular outcomes may also be beneficially affected by the improved active travel elements of the Appeal Proposal (see ES para 16.11.25) and by the economic benefits facilitating healthier diet and undertaking more physical activity (see ES para 16.11.36). Quantifying only the noise related

influences on cardiovascular outcomes would provide an incomplete picture of population health outcomes.

2.1.20 The health assessment draws on the quantitative measures as appropriate to inform and illustrate a purposefully qualitative judgement because this allows a consistent methodology across determinants of health. This provides a balanced conclusion, with significance for each determinant of health determined on an equivalent basis. This is the established good practice approach advocated by EUPHA/IAIA.

2.1.21 As the scope and methods of the health assessment are acceptable and there has been an evaluation of the cardiovascular effects of the Appeal Proposal on health, the contention that the ES and ESA conclusions are unsafe due to the absence of such an assessment, is incorrect.

Whether increased risk equates to a significant population health effect

2.1.22 The POE of Mr Fiumicelli states (para 10.3) that the ES and ESA significance conclusion are unsafe because, in relation to the cardiovascular effects of noise:

> *[the] … attendant risks of direct health effects of aircraft noise are greater for the 12 MPPA scheme than for 10MPPA.* [emphasis added]

2.1.23 In response I note that a change in 'risk', in itself, is not a determination of whether there is a significant population health effect.

2.1.24 The ES health chapter and ESA health section are both clear that significant population health effects are unlikely; and that this takes into account that the operational noise effects of the Appeal Proposal are likely to make an incremental addition to population risk factors for outcomes such as sleep disturbance and cardiovascular outcomes.

2.1.25 In my POE (para 4.2.47) I make the point that a change in risk factors "*is a statement about how the project affects the probability of a change in health outcomes*".

2.1.26 Furthermore, I point out in my POE (para 5.2.9) that only a proportion of those experiencing a change in risk factors are likely to experience a change in health outcomes.

2.1.27 Figure 4 'Severity of Effects and Numbers of People Affected' (page 45) of Mr Fiumicelli's POE makes this point also. Showing that the great majority of people experience outcomes of low severity and that a risk factor change does not in itself mean a change in the most serious health outcomes.

2.1.28 I also note that Figure 4 of Mr Fiumicelli's POE places 'sleep disturbance' in the lowest category of outcome severity. The EIA health assessment gives sleep disturbance more weight than this.

2.1.29 The ES and ESA assessments show that the small change in risk, including for cardiovascular outcomes, is not likely to give rise to a significant population health effect.

2.1.30 That there is likely to be a small change in risk, in and of itself, is not a valid reason to suggest that the ES and ESA conclusions are unsafe.

Whether an increase in the number of people experiencing noise above the SOAEL equates to a significant effect.

2.1.31 The POE of Mr Fiumicelli states (para 10.4), that the ES and ESA significance conclusion are unsafe because the Appeal Proposal would:

> *Increase the number of people experiencing significant adverse and adverse impacts on health and quality of life from air noise …* [emphasis added]

2.1.32 I address this point in my main Health POE (para 5.2.22). I also spend time in my main POE (section 4.2) explaining that health in EIA takes a population health approach.

2.1.33 That there is an increase in the number of people above the SOAEL does not, in itself, mean that there is a significant adverse population health effect due to the Appeal Proposal.

2.1.34 In my main POE I set out why it is reasonable to conclude that it is unlikely that there would be a significant population health effect. This includes discussion of population extent; it also includes discussion of the change in numbers of aircraft movements and in sound levels relative to the future baseline.

2.1.35 The POE of Mr Fiumicelli confirms the view that noise thresholds are not clear-cut levels against which to judge the start or end of health outcomes (para 4.56):

> *…there is no specific level that represents a precise threshold at which annoyance starts or at which the proportion of the population reacting negatively makes a step change.*

2.1.36 That there is an increase in the number of people above the SOAEL is, in and of itself, is not a valid reason to suggest that the ES and ESA population health conclusions are unsafe. The following paragraphs reiterate points made in my main POE as to why this is the case.

2.1.37 In my main POE (Section 4.2) I explain that, in terms of population extent, effects to a small minority of the population should be discussed and be a focus for mitigation; but are indicative of not giving rise to significant population health effects, as indicated by PHE[5] and EUPHA/IAIA[4] methods.

2.1.38 It is my view that noise policy aims to avoid exposing populations to levels of noise that would give rise to widespread adverse health effects. The situation is less clear-cut when only a minority, in this case a small minority, of the population is exposed to the threshold level. In these circumstances widespread adverse health effects in the population are unlikely. The policy aim is therefore achieved even with some exceedances of the noise threshold. The threshold is thus not the only consideration.

2.1.39 Relative to the population[*] the increase of 150 dwellings (c.450 people) at the SOAEL is a small minority (para 4.4.17 of my main POE). As I note in my main POE (para 5.2.9), within this affected population a smaller sub-population, the 'vulnerable group population', would be sensitive to noise effects. Within this sub-population only a proportion would be expected to experience a change in risk factors and, of these, only a proportion experience a change in health outcomes. Effects would be further avoided or reduced as all the 150 dwellings would be eligible for the improved noise insulation grant scheme.

2.1.40 To treat the SOAEL as a hard threshold where population health effects become significant with a small number of exceedances would not reflect the actual change in population health outcomes that would be expected. Due to variability in subjective responses to noise, significant adverse health effects have the potential to occur well below any reasonable value selected for SOAEL. My main POE (para 4.2.6) notes this potential as a societal burden inherent to all development and planning decisions. In its application, SOAEL can therefore only be a guide to greater potential for health effects within a population. If the SOAEL is experienced by all, or the majority, of a population the potential

[*] ES para 16.11.14 sets out the operational noise population groups, these includes the 'site-specific' population and the 'local' population. ES para 4.3.3 states that the 'site specific' population baseline references North Somerset 013D Lower Layer Super Output Areas (LSOA) and North Somerset 013B LSOA. Based on 2011 statistics these two LSOAs had a population of 2,617 people (ES Appendix 16B Table 16.15). This is a conservative population comparator as effects are spread over the wider area of the ES Noise chapter air noise assessment area (illustrated in ES Figure 7.6). The ES health chapter 'local population' relates to North Somerset Unitary Authority, which based on the 2011 statistics, had a population of 202,566 people.

for a significant adverse population health effect is high. If the SOAEL is experienced by a small minority of a population the potential for a significant adverse population health effect is more limited. In these circumstances additional context is informative.

2.1.41 The relative change in noise levels has informed my judgement (see para 4.4.17 of my main POE). For all dwellings, including those above the SOAEL, the noise level change between the 2030 10 mppa and 12 mppa scenarios is described by the ESA noise assessment as negligible, see ESA Appendix 6A: Noise and Vibration Supporting Data Table 6A.63 (CD2.20.4). This is indicative of a very low change in average exposure.

2.1.42 As noted in my main POE (para 4.4.15) the forecast change in night-time aircraft movements in 2030 with the Appeal Proposal equates to an additional three arrivals and four departures (ESA Table 6.18) per night. The changes do not commence before 23:30. All changes in departures are after 06:00. There would be no change in the noisiest aircraft (para 5.2.20 of my main POE). This is indicative of a small scale of change.

2.1.43 As noted in my main POE (para 5.2.18), the ESA indicates that in terms of the number of people potentially highly sleep disturbed there is an increase of around 100 people (see ESA Table 6.11). Effects would be similar to the 2017 baseline and peak effects of current consented growth to 10 mppa. The actual number are likely to be less, as this does not account for the expected benefits of the noise insulation grant scheme. The indicator shows that a small minority of people may be sleep disturbed by the existing airport activity and that the great majority of these people would continue to be sleep disturbed with or without the Appeal Proposal. This is indicative of only a slight change in the population health baseline.

2.1.44 Given the consensus that there are not precise thresholds at which health effects occur or show step changes, experiencing an average change of about 2dBs or less, even if this takes levels above the value selected for SOAEL, does not in itself represent a trigger for significance population health effects. In the context of population health effects, SOAEL can be viewed as a point at which there is the potential for significant population health effects. Careful consideration then has to be given to contextual factors including the proportion of the population exposed, the sensitivity of the population affected and the relative change in noise levels and sound characteristics.

2.1.45 As the affected population extent is a small minority; appropriate targeted mitigation would reduce effects, including having regard to inequalities; and the relative change is described as negligible, it is my professional judgement that in public health terms a significant change in population health would be unlikely.

2.1.46 I find the change in noise level to be negligible for the general population and minor adverse for vulnerable groups. These conclusions acknowledge that there would be a small change in health-related risk factors for a small minority of the population. In public health terms this is not an unacceptable level of change in risk factors in the context of other noise sources and other influences on population health. It is thus not a significant change. My conclusion that the effect is not significant aligns with that of NSC Officers, who took advice from the Council's Public Health Team and Public Health England.

2.1.47 Based on the above, it is my professional opinion that an increase in the number of people above the SOAEL is, in and of itself, is not a valid reason to suggest that the ES and ESA conclusions are unsafe.

Whether for an effect to be 'acceptable' there must be no increase in the size of the population experiencing noise above the SOAEL

2.1.48 The POE of Mr Fiumicelli states (para 10.4), that the ES and ESA is overly optimistic because the Appeal Proposal does:

> *Not ensure that impacts are reduced to an <u>acceptable</u> level since the population adversely impacted by noise <u>increases</u>, including those experiencing noise above SOAEL…* [emphasis added]

2.1.49 Mr Williams discusses the SOAEL levels relevant to aircraft noise and the noise insulation grant scheme, which alongside the noise controls, should be considered acceptable mitigation. Mr Melling discusses the planning balance.

2.1.50 The European Commission define 'acceptability' as an element of EIA 'significance' (see para 4.2.7 of my main POE). The discussion above of the relationship between population extent and significance is therefore also relevant to this linked point on 'acceptability'.

2.1.51 The Noise Policy Statement for England (NPSE)[6] (CD 10.4) paragraph 2.4 acknowledges that there is a level of "*noise burden to place on society*". It also seeks to provide direction for decision makers as to what is 'acceptable'. This includes through the vision to "*promote good health and quality of life*" (NPSE para 1.6). NPSE para 2.15 notes that the terms 'promote' and 'good' both recognise that acceptability cannot be tied to a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations.

2.1.52 This means a professional judgement has to be made as to what is appropriate in the circumstances of a given project. In the main this is the selection of appropriate SOAEL thresholds as discussed by Mr Williams. The health assessment also responds to NPSE paragraph 2.9 that emphasises that noise depends not only "*the physical aspects of the sound itself, but also the human reaction to it*".

2.1.53 In relation to the 'human reaction' I have made points about how population health may change to variable degrees depending on the sensitivity and proportion of the population exposed at the SOAEL (paras 2.1.31 to 2.1.47 above). Those paragraphs explain that an increase in the population experiencing noise above SOAEL is, in itself, not sufficient to determine if there would be a significant population health effect.

2.1.54 Similarly in relation to the 'physical aspects of the sound itself' I have made points above about: the small relative change in noise levels; the low frequency of additional noise events at night; and there being no change in the loudest noise event. These are also relevant context indicative of limited potential for significant, and thus unacceptable, population health effects.

2.1.55 As I explain in my POE (section 4.2) the determination of population health significance is a professional judgement informed by a range of criteria and evidence sources. I explain that the health assessment has, in line with good practice, considered 'acceptability' of the potential health effects. This discussion of 'acceptability', as part of determining significance, makes reference to the relevant health policy context, regulatory standards and consultation responses. Specifically in my main POE (para 4.3.36) I note that with mitigation and control measures implemented, the changes due to the Appeal Proposal are assessed as meeting relevant standards; and the health policy context of NSC raises expectations in relation to achieving 'acceptable' noise levels through mitigating and monitoring.

2.1.56 In my main POE (para 5.2.7) I explain that I find the change in noise level to be negligible for the general population and minor adverse for vulnerable groups. These conclusions acknowledge that there would be a small change in health-related risk factors for a small minority of the population. In public health terms this is not an unacceptable level of change in risk factors in the context of other noise sources and other influences on population health. It is thus not a significant change. My conclusion that the effect is not significant aligns with that of NSC Officers, who took advice from the Council's Public Health Team and Public Health England.

2.1.57 In my professional opinion the ES and ESA conclusions are reasonable and are not 'overly optimistic' in reaching conclusions on acceptability in the context of an increase in the population experiencing noise above SOAEL.

Whether considering noise effects in isolation is sufficient to establish if there is an improvement in the health and wellbeing of the local population

2.1.58 The POE of Mr Fiumicelli states (para 10.4), that the ES and ESA is overly optimistic because the Appeal Proposal does:

> *Not contribute to improving the health and well being of the local population; rather it contributes to a reduction in health, well-being and quality of life of the local population…* [emphasis added]

2.1.59 The phrasing chosen by Mr Fiumicelli is identical to that of NSC Reason for Refusal (RFR) 2, suggesting this is linked point. RFR2 states:

> *"…the proposed development would not contribute to improving the health and well-being of the local population contrary to policies CS3, CS23 and CS26 of the North Somerset Core Strategy 2017."* [emphasis added]

2.1.60 An identical policy point was made in the NSC SOC in relation to air quality, as expanded upon in the POE of Dr Broomfield.

2.1.61 I have covered this narrow application of NSC policy in my POE on Health (paras 5.2.26 to 5.2.31).

2.1.62 I add that the phrasing "*contribute to improving the health and wellbeing of the local population*" appears only in the NSC Core Strategy specifically in the context of Health Impact Assessment (HIA) (policy CS26). NSC Committee Report of 10 February 2020 (page 129) confirms that the ES Health chapter is the HIA in this case. The Core Strategy explanatory text (Core Strategy para 3.320) specifically states that it is the HIA that is the "*tool used to assess how development proposals will contribute to improving the health and wellbeing of the local population*" including identifying both the "*potential health gains and potential risks to health*". Core Strategy para 3.320:

> *"Health Impact Assessments are an important tool used to assess how development proposals will contribute to improving the health and wellbeing of the local population and end users of the scheme. Public authorities and developers alike increasingly need to consider how policies, strategies or developments will impact on health and health inequalities. A Health Impact Assessment can identify the potential health gains and potential risks to health and help to identify additional measures to reduce or avoid these risks. This policy requires Health Impact Assessments to be submitted with applications for all major development within the district."* [emphasis added]

2.1.63 I do not accept that the statement that the Appeal Proposal will 'not contribute to improving the health and well-being of the local population' can fairly, or helpfully, be determined on one measure, in this case noise. It is my view that this policy test can only be usefully explored based on the overall balance of effects from the Appeal Proposal, including giving more weight to those effects that are shown to be significant. As show in section 4.3 for the ES, and confirmed in section 4.4 for the ESA, the economic beneficial effects of the Appeal Proposal are likely to be moderate and extend to the population level; whist the adverse environmental exposures are incremental in their level of change and limited to a small minority. On balance the Appeal Proposal is likely to contribute to improving the health and well-being of the local population more than it detracts from it.

2.1.64 This remains my opinion and applies to both Mr Fiumicelli and Dr Broomfield's narrow usages of the NSC policy test as more generally set out in RFR2.

2.1.65 Indeed, the point is made in the POE of Mr Fiumicelli at paragraph 6.87 that:

> *… the residual impacts [from noise should be] weighed against the social and economic benefits of the noise generating scheme.*

2.2 Evidence of Dr Broomfield

Whether the health assessment recognises non-threshold health effects

2.2.1 The POE of Dr Broomfield states (para 70):

> *I am concerned that 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 does* [sic] *not recognise that adverse health impacts arise even at levels below current air quality standards and objectives.* [emphasis added]

2.2.2 This is incorrect. The health assessment has clearly stated that it recognises that adverse health impacts arise even at levels below current air quality standards and objectives. I address this point in my main POE (para 4.3.47 to 4.3.54).

2.2.3 The ES Health chapter states (para 16.11.10, bullets 1 and 4):

> *"The scientific literature summarised in Appendix 16A indicates evidence from sufficiently high-quality studies to support an association between air pollutants (including NO_2, PM_{10} and $PM_{2.5}$) due to aviation, airport and surface access sources of the Proposed Development and health and wellbeing effects. Whilst the literature supports there being thresholds set for health protection purposes, it also acknowledges potential for non-threshold health effects (i.e. when there is no known exposure threshold level below which adverse health effects may not occur, including for NO_2 and $PM_{2.5}$)… ;" [emphasis added]*
>
> *"Relevant regulatory standards are summarised in **Appendix 16A**. Based on the **Chapter 8: Air Quality**, assessment findings, with mitigation and control measures implemented, the operational emissions of the Proposed Development would be within statutory requirements (UK AQOs), including for NO_2. The Government define these air quality standards as concentrations recorded over a given time period, which are considered to be acceptable in terms of what is scientifically known about the effects of each pollutant on health and the environment.[53] Recognising the non-threshold nature of some air pollutants the assessment has had regard to WHO guide values (but does not hold the Proposed Development to WHO guide values where they are more stringent than UK AQOs);*
> [emphasis added]

2.2.4 The ES Health chapter Appendix 16A states in relation to the scientific evidence (para 16.1.11):

> *For both fine particulate matter ($PM_{2.5}$) and NO_2 there is no identifiable threshold below which there is no risk to health[14,15].*

2.2.5 The ESA health section states (para 9.5.13):

> *"The conclusion reflects the UK Government view that compliance with UK Air Quality Objectives demonstrates an acceptable level of health protection[75] and that these air quality protection measures are produced in the knowledge that particular groups within a population will have particular health vulnerabilities. The minor adverse (rather than negligible) score for vulnerable groups represents a conservative assessment on the basis of scientific uncertainty (and emerging evidence) about non-threshold health effects of NO_2 and $PM_{2.5}$. This is a public health acknowledgement of the incremental contribution to air pollution that the Proposed Development would make, but also recognition that, at the project level, this should not be considered a significant effect on population health.*
> [emphasis added]

2.2.6 In my main POE (section 4.2) I explain good practice methods for determining the significance on population health effects. This includes acknowledging tensions between the scientific literature and regulatory standards. The EIA health assessment acknowledges the scientific evidence for non-threshold health effects of certain air pollutants but also gives weight to the Government's clearly stated statutory position on what constitutes an acceptable level of air pollution in health protection terms.

2.2.7 As stated in my main POE (para 4.3.41) the UK Air Quality Objectives (AQOs) are derived from, and are numerically identical to, the UK Air Quality Standards.

> *UK Government, Department for Environment, Food and Rural Affairs, Definitions:* [7]
>
> *Air Quality Standards are concentrations recorded over a given time period, which are considered to be acceptable in terms of what is scientifically known about the effects of each pollutant on health and on the environment.* [emphasis added]

2.2.8 The POE of Dr Broomfield states (para 77 in relation to NO_2 and para 87 in relation to $PM_{2.5}$):

> *As a result, from the perspective of adverse health impacts it is not sufficient to conclude that because air quality standards or objectives are met with the proposed development, that there would be no adverse health impact arising from the development.* [emphasis added]

2.2.9 This point, that there would be some health effect but not a significant population health effect, is specifically made in the ESA health section para 9.5.13 (quoted above).

2.2.10 I am clear that the ES Health chapter and ESA health section both recognise and take into account the non-threshold nature of NO_2 and $PM_{2.5}$ when concluding that there would not be significant adverse population health effects due to the Appeal Proposal. It is incorrect to suggest this is not the case.

Whether considering air quality effects in isolation is sufficient to establish if there is an improvement in the health and wellbeing of the local population

2.2.11 The POE of Dr Broomfield states (para 78 in relation to NO_2 and para 88 in relation to $PM_{2.5}$):

> *While it is not possible to quantify the precise extent of these increased risks, the information provided with the application demonstrates that the development would result in an increase in risks to health, contrary to the requirements of national aviation and planning policy, and Policies CS3, CS23 and CS26 of the North Somerset Core Strategy 2017.* [emphasis added]

2.2.12 This point is further explored, in the narrow context of just air quality, in the POE of Dr Broomfield, para 133 states:

> *…One key aim of [Core Strategy policy CS26] is to identify the potential health gains that could result from new development. However, the application does not consider or identify gains that could be made in relation to the air quality impact of the proposed development. I conclude that the proposed development does not achieve the policy objective of CS26.*

2.2.13 The point, that there would be a very small increase in risks but not a significant population health effect, and that this has been taken into account by the health assessment, is made in the ESA health section para 9.5.13 (quoted above).

2.2.14 I disagree that such a small increase in risk is contrary to planning policy. If that viewpoint was accepted, then very few developments would be permitted. I explain in my main POE (paras 5.2.24 to 5.2.31) that taking a single determinant of health, in this case air quality, as the sole basis for the policy

test is inappropriate. I make the further point (paras 2.1.60 to 2.1.64 of this Rebuttal) that NSC policy specifically refers to this being a matter for the HIA taking into account both the beneficial and adverse health effects of a proposal.

2.2.15 The ES health chapter and ESA health section have considered both the beneficial and adverse population health effects of the Appeal Proposal. As show in section 4.3 for the ES, and confirmed in section 4.4 for the ESA, the economic beneficial effects of the Appeal Proposal are likely to be moderate and extend to the population level; whist the adverse environmental exposures are incremental in their level of change and limited to a small minority. On balance the Appeal Proposal is likely to contribute to improving the health and well-being of the local population more than it detracts from it.

Whether there has been a cumulative assessment of health effects

2.2.16 The POE of Dr Broomfield states (para 98):

> *…the assessment does not consider whether the combined effects of factors such as increased air pollution and noise could result in an impact which is greater than the individual effects. In the absence of any such assessment, and in the light of the increase in air pollution and associated health effects resulting from the proposed development, I conclude that there remains the potential for inter-related effects on the health of the local population due to the proposed development.* [emphasis added]

2.2.17 I confirm in my main POE (para 4.3.11 and paras 5.2.44 to 5.2.47) that cumulative effects for human health are reported in ES Chapter 18: Cumulative Effects Assessment. This includes assessment of the combined air quality and noise effects to population health from the Appeal Proposal, including to vulnerable groups. ESA paragraph 11.3.2 updates this assessment.

3 References

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