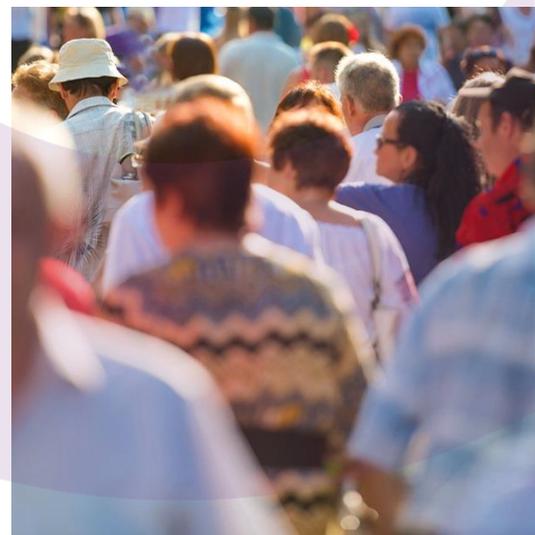
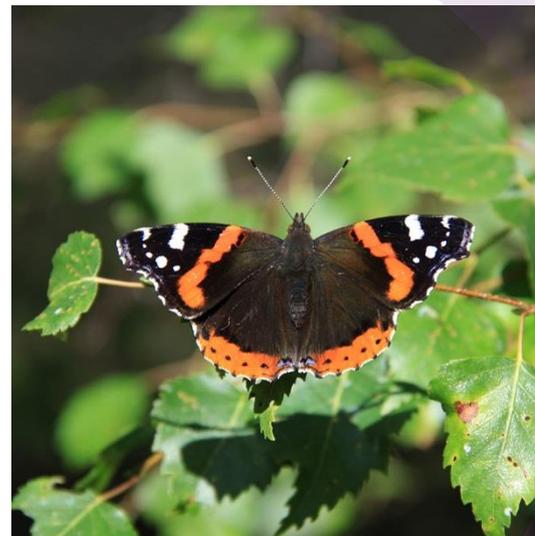




Bristol Airport Limited

12 mppa Planning Appeal

Proof of Evidence — Air Quality,
Martin Peirce



Report for

Bristol Airport Limited

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Glossary of abbreviations

Table 1.1 Glossary of abbreviations

Abbreviation	Explanation
APU	Auxiliary Power Unit
AQAL	Air quality assessment level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Standard
ASAS	Airport Surface Access Strategy
BAL	Bristol Airport Limited
COMEAP	Committee on the Medical Effects of Air Pollution
CS	North Somerset Core Strategy 2017
CURED	Calculator Using Realistic Emissions for Diesels
Defra	Department of the Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emission Factors Toolkit
EPUK	Environmental Protection UK
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESA	Environmental Statement Addendum
GSE	Ground Support Equipment
HIA	Health Impact Assessment
IAQM	Institute of Air Quality Management
IES	Institution of Environmental Sciences
LAQM	Local Air Quality Management
mppa	Million passengers per annum
NPPF	National Planning Policy Framework
NO ₂	Nitrogen dioxide

Abbreviation	Explanation
NO _x	Oxides of nitrogen: nitrous oxide (NO) + NO ₂ collectively
NSC	North Somerset Council
PCAA	Parish Councils Airport Association
PHE	Public Health England
PM	Particulate matter, PM ₁₀ or PM _{2.5}
PM ₁₀	Particulate matter smaller than 10 µm in diameter
PM _{2.5}	Particulate matter smaller than 2.5 µm in diameter
PSDH	Project for the Sustainable Development of Heathrow
SAC	Special Area of Conservation
SAF	Sustainable Aviation Fuel
SOCG	Statement of Common Ground
UFP	Ultrafine particulate
WHO	World Health Organization
µg m ⁻³	Microgram per cubic metre

1. Introduction

1.1 Qualifications and experience

- 1.1.1 My name is Martin Peirce. I hold the Degree of Bachelor of Science in Mathematics with Astronomy (Upper Second Class Honours) from the University of Leicester and the Degree of Master of Science in Non-linear Mathematics from the University of Bath. I am a member of the Institution of Environmental Sciences (IES) and a member of the Institute of Air Quality Management (IAQM) and am bound by their codes of conduct.
- 1.1.2 I am a Principal Consultant at Wood, an environmental and engineering consultancy. I have worked as an environmental consultant for 30 years, most of that time specialising in air quality. In 1998, I worked on the environmental assessment for the public inquiry into Heathrow Terminal 5, and since then much of my career has been working on air quality assessments for many airport developments, including at Heathrow, Gatwick, Stansted, Manston, Luton and Bristol. I have also led and worked on air quality assessments in the energy, industrial and residential sectors. These assessments have often involved carrying out dispersion modelling studies to determine and assess the impacts of proposed developments on air quality.
- 1.1.3 I led the air quality assessment in respect of Bristol Airport Limited's (BAL) application to develop Bristol Airport to accommodate 12 million passengers per annum (mppa) (the Appeal Proposal) and drafted the air quality chapters of the Environmental Statement (ES) and Environmental Statement Addendum (ESA).

1.2 Scope of evidence

- 1.2.1 This Proof of Evidence 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. Specifically, my evidence concerns matters relating to the air quality effects of the Appeal Proposal in response to issue d) for the appeal and NSC's reasons for refusal.
- 1.2.2 Details of the air quality assessment for the Appeal Proposal have previously been given in four documents:
- Chapter 8 of the ES included with the planning application (CD2.5.19 and CD2.5.20);

- A technical note, of 2 April 2019, that responded to a Regulation 25 request for further information from NSC and comments from consultees in response to the planning application;
- A further technical note, of 11 April 2019, that responded to a Regulation 25 request for further information from NSC concerning the impacts of road traffic beyond the original study area (CD3.4.10); and
- An addendum (ESA) to the ES, of November 2020, that presented an updated assessment using later data (CD2.20.1).

1.2.3 In this proof, I address the Reasons for Refusal given by NSC in its Decision Notice, and other comments by NSC and Rule 6 parties, where they relate to air quality in their respective Statements of Case. To do this, I draw out, discuss and clarify key points from the documents listed above. My proof is structured as follows:

- Section 2: My response to the Reasons for Refusal;
- Section 3: A summary of the legislative and policy context;
- Section 4: A summary of the assessment presented in the ES and ESA;
- Section 5: My response to issues raised by NSC and other parties; and
- Section 6: My conclusions.

1.2.4 A separate summary of my proof has also been provided.

1.2.5 My evidence solely relates to the air quality impacts of the operational phase of the Appeal Proposal in as much as it has the potential to affect human health. My evidence does not address the resulting effects on population health (evidence on which will be given by Mr Pyper). Air pollution can also affect ecological receptors, and these are addressed in the ES and ESA, but ecological effects have mostly not been raised in the Reasons for Refusal, Statement of Case, or other representations, so I have not addressed them in my evidence, except in my response to one comment from the Parish Councils Airport Association (PCAA). Similarly, my evidence does not address the construction phase, including any dust impacts, of the Appeal Proposal. It has been agreed by NSC in the Statement of Common Ground (SOCG) that air quality effects on ecological receptors and impacts from the construction phase are not significant.

1.2.6 My evidence is true, is my professional opinion and is given in accordance with the codes of conduct of the IAQM and the IES. Inter alia, these require me to maintain professional integrity at all times and be guided by the principle of applying the most appropriate science/practice for any

given task. They require me to display objectivity and refrain from being selective or partial when presenting data or facts for a written report or in oral form, and to have full regard for the public interest at all times.

1.3 Summary of evidence

1.3.1 In my proof, I respond to the Reasons for Refusal and issues raised by NSC and Rule 6 parties in the Statements of Cases and elsewhere. Their principal arguments are that the air quality impacts, and the residual health effects of the Proposed Development are not acceptable and are not compliant with national and local policy.

1.3.2 In my proof I show, by reference to the ESA and to established guidance, that:

- The air quality impacts of the Appeal Proposal are small and are not significant, in accordance with widely accepted criteria;
- Overall air quality will remain at acceptable levels even with the Appeal Proposal;
- The assessment is robust and uncertainty about aircraft fleet forecasts and the year at which 12 mppa will be reached will not change the material conclusions of the assessment;
- The assessment addresses the pollutants agreed at the scoping stage, but also provides an indication of the likely impacts on ultrafine particulate (UFP) concentrations;
- The Appeal Proposal includes embedded mitigation to reduce the air quality impact of the development, and additional mitigation will be committed to under a planning condition; and
- The Appeal Proposal is fully consistent with national and local policy requirements to manage and improve air quality within a context of sustainable airport growth.

2. Reasons for Refusal

2.1.1 Of NSC's reasons for refusal (CD4.16) of the planning application for the Appeal Proposal, the second refers to air quality and is reproduced below:

2.1.2 *"The noise and impact on air quality generated by the increase in aircraft movements and in particular the proposed lifting of seasonal restrictions on night flights would have a significant adverse impact on the health and well-being of residents in local communities and 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.”

2.1.3 NSC’s Statement of Case expands on this, making the following claims:

- BAL’s case fails to address the broader national and local policy agenda of needing to reduce the impact of the airport on air quality;
- The Appeal Proposal will not contribute to improving the health and well-being of the local population, as it will result in an increase in emissions of nitrogen dioxide (NO₂) and particulate matter (PM) even taking mitigation into account, and even low levels of exposure to air pollutants may present the risk of harm to health;
- The air traffic forecasts are subject to significant uncertainty; and
- The potential impacts of increases in UFP should be considered.

2.1.4 In this proof, I will address these issues and clarify and confirm the results of the air quality assessment reported in the ES, Regulation 25 responses and ESA. The air quality assessment provides a detailed and robust assessment of air quality impacts, as was agreed by NSC’s officers in their report on the application. The ESA demonstrates that the air quality impacts of the Appeal Proposal, although not negligible, are small, and are not significant in Environmental Impact Assessment (EIA) terms. I will show that the Appeal Proposal is compatible with planning policy in relation to air quality.

3. Legislative and policy context

3.1 General context

3.1.1 The legislative, regulatory and policy context has been set out in the ES (Section 8.3) and the ESA (Section 7.2). The only significant change that has occurred since the ESA was published is the publication of the Government's Ten Point Plan for a Green Industrial Revolution (November 2020)¹ (CD8.8), discussed in **Section 3.2** below, so the full details of other legislation and policy are not repeated in this document.

3.1.2 However, it is worth reiterating the key criteria against which the air quality impacts of the Appeal Proposal have been assessed. The Air Quality Standards Regulations 2010² (CD8.3) impose a duty on the Secretary of State to meet certain limit values (commonly referred to as Air Quality Standards, AQS), based on the limit values set in the (then applicable) EU Ambient Air Directive³. Air Quality Objectives (AQOs) are set in the Air Quality Strategy⁴ (CD8.2) and are a keystone of the Local Air Quality Management (LAQM) framework under which local authorities are expected to deliver compliance with the AQOs. Both AQSs and AQOs are concentrations of pollutants which should not be exceeded, when averaged over a certain period of time (and sometimes with a permitted number of periods which may exceed that level). As far as the pollutants and concentrations considered in this evidence are concerned, AQOs and AQSs are numerically the same.

3.1.3 The criteria of greatest relevance for this evidence are the following AQOs and AQSs:

- NO₂: annual mean concentration of 40 µg m⁻³ (micrograms per cubic metre);
- Particulate matter smaller than 10 µm in diameter (PM₁₀): annual mean concentration of 40 µg m⁻³, and daily mean concentration of 50 µg m⁻³ not to be exceeded more than 35 times a year; and

¹ HM Government (2020) The Ten Point Plan for a Green Industrial Revolution: Building back better, supporting green jobs, and accelerating our path to net zero. <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>

² The Air Quality Standards Regulations 2010. Statutory Instrument 2010 No. 1001, [online]. Available at: <http://www.legislation.gov.uk/ukSI/2010/1001/contents/made>.

³ Official Journal (2008). Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe, [online]. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0050>.

⁴ Department for Environment, Food & Rural Affairs (2007). The air quality strategy for England, Scotland, Wales and Northern Ireland: Volume 1, [online]. Available at: <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1>.

- Particulate matter smaller than 2.5 µm in diameter (PM_{2.5}): annual mean concentration of 25 µg m⁻³.

3.1.4 PM₁₀ and PM_{2.5} are collectively referred to as particulate matter (PM).

3.1.5 In addition, the World Health Organization (WHO) has a guideline level for PM_{2.5} concentrations of 10 µg m⁻³ as an annual mean⁵ (CD8.1). This has not been adopted in England as an AQS, AQO or target, but the Clean Air Strategy sets an exposure reduction target, to reduce the number of people living in locations above the WHO guideline by 50% by 2025, compared to a 2016 baseline.

3.1.6 The above criteria are concerned with the effects of air pollution on human health, and so apply where people may be expected to be exposed to these levels of air pollution.

3.1.7 Later in my proof, I will also make frequent reference to guidance from the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK)⁶ (CD8.6). Although this guidance has no formal or legal status, it is widely recognised and respected within the planning and air quality communities. The aims of the guidance are to provide professionals operating within the planning system with a means of reaching sound decisions, having regard to the air quality implications of development proposals, and to help developers to better understand what will make a proposal more likely to succeed. It offers guidance on policy within England and Wales, designing developments for air quality, undertaking air quality assessments, assessing significance and mitigating impacts.

3.1.8 In particular, I use the terms 'substantial', 'moderate', 'slight' and 'negligible' to describe impacts in accordance with the definitions in the IAQM/EPUK guidance.

3.1.9 I also follow the IAQM guidance in using the term Air Quality Assessment Level (AQAL) to mean an AQS, AQO, or any other assessment level given in legislation, policy or guidance against which the impacts various pollutants may be assessed.

3.2 Ten Point Plan for a Green Industrial Revolution

3.2.1 The Government's Ten Point Plan for a Green Industrial Revolution¹ (November 2020) is primarily focused on decarbonising the UK economy through measures such as cleaner energy production

⁵ WHO (2006) Air Quality Guidelines: Global Update 2005. ISBN 92 890 2192 6.

⁶ EPUK and IAQM (2017). Land-use Planning and Development Control: Planning for Air Quality, v1.2, [online]. Available at: <http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf> [Checked 22/03/2018].

and increased electrification. Many of these policies also tend to improve air quality, notably Point 5: Green Public Transport, Cycling and Walking.

- 3.2.2 Of particular relevance here is Point 6: Jet Zero and Green Ships, which aims to encourage the use of Sustainable Aviation Fuels (SAF), consulting on a SAF mandate in 2021 with a mandate possibly starting in 2025. Other measures are aimed at the longer-term decarbonisation of aviation. Increased use of SAF will have some benefits for air quality, but in general air quality benefits of the Ten Point Plan on the Proposed Development are likely to be modest.

4. Assessment summary

4.1 Introduction

4.1.1 In this section, I present a summary of the assessments given in the ES, Regulation 25 information, and ESA. I demonstrate that the air quality assessment contained in the ES and ESA is robust and reflects best practice and confirms that the Appeal Proposal will not result in significant air quality effects.

4.2 Assessment Methodology

4.2.1 The methodology for the air quality assessment contained in the ES and ESA follows established guidance for air quality assessments generally and for airport air quality modelling in particular. The assessment was carried out using dispersion modelling to predict pollutant concentrations at receptor locations, i.e., places where people may be exposed to pollution over the relevant timescales. Sources of emissions included in the assessment are:

- Aircraft, including main engines, auxiliary power units (APUs), brake wear and tyre wear;
- Ground Support Equipment (GSE), i.e., plant and vehicles used airside;
- Road traffic, both airport-related and non-airport;
- Car parks; and
- Background sources, i.e., other sources unrelated to the airport.

4.2.2 Modelling of emissions from aircraft follows the approach recommended by the Project for the Sustainable Development of Heathrow (PSDH), a large project sponsored by the Department for Transport (DfT) that aimed to develop best practice in airport air quality modelling. Road traffic emissions were calculated using emission factors published by Defra, with dispersion modelling following guidance from Defra's Local Air Quality Management Technical Guidance⁷ (TG16) (CD8.10), including model verification. Background sources were taken from the latest versions of Defra's mapped background concentration data.

4.2.3 The assessments considered a number of scenarios. The historic year 2017 was assessed in order to provide a baseline and model evaluation. Two future scenarios were assessed, known as 10 mppa

⁷ Defra (2018) Local Air Quality Management Technical Guidance (TG16). February 2018.

(i.e., without the Appeal Proposal) and 12 mppa (i.e., with the Appeal Proposal). In the ES, the assessment year for the 10 mppa and 12 mppa scenarios was 2026. In the ESA, the assessment year for the 10 mppa and 12 mppa scenarios in the Core Case was 2030, reflecting the slower expected growth following the Covid-19 pandemic. The ESA also considered two sensitivity scenarios representing Faster and Slower Growth Cases, in which the airport was assumed to reach a throughput of 12 mppa in 2027 and 2034 respectively, to address the uncertainty in growth rates following Covid-19.

4.2.4 The methodology was initially outlined in the Scoping Report⁸ (CD4.8) issued to NSC on 20 June 2018, together with a request for a scoping opinion under Regulation 15 of the EIA Regulations (CD4.7). NSC's Scoping Opinion⁹ (CD4.9) was subsequently adopted on 6 August 2018. NSC's Scoping Opinion stated of the air quality chapter of the Scoping Report that the "*Scope and methodology for assessment is acceptable*" without further comment. Wrington Parish Council suggested that impacts at Redhill should be assessed and drew attention to a drafting error in the text of the Scoping Report. Natural England noted that the assessment should take account of the risks of air pollution to ecological sites and how these can be managed or reduced. There were no other substantive responses to the Scoping Report.

4.2.5 The Officer's Report (CD4.11) subsequently confirmed that "*The method used to establish the air quality results and the number and distribution of the assessment locations provide a realistic projection of the impacts.*"

4.2.6 NSC's Statement of Case does not dispute the modelling methodology or quantitative results, except in relation to two aspects, namely:

- The air traffic forecasts (which I address in Paragraph 5.2.58 et seq.); and
- The assessment of UFP (which I address in Paragraph 5.2.66 et seq.).

4.3 Environmental Statement

4.3.1 The ES assessment predicted no 'substantial' impacts, 'moderate' impacts at seven receptors (of which one has subsequently been removed and some are not residential and therefore are not relevant locations of exposure with respect to annual mean AQOs), and 'slight' impacts at 50 receptors, with respect to annual mean NO₂ concentrations. It found that concentrations at all

⁸ Wood (2018) Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Environmental Impact Assessment: Scoping Report. Doc Ref. 40506r008i1

⁹ North Somerset Council (2018) 18/P/3502/EA2 Scoping Opinion.

receptors would remain comfortably below the AQO, with a maximum NO₂ concentration of 35 µg m⁻³. All other impacts, including from PM, were assessed to be negligible.

4.3.2 In the 12mppa scenario, the assessment identified that the highest NO₂ concentrations would be experienced along the A38 between West Lane and the airport roundabout, where there are contributions from both aircraft and traffic, with queuing traffic a particular issue. It noted that concentrations are sensitive to the exact distance of the receptor from the road and from the junctions.

4.3.3 Overall, the ES concluded that the air quality impacts of the Appeal Proposal were of moderate adverse significance.

4.3.4 The Officer's Report concluded:

4.3.5 *"The method used to establish the air quality results and the number and distribution of the assessment locations provide a realistic projection of the impacts. For human health, there are no predicted exceedances of the annual mean air quality objectives for PM₁₀ and PM_{2.5}. For nitrogen dioxide (NO₂) however all but two receptors' locations are expected to incur increase[d] concentrations, but the projected levels remain below the air quality objective. In terms of Local Air Quality Management, all receptors comply with acceptable levels, although some are close to these limits. To ensure this remains the case, ongoing monitoring will be required together with an air quality action plan to improve air quality. This can be secured through a S106 legal agreement."*

4.3.6 Public Health England (PHE) reviewed the ES and said that *"During the operation of the airport, we agree that the major pollutants of concern are nitrogen dioxide (NO₂) and particulate matter (PM₁₀/PM_{2.5}). We agree with the approach taken in the air quality assessment."*

4.4 Regulation 25 information

4.4.1 In response to the Regulation 25 request for further information from NSC, information was provided on (among other things):

- Impacts from road traffic further from Bristol Airport, extending towards Bristol; and
- Consistency with Clean Air Strategy's target to halve exposure to levels of PM_{2.5} above the WHO guideline between 2016 and 2025.

Road traffic

4.4.2 The Regulation 25 response presented an assessment of impacts from road traffic on the wider network included in the traffic modelling undertaken for the Transport Assessment. The assessment showed that, relative to the 10 mppa baseline, the Appeal Proposal would have a negligible impact at all the assessed receptors using assessment criteria from IAQM and EPUK. It therefore concluded that the Appeal Proposal will have a negligible air quality impact due to associated road traffic on the wider network.

PM_{2.5}

4.4.3 The Regulation 25 response showed that there were 10 receptors of those modelled in the ES that experienced annual mean PM_{2.5} concentrations over 10 µg m⁻³ in at least one of the 2017 baseline, 10 mppa and 12 mppa scenarios. It showed that concentrations at all receptors except one would be lower in the 12 mppa scenario than in 2017; the number of receptors over 10 µg m⁻³ decreases from nine in 2017 to four in 12 mppa. The response confirmed that this trajectory is consistent with the target in the Clean Air Strategy (noting that the evaluation years in the Strategy are 2016–2025 rather than 2017–2026).

4.5 Environmental Statement Addendum

- 4.5.1 The ESA presented an updated air quality assessment that took account of the updated passenger forecasts and, specifically:
- A change in assessment year from 2026 to 2030 (2030 being the year in which 12 mppa is now forecast to be reached in the Core Case);
 - A Faster Growth Case (where 12 mppa is reached in 2027) and a Slower Growth Case (where 12 mppa is reached in 2034) in comparison to the Core Case; and
 - Updated emission factors for aircraft engines and road traffic. Road traffic emissions were calculated using version 10.1 of the Emission Factors Toolkit (EFT). The ES used version 8.0.1 of the EFT supplemented by the Calculator Using Realistic Emissions for Diesels (CURED), which was the best information available at the time.
- 4.5.2 The assessment in the ESA found concentrations of NO₂ in the 10 mppa and 12 mppa Core Case scenarios to be appreciably lower than those reported in the ES. The contribution to concentrations from background sources is marginally lower in the ESA due to the later year, and the contribution from aircraft is marginally higher due to the updated aircraft fleet forecast. The main difference

accounting for the change in total NO₂ concentrations is the contribution from road traffic, which is much smaller in the ESA than in the ES. This is because the emission factors used for cars are much lower which partly reflects the later assessment year (2030 rather than 2026) and reductions in average emission factors over time, but mainly reflects changes relating to the performance of Euro 6c diesel cars.

- 4.5.3 The Euro 6c standard entered into force in September 2018, following the earlier Euro 6b in 2015, so at the time of the original assessment and the development of CURED V3A, it was not known what the real-world performance of Euro 6c cars would be. CURED appears to have taken a cautious approach and assumed that Euro 6c engines would not deliver much improvement in emissions compared to the preceding engine standards.
- 4.5.4 It is now evident that the real-world performance of Euro 6c cars is successfully delivering improved emission performance for oxides of nitrogen (NO_x). CURED has been withdrawn and general expert opinion is that the latest versions of the EFT provide a valid basis for estimating future emissions¹⁰. The emission performance of Euro 6c cars is important because by the assessment year of 2030, they will make up a large proportion of the vehicle fleet.
- 4.5.5 Consequently, the ESA predicted no “moderate” impacts, “slight” impacts at just fourteen receptors, and negligible impacts at all other modelled receptors. Annual mean concentrations of NO₂ are modelled to be below 30 µg m⁻³ at all receptors in the 12 mppa scenario, less than 75% of the AQO.
- 4.5.6 Annual mean concentrations of PM_{2.5} were predicted to be well below the AQO of 25 µg m⁻³ in all scenarios at all receptors, and to be below the WHO guideline of 10 µg m⁻³ at all but two receptors. At both of these receptors, which represent properties on the A38 Bridgwater Road in Bedminster Down, the PM_{2.5} concentration is greater than 10 µg m⁻³ in both 10 mppa and 12 mppa scenarios.
- 4.5.7 Overall, the ESA concluded that the air quality impacts of the Appeal Proposal were not significant.

Faster and slower growth cases

- 4.5.8 The ESA gave consideration to two sensitivity tests to examine whether the effects of faster (i.e., earlier) or slower (i.e., later) growth to 12 mppa would result in any material change to the effects

¹⁰ Air Quality Consultants (2020) Performance of Defra’s Emission Factor Toolkit 2013 - 2019.
<https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=7fba769d-f1df-49c4-a2e7-f3dd6f316ec1>

reported above. In the Faster Growth Case, the airport is forecast to reach a throughput of 12 mppa in 2027 and in the Slower Growth Case the airport reaches a throughput of 12 mppa in 2034.

- 4.5.9 The principal effect of the faster and slower growth scenarios is to affect the NO_x emissions from road traffic, which are falling rapidly as new, cleaner cars enter the fleet. However, even in the Faster Growth Case, pollutant concentrations are sufficiently low that the increased vehicle emissions will not present any risk of exceeding any AQOs. It should also be noted that the ES used 2026 as an assessment year, and so may be considered a worst case in terms of growth scenarios, as well as using very pessimistic, and subsequently superseded, emission factors; this found that impacts for NO₂ were no worse than 'moderate' at a small number of receptors
- 4.5.10 For other pollutants, changes in the background are more modest, but an earlier assessment year would produce very slightly higher impacts than a later assessment year, but the quantitative assessment for 2030 shows that impacts are sufficiently small that an assessment year of 2027 (Faster Growth Case) would not materially change the conclusion that there are no significant effects. The ES may be considered a worst case for these pollutants and found no significant effects for any of these pollutants.
- 4.5.11 Conversely, the Slower Growth Case would mean that impacts from the Appeal Proposal were even lower than forecast in the Core Case, with pollutant concentrations even further below AQOs in the later assessment year. Slower growth would allow more time for cleaner road vehicles, such as Euro 6c cars and electric vehicles, to enter the fleet, as well as cleaner aircraft and cleaner airside vehicles. The background concentrations will also continue to decline. Impacts will therefore be even less than for the Core Case.

4.6 Mitigation measures

- 4.6.1 Two key mitigation measures are embedded into the Appeal Proposal that will directly reduce the air quality impacts of expansion to 12 mppa, namely:
- Realignment of roads at the junctions of Downside Road and West Lane with the A38. This will tend to reduce the amount of traffic queuing, which in turn will improve air quality at receptors near these sections of road; and
 - The Airport Surface Access Strategy (ASAS) (CD7.4), which will increase the proportion of airport passengers travelling by public transport instead of private car, with an ambitious target

of 17.5% public transport mode share. This will improve air quality at receptors near roads with a significant amount of airport-related traffic.

4.6.2 Evidence about these mitigation measures will be given by Dr Witchalls.

4.6.3 Further mitigation measures that will indirectly affect air quality are:

- A commitment, to be secured by a Section 106 agreement, to develop an Air Quality Action Plan (AQAP), coordinated with the Carbon and Climate Change Action Plan and Airport Surface Access Strategy. This will help BAL introduce further measures to reduce air quality impacts from the Bristol Airport's operations.

5. Response to issues raised by North Somerset Council and other parties

5.1 Overview

5.1.1 NSC cites air quality as an issue in its Reasons for Refusal, and also makes several arguments in relation to air quality in its Statement of Case. The bulk of my evidence is concerned with these. The Statements of Case of the Rule 6 parties make the following references to air quality:

- PCAA express concern about health impacts of increased emissions; and
- Bristol XR Elders Group mention increases in air pollution and resulting health effects.

5.1.2 The air quality issues in the Statements of Case from PCAA and XR Elders, as well as those made in comments from a number of interested parties, align with NSC's second Reason for Refusal and so I will address them implicitly by focussing on the more specific and detailed issues raised by NSC and on the Reason for Refusal.

5.1.3 I have organised my evidence, first by the principal body raising the issue, and then by general theme. This is to minimise duplication; it is not intended to downplay the importance of other bodies who make similar points.

5.1.4 In my evidence, I demonstrate that air quality is generally improving and will be better in future than in recent years, with or without the Appeal Proposal. The development of Bristol Airport to accommodate 12mppa results in small changes in pollutant concentrations at some receptors but these do not result in significant impacts. In regard to air quality, the Appeal Proposal is consistent with relevant policy including national aviation policy, the National Planning Policy Framework (NPPF) (CD5.8) and the North Somerset Core Strategy 2017 (CD5.6). The air quality impacts are not grounds for refusing the Appeal.

5.2 North Somerset Council

5.2.1 In its Reasons for Refusal and Statement of Case, NSC claim that any adverse impact at all from the Appeal Proposal is unacceptable and contrary to policy and claim that the assessment is flawed in its treatment of forecast uncertainty and UFP. This is despite NSC's Officer's Report stating that the ES methodology was "*realistic*" and the impacts were "*acceptable*". I reject the claims of NSC and

will show that the assessment is robust and demonstrates that the impacts are not significant, and the Appeal Proposal is consistent with relevant air quality policy.

5.2.2 I have grouped my responses into the following general themes:

- Reasons for Refusal;
- Reducing the impact on air quality;
- Uncertainty around the air traffic forecasts; and
- UFP.

Reasons for Refusal

5.2.3 In its reasons for refusal, NSC states: *"The noise and impact on air quality generated by the increase in aircraft movements and in particular the proposed lifting of seasonal restrictions on night flights would have a significant adverse impact on the health and well-being of residents in local communities and 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"*.

5.2.4 The first part of the Reason for Refusal asserts that the proposed development "... would have a significant adverse impact on the health and well-being of residents in local communities". This is wrong. While the Appeal Proposal will have some adverse air quality impacts, these have been assessed in the ES and ESA, and the ESA shows that these are not significant. NSC's Officer's Report stated, based on the ES: *"all receptors comply with acceptable levels"*. The ESA shows that, in fact, air quality will be appreciably better than was presented in the ES which formed the basis for that opinion.

5.2.5 Using widely recognised and accepted criteria from IAQM and EPUK, the ESA demonstrates that, with regard to annual mean NO₂:

- there are no moderate or substantial impacts, in terms of the IAQM/EPUK guidance, at any of the modelled receptors;
- there are slight adverse impacts at fourteen receptors;
- there are no new or existing exceedances of the limit value; and
- annual mean NO₂ concentrations are less than 75% of the AQO at all modelled receptors.

- 5.2.6 These impacts are clearly not significant in the context of a project such as the Appeal Proposal.
- 5.2.7 For hourly mean NO₂ and all other pollutants, the impacts are even smaller than for annual mean NO₂.
- 5.2.8 It should be noted that the assessment demonstrates that the Appeal Proposal will comply with AQOs, but further it demonstrates that impacts on concentrations that are below the AQOs are small. I discuss this latter point in more detail in paragraph 5.2.22 et seq.
- 5.2.9 Mr Pyper will give evidence on the health effects, but there is no basis in my evidence to conclude that the *"impact on air quality... would have a significant adverse impact on the health and well-being of residents in local communities"*.
- 5.2.10 The second part of the Reason for Refusal seems to go further and suggests that *"the proposed development would not contribute to improving the health and well-being of the local population"* and that this is itself contrary to the core strategy, in other words that every development has a duty to specifically improve the health and well-being of the local population. None of policies CS3, CS23 and CS26 of the North Somerset Core Strategy 2017 say this.
- 5.2.11 Evidence on wider policy analysis will be given by Dr Melling, but I will address the technical air quality aspect of compliance with policy (e.g., the interpretation of *"acceptable level"*).
- 5.2.12 Policy CS3 of the North Somerset Core Strategy states:

"Development that, on its own or cumulatively, would result in air, water or other environmental pollution or harm to amenity, health or safety will only be permitted if the potential adverse effects would be mitigated to an acceptable level by other control regimes, or by measures included in the proposals, by the imposition of planning conditions or through a planning obligation."
- 5.2.13 No guidance is given in the Core Strategy as to what an *"acceptable level"* of air quality effect is, but NSC's Officer's Report stated, based on the original ES: *"all receptors comply with acceptable levels"*. The ESA shows that concentrations will be lower than modelled in the ES. It was therefore the view of NSC's Officers that the Appeal Proposal is consistent with CS3.
- 5.2.14 Turning to other independent guidance as to what may be an *"acceptable level"*, the most widely accepted and recognised guidance in this area is that from IAQM and EPUK. That guidance leaves the final decision as to what effects are significant to professional judgement but provides a clear framework for evaluating impacts and expressing them in a way that can be evaluated using professional judgement.

- 5.2.15 What is an acceptable level will depend on the wider context of a proposed development. What is acceptable for a major employment centre may not be acceptable for a house extension, for example. Given the fact that concentrations at all receptors are expected to remain well within AQOs, the very small air quality impacts and the small number of receptors experiencing non-negligible impacts, in my professional judgement it is clear that the potential adverse impacts from the Appeal Proposal in terms of air quality are not at a clearly unacceptable level. Based on a simple consideration of the overall context of the Appeal Proposal, my professional judgement is that the potential adverse impacts are at an acceptable level.
- 5.2.16 The Appeal Proposal includes a number of embodied mitigation measures, as detailed in Section 4.6, which will contribute to ensuring that the impacts are kept at an acceptable level. These measures are either integral to the Appeal Proposal or can be secured through a suitable planning condition.
- 5.2.17 Policy CS23 states: *"Proposals for the development of Bristol Airport will be required to demonstrate the satisfactory resolution of environmental issues, including the impact of growth on surrounding communities and surface access infrastructure."*
- 5.2.18 With regard to air quality, the effects of the Appeal Proposal have been shown to be not significant in accordance with established and recognised guidance, and suitable mitigation either is embedded or can be secured. This issue has therefore been satisfactorily resolved.
- 5.2.19 Policy CS26 of the Core Strategy is to *"support programmes and strategies which increase and improve health services throughout the district, promote healthier lifestyles and aim to reduce health inequalities."* The ESA shows that the air quality effects of the Appeal Proposal on health are not significant, as I demonstrate in the following sections where I address NSC's Statement of Case in detail, and Mr Pyper takes up further in his evidence. The Appeal proposal, therefore, does not in any way conflict with this policy.
- 5.2.20 To summarise, NSC was wrong to rely on the air quality effects of the Appeal Proposal in its Reasons for Refusal, and refusal is not justified on these grounds. NSC has expanded on the Reasons for Refusal in its SoC and I deal with these points in the sections that follow.

Reducing the impact on air quality

- 5.2.21 In this section I respond to NSC's comments about the need to reduce the impact of the Appeal Proposal on air quality. This issue has also been raised in general terms by a number of other parties about the impacts of the Appeal Proposal on air quality.

The broader policy and increases in emissions

- 5.2.22 NSC now asserts in its Statement of Case (paragraph 70) that: *“BAL’s case is overly focussed upon issues relating to compliance with limit values and thus fails to address the broader national and local policy agenda of needing to reduce the impact of the airport on air quality going forward.”*
- 5.2.23 This is simply incorrect. The air quality assessment in the ES and ESA uses widely recognised and accepted guidance from the IAQM and EPUK. The first priority of any proposed development should be to demonstrate that legal standards are complied with, or where there are already exceedances, any additional contribution from the development would be insignificant. The next step is to assess the significance of impacts even if they are within the standards. The IAQM/EPUK guidance clearly recognises this; impacts where the concentrations remain below 75% of the AQAL may still be described as ‘slight’ or ‘moderate’ and could be assessed as significant if, for example, a large number of receptors are affected.
- 5.2.24 Accordingly, the ES and ESA demonstrate that there is no risk of any exceedance occurring as a result of the Appeal Proposal, but they then go on to assess the impacts even though they are within the AQALs.
- 5.2.25 The assessment, therefore, demonstrates that the overall health effects of the Appeal Proposal are acceptable. Furthermore, the assessment shows that air quality is improving around Bristol Airport, even with the Appeal Proposal, except at a very small number of locations (I discuss this further in paragraph 5.2.34).
- 5.2.26 The assessment also provides information on source apportionment to enable the mitigation to be directed where it is most effective. The most significant effects arise from road traffic, especially queuing traffic, which has directed mitigation towards the two primary mitigation measures for air quality, namely the road junction realignment to reduce queues and the surface access strategy to reduce airport-related road traffic.
- 5.2.27 I will now go on to describe more fully how BAL’s case addresses the air quality policy agenda by addressing particular issues raised by NSC.
- 5.2.28 NSC states in its SOC (paragraphs 72, 73 and 76): *“BAL’s case fails to address the broader national and local policy agenda of needing to reduce the impact of the airport on air quality... [T]he Proposed Development will not contribute to improving the health and well-being of the local population... contrary to Policy CS26 of the CS... The Proposed Development will result in an increase in emissions of NO₂ and particulate matter... As a result, the Proposed Development does not contribute to improving the health and well-being of the local population as required by the Development Plan;*

rather it increases the risk of harm to health and well-being of that population. Accordingly, the Proposed Development is not in accordance with Policy CS26 of the CS."

- 5.2.29 There is no national or local policy requirement that every development should result in an improvement in air quality relative to the development not taking place. If that was the intent of policy-makers, it would be clearly stated. This was recognised in the Stansted Appeal Decision¹¹, which states that *"While the Framework [NPPF] seeks to improve air quality where possible, it recognises that it will not be possible for all development to improve air quality."*
- 5.2.30 Rather, the NPPF states (paragraph 180) that *"decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants"* (emphasis added). The Appeal Proposal sustains compliance with all relevant limit values and objectives. Since the objectives are already complied with, there is no need for the Appeal Proposal to *"contribute towards"* compliance.
- 5.2.31 Paragraph 180 goes on to say that *"Opportunities to improve air quality or mitigate impacts should be identified"* (again, emphasis added), and the Appeal Proposal has mitigated impacts, as I have summarised in Section 4.6, where I present the key mitigation measures that are embedded in the Appeal Proposal and those that BAL intends to secure through a planning condition.
- 5.2.32 Paragraph 171 of the NPPF stipulates that *"decisions should contribute to and enhance the natural and local environment by: ... preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability."* The ESA has established that air quality is well within AQALs at all locations affected by the Appeal Proposal and is better in the 12 mppa 2030 scenario than in 2017 at almost all receptors (see paragraph 5.2.34). Therefore, the Appeal Proposal cannot be described as contributing to unacceptable levels of air pollution, and the Appeal Proposal is therefore consistent with this policy.
- 5.2.33 Paragraph 171 goes on to say that *"Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information."* There are very few developments that are able to deliver a net improvement to air quality, so the *"where possible"* caveat is very important.

¹¹ Planning Inspectorate (2021) Appeal Decision, Appeal Ref: APP/C1570/W/20/3256619. London Stansted Airport, Essex. Decision date: 26 May 2021

5.2.34 Air quality is generally improving in response to a wide range of measures being taken at national, international and local levels. In this context, the ESA has identified that concentrations are lower in the 12 mppa 2030 scenario than in 2017 at all modelled receptors, except at a small number of receptors, as follows:

- Seven receptors (very close to the airfield) have higher NO₂ concentrations than in 2017. The greatest NO₂ concentration at any of these locations is 22 µg m⁻³, or just over half the AQO, and five of them are among those which have already been identified as experiencing 'slight' impacts from the Appeal Proposal;
- Four receptors (three very close to both the airfield and the A38, plus a receptor representing the Bristol Air Quality Management Area (AQMA) next to the A38) have higher PM₁₀ concentrations than in 2017. The greatest PM₁₀ concentration at any of these locations is 16 µg m⁻³, or well under half of the AQO, and all experience 'negligible' impacts from the Appeal Proposal; and
- One receptor (representing the Bristol AQMA) has higher PM_{2.5} concentrations than in 2017. The PM_{2.5} concentration at this location is 9.8 µg m⁻³, or well under half of the AQO and less than the WHO guideline, and it experiences 'negligible' impacts from the Appeal Proposal.

5.2.35 Similarly, to the NPPF, the Core Strategy's Policy CS3 (previously quoted at paragraph 5.2.11) aims to manage and reduce air quality impacts where these are unacceptable, rather than eliminate all emissions.

5.2.36 The ESA demonstrates that the adverse effects of the Appeal Proposal on air quality would be mitigated to a level which, in the context of the overall proposal, are acceptable in accordance with relevant legislation and standards and recognised guidance such as that from the IAQM and EPUK.

5.2.37 I have been unable to find any requirement in the Development Plan to justify NSC's statement that *"the Proposed Development does not contribute to improving the health and well-being of the local population as required by the Development Plan"* (paragraph 76 of NSC's Statement of Case).

PM_{2.5}

5.2.38 NSC states in its Statement of Case (paragraph 81): *"The National Clean Air Strategy includes a commitment to progressively cut public exposure to particulate matter pollution. This is accompanied by a commitment to tightening the air quality objective for PM_{2.5} towards the WHO annual mean guideline of 10 µg m⁻³. The assessment of any large-scale and long-term project such as the Proposed Development should take this commitment to a tightening of air quality policy at a national level into*

account.” Further, at paragraph 82, NSC states: “the ES does not demonstrate that the Proposed Development would avoid adverse impacts on health due to increases in levels of PM_{2.5} and nitrogen dioxide, in the context of ... the expected tightening of PM_{2.5} standards over the lifetime of this development.”

5.2.39 NSC’s assertion is wrong. The Regulation 25 information and the ESA demonstrate that the Appeal Proposal is consistent with the Clean Air Strategy’s target to reduce the number of people living in locations above the WHO guideline level of 10 µg m⁻³ by 50% by 2025 compared with a 2016 baseline.

5.2.40 The Appeal Proposal is consistent with current policy on particulate pollution. It is not possible or appropriate to try to determine the Appeal against policy that may or may not be adopted in future. That said, there is a clear direction of travel with regard to PM_{2.5}, with the focus for this being the Environment Bill which is currently before Parliament.

5.2.41 The Environment Bill, as currently drafted, includes a requirement for the Secretary of State to set a new target for PM_{2.5} by October 2022, plus another air quality target by the same time. It requires that the Secretary of State is satisfied that these targets can be met. Some commentators have suggested that the PM_{2.5} target should be to achieve the WHO guideline level of 10 µg m⁻³, but it is no more than speculation to say that this is the target which will eventually be adopted. The Clean Air Strategy does not include a target to achieve the WHO guideline level, only to reduce the number of people exposed above that level. The Clean Air Strategy notes that even with the measures included in the Strategy, PM_{2.5} concentrations are expected to exceed the WHO guideline in 2030 in many areas, including much of London.

5.2.42 It is clear, therefore, that the 2022 target will either be weaker than the WHO guideline, later than 2030, or will require stronger national action than envisaged in the CAS. In any case, since concentrations in the vicinity of Bristol Airport are forecast to be below the WHO guideline at all but two receptors with the Appeal Proposal in 2030, the Appeal Proposal is entirely consistent with meeting whatever target is set.

Solutions to improve air quality

5.2.43 NSC now alleges in its Statement of Case (paragraph 73) that the Appeal Proposal *“fails to deliver the innovative solutions and incentives expected by both national aviation policy and the NPPF; further, it does not contribute to the delivery of improvements in air quality against ‘ambitious targets’”*.

5.2.44 It also states (paragraph 78) that:

“The Council will contend that to comply with national aviation policy, the NPPF and Policies CS3 (mitigating impacts to an acceptable level), CS23 (Satisfactory resolution of environmental issues) and CS26 (contribute to improving health and well-being) of the CS:

(a) BAL must identify and adopt ambitious targets for a reduction in emissions at BA;

(b) BAL must produce a detailed scheme of mitigation and assessment thereof in which it demonstrates that all reasonably practicable “innovative solutions and incentives” and mitigation will be brought forward with the aim of delivering a situation where, if planning permission is granted for the Proposed Development, emissions are not increased when compared to the position if planning permission for the Proposed Development were refused.”

5.2.45 BAL is working to manage and improve the impact that its operations have on air quality. The Appeal Proposal includes measures to improve air quality, as described in Section 4.6. These focus on the principal source of exposure, namely road traffic, and include the junction reconfiguration which will reduce queuing, and the Airport Surface Access Strategy (ASAS), which sets quantified, measurable targets to reduce the number of passengers travelling by private car. The Air Quality Action Plan will introduce further measures, which will build on best practice learned at other airports where air quality is a greater issue than at Bristol Airport. It will identify what measures are likely to be reasonably practicable and what emissions reduction is possible and cost-effective.

5.2.46 NSC’s Officer’s Report states that *“To ensure [air quality remains at acceptable levels], ongoing monitoring will be required together with an air quality action plan to improve air quality. This can be secured through a S106 legal agreement.”* BAL agrees with this and is committed to ongoing monitoring and to the development of an Air Quality Action Plan. The Officer’s Report does not identify a need for any additional mitigation or measures than those assumed in the ES.

5.2.47 The nature of aviation means that many mitigation measures need to be taken at a national and international level. BAL is a member of Sustainable Aviation, which brings the UK aviation industry together to work with national government and international organisations to improve the environmental performance of the industry. Initiatives nationally include the rollout of electric ground support equipment, measures to reduce auxiliary power unit use, and surface access strategies that encourage sustainable transport use. As well as its own initiatives, BAL is able to learn from other airport operators and share best practice.

- 5.2.48 Air quality around Bristol Airport continues to be generally good and will improve in future, with or without the Appeal Proposal. It would therefore be premature to bring forward further detailed proposals at this stage, but rather they should be developed as part of the costed action plan developed in liaison with NSC officers, a position that had been previously agreed with the Council.
- 5.2.49 It is not necessary to set specific targets for the reduction of emissions. BAL has already committed to maintain the monitoring of air quality around Bristol Airport, and has an existing Section 106 commitment to report any significant deterioration in air quality. Given that concentrations are comfortably within AQOs, and are generally expected to improve in future, this is an appropriate framework for ensuring that air quality remains at acceptable levels in future.
- 5.2.50 I have previously addressed the claim that emissions should not be allowed to increase relative to the situation where planning permission were refused (paragraph 5.2.29 et seq.).

Residual risks to health

- 5.2.51 At paragraph 74 of its Statement of Case, NSC asserts that *“Reducing ground level concentrations of particulate matter to comply with the air quality objective levels does not eliminate risk of harm to the health and wellbeing of exposure populations... [There is] evidence of health impacts due to low level exposure to nitrogen dioxide... Increases in exposure even below air quality objectives increases the risk of harm to health and well-being.”* It also states at paragraph 82: *“the ES does not demonstrate that the Proposed Development would avoid adverse impacts on health due to increases in levels of PM_{2.5} and nitrogen dioxide, in the context of evidence that health impacts arise at levels below current standards”*.
- 5.2.52 It is generally accepted that the evidence suggests that there is no threshold for concentrations of PM below which adverse health effects do not occur (in other words, there is no completely safe level). The evidence for the health effects of NO₂ is generally weaker than it is for PM, largely because it is difficult for epidemiological studies to disentangle the effects of NO₂ from PM and other co-pollutants. It is therefore uncertain whether there is a threshold effect for NO₂, and COMEAP¹², for example, remains divided whether extrapolation of the concentration–response function to zero is justified.
- 5.2.53 The IAQM/EPUK guidance recognises that air pollutants may have adverse effects below the AQALs, and therefore offers guidance to assess impacts even where AQALs are met. For example, the

¹² COMEAP (2018) Associations of long term average concentrations of nitrogen dioxide with mortality.
<https://www.gov.uk/government/publications/nitrogen-dioxide-effects-on-mortality>

original ES identified 'moderate' impacts for annual mean NO₂ at seven receptors, but at all these receptors the total NO₂ concentrations was more than 10% below the AQO, and in one case less than 70% of the AQO. The ESA used more up-to-date information and showed that there will be no 'moderate' impacts but that there will still be 'slight' impacts at fourteen receptors, even though the greatest annual mean NO₂ concentration is just 25 µg m⁻³ or 64% of the AQO.

5.2.54 NSC's Officer's Report did not raise any concerns about health effects where air quality was within the AQOs. It states that *"No specific action is required other than ongoing monitoring of air quality. Only if air quality reduced and did not comply with acceptable public health standards would intervention be required."*

5.2.55 Overall, the residual risks to health from the emissions arising from the Appeal Proposal are extremely small and within criteria for what is considered acceptable for a development of this nature. Further evidence on the effects of air quality on health is given by Mr Pyper.

In-combination effects

5.2.56 NSC states in its SOC (paragraph 77): *"The risk to the health and well-being of the local population needs to be considered in combination with the increased noise impacts to which that same population will be exposed if the Proposed Development is granted planning permission."*

5.2.57 The in-combination effects of air quality and noise impacts on health are considered in the cumulative effects assessments in the ES and ESA, and in the Health Impact Assessment (HIA), along with other impacts such as socioeconomic impacts. Evidence on the effects of air quality on health is given by Mr Pyper.

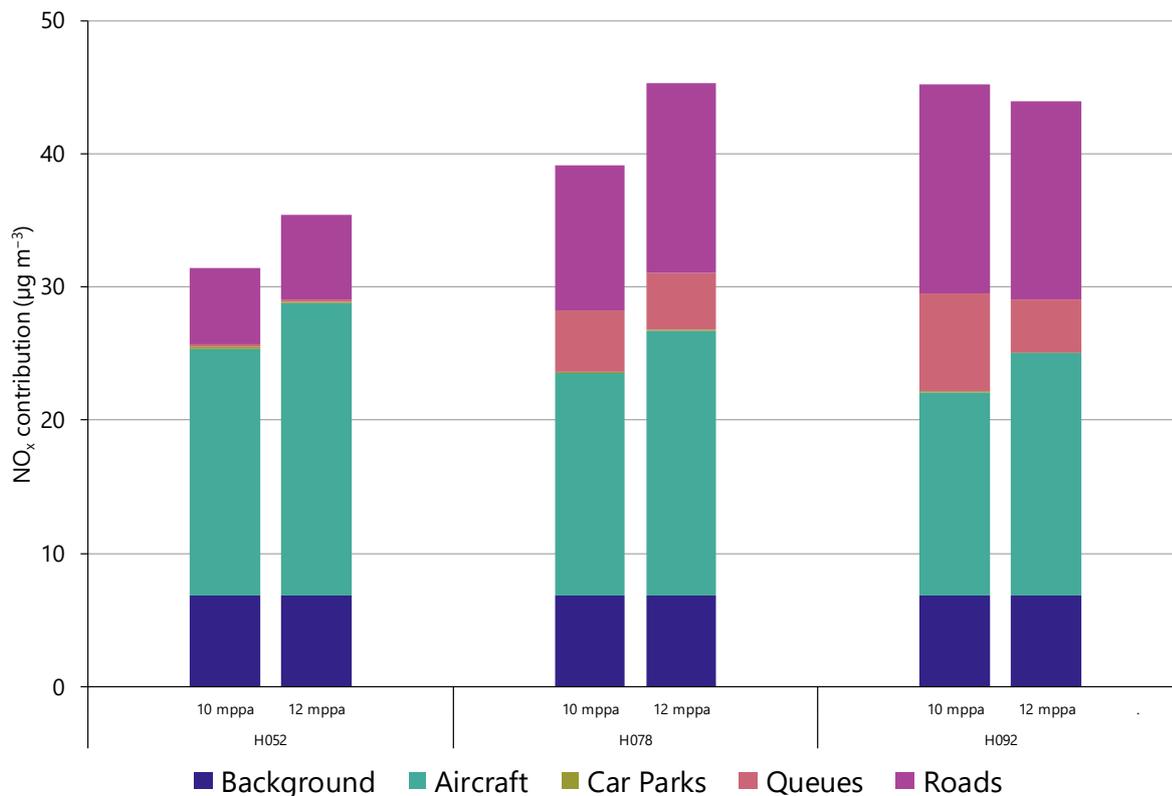
Uncertainty around the air traffic forecasts

5.2.58 NSC states in its SOC (paragraph 75): *"the air traffic forecasts, on which the conclusions in the air quality section of the Addendum ES are based, are subject to significant uncertainty... [I]t is important to have regard to the degree of uncertainty in the air quality forecasts and to understand their sensitivity to changes in assumptions e.g., different aircraft fleet mixes or slower reduction in vehicles emission reductions."*

5.2.59 Evidence on the forecasts is given by Mr Brass. Here, I will address the effect of uncertainty in the forecasts on predicted air quality impacts. I will show that allowing for the likely degree of uncertainty in the aircraft forecasts does not change the conclusions of the assessment.

- 5.2.60 Concentrations of pollutants at relevant ground level receptors are not particularly sensitive to changes in aircraft emissions. For example, a hypothetical increase in aircraft emissions of 20% would increase concentrations of NO₂ by less than 3 µg m⁻³ at any receptor, leaving NO₂ concentrations below 70% of the AQO at all receptors, and no receptors would experience impacts classified as 'moderate' or 'substantial' as a result of the Appeal Proposal. Aircraft are not a major source of PM emissions, so the effect of any uncertainty in the aircraft forecast in terms of fleet mix is even smaller.
- 5.2.61 The ES and ESA were based on different fleet forecasts. Comparing the aircraft contribution to NO_x concentrations from the two models, the difference is in the range -5% to +5% (depending on receptor location) for the 10 mppa scenario, or -10% to -5% for the 12 mppa scenario. These figures may be taken as an indication of the likely level of uncertainty in the aircraft contribution to NO_x concentrations due to uncertainty in the fleet forecast.
- 5.2.62 The information provided in the Regulation 25 response included a full source apportionment, i.e., a breakdown of the contribution to concentrations at each receptor from the various sources (aircraft, road traffic, background etc.), based on the ES modelling **Figure 5.1** shows a source apportionment at three representative receptors based on the ESA modelling, similar to the chart presented in the Regulation 25 response. Note that this is in terms of NO_x, not NO₂, because of the chemical interactions involved. Roughly speaking, 10 µg m⁻³ of NO_x corresponds to about 5–7 µg m⁻³ of NO₂.
- 5.2.63 The full ESA source apportionment shows that the aircraft contribution to NO_x concentrations is at most 50% of the total in locations where the total NO₂ concentration is about 25 µg m⁻³, so even doubling the aircraft contribution — extremely unlikely to be realistic — would still not cause an exceedance. At locations on the A38 where total concentrations are higher, the aircraft contribution is smaller, so again even a substantial increase in the aircraft contribution would not cause an exceedance.

Figure 5.1 Source apportionment for selected receptors, based on ES modelling, as NO_x



Note that concentrations are NO_x, and should not be compared against the 40 µg m⁻³ limit which is for NO₂.

5.2.64 The ESA includes a sensitivity assessment of faster and slower growth scenarios; since air quality is improving overall, an earlier assessment year (Fast Growth) will generally have worse impacts than the ESA Core Case, whereas a later assessment year (Slow Growth) will have lower impacts than the ESA Core Case. The sensitivity assessment concludes that changes to the growth scenario were unlikely to lead to significant impacts. The ESA also suggested that the original ES can be taken as an extreme worst case (even Faster Growth), since it presented an alternative aircraft fleet in an earlier assessment year, as well as substantially worse road vehicle emission factors; this showed that air quality impacts in this scenario were comfortably within AQALs and of only moderate significance, which was considered “acceptable” by NSC’s officers.

5.2.65 No evidence has been presented by NSC, or other parties, that any underestimation in emissions from aircraft has occurred. The assessment presented in the ES and ESA is therefore robust and the conclusions are unlikely to be changed by plausible changes to the aircraft fleet forecast.



Ultrafine particles (UFP)

- 5.2.66 NSC states in its SOC (paragraph 80): *"The potential impacts of increases in ultrafine particles should be considered and given weight in the decision making process, as envisaged in para. 3.127 of Aviation 2050."* At paragraph 92, NSC states *"The ES does not demonstrate that the Proposed Development would avoid significant impacts due to increased emissions of ultrafine particles (UFP)."*
- 5.2.67 There is currently no evidential basis on which to present a robust assessment of UFP. This was acknowledged in the Stansted Appeal Decision¹¹, which states that *"there is no recognised methodology for assessing UFP and the most that can be done is a qualitative, rather than quantitative assessment."* Aviation 2050¹³ (CD9.29) notes that *"UFPs are believed to contribute to the toxicity of airborne particulate matter but the magnitude of their contribution is currently unclear."* Nonetheless, I provide some discussion of the issues around UFP and the likely effects of the Appeal Proposal below.
- 5.2.68 In the Scoping Report submitted to NSC, BAL said that it proposed to assess NO₂, PM₁₀, PM_{2.5} and NO_x in the ES, with reasons for scoping out other pollutants. NSC, in its Scoping Opinion, stated that the *"Scope and methodology for assessment is acceptable."* This is therefore a change of position by NSC.
- 5.2.69 NSC's Officer's Report states that *"The method used to establish the air quality results... provide[s] a realistic projection of the impacts."*
- 5.2.70 There are currently no ways to estimate emissions of UFP from aircraft or road traffic, and therefore no way to determine what the concentrations with or without the Proposed Development would be. There are no quantitative criteria against which concentrations of UFP could be assessed, in part because monitoring standards have yet to be produced (for example, it is uncertain whether particle mass or particle number is the key quantity). There is generally poor understanding of the health effects of UFP. It is therefore not possible to determine the significance of the effects of UFP emissions from the Proposed Development. In this context, NSC agreed in its Scoping Opinion that the pollutants to be assessed, as detailed in BAL's Scoping Report, were appropriate and this did not include UFP.
- 5.2.71 However, the effects of UFP are included within the effects of PM_{2.5} (which are comparatively well understood), since UFP is a constituent of PM_{2.5}. The increase in concentrations of PM_{2.5} from the

¹³ HM Government (2018) Aviation 2050: The future of UK aviation. A consultation. Cm 9714.

Appeal Proposal is less than $0.5 \mu\text{g m}^{-3}$ or 2% of the AQO (5% of the WHO guideline) at all receptors, so the impact on UFP is likely to be similarly small.

5.3 Parish Councils Airport Association

5.3.1 As noted above, the PCAA's Statement of Case raises air quality impacts as an issue in a general sense and I have addressed this above in my response to NSC's comments. However, the PCAA has also made some specific comments in its response to the ESA which I have addressed below.

Effects of Covid-19 lockdown

5.3.2 The PCAA state that *"no data has been given showing the impacts on air quality round the Airport from the first lock down which commenced in March 2020. This would give a more accurate assessment of the contribution coming from airport operations."*

5.3.3 Air quality monitoring data will be published as usual in BAL's Annual Monitoring Report. I have carried out a brief review of data from BAL's continuous monitoring station over the period since March 2020, which I summarise here.

5.3.4 In broad terms, levels of air pollution are seasonal due to a mix of local weather conditions, such as low wind speeds, as well as longer range weather conditions, which can lead to a recirculation of air over northern Europe and influxes of dust.

5.3.5 Overall, as expected given the Covid-19 situation, levels of NO_2 around Bristol Airport are lower in 2020 than in 2019. This is likely to be due to reductions in various emissions sources, i.e., less road traffic and less aircraft traffic. Looking at the results across the year, the monitoring results are consistent with what was observed nationally; a substantial drop in NO_2 early in the first lockdown (Spring 2020), returning to near-normal levels in most locations by the end of 2020 as road traffic and other activity returned to near normal. Measurements of NO_2 at the BAL continuous monitor, which is located in the long-stay car park, remain lower than normal at the end of 2020 due to the continuing reduction in on-airport emissions sources.

5.3.6 PM_{10} was slightly higher across the country in the early months of the first lockdown due to weather carrying in pollution from overseas. There was very little lockdown effect observed nationally last spring. BAL contributes less than $1 \mu\text{g m}^{-3}$ of PM_{10} at the continuous monitor location, so as expected there is no strong signal in the monitoring data due to the reduction in airport activity over the course of 2020.

Future levels of air quality

- 5.3.7 The PCAA argues that *“Air quality should and must be retained at least at the level of 2017, the baseline year. It is a cause of concern that parts of Felton Common close to the A38 are predicted to exceed the limit value for annual mean NO_x. Acid deposition rates at North Somerset & Mendip Bats 1 SAC and North Somerset & Mendip Bats 2 SAC [Special Area of Conservation], are predicted to be higher than the relevant Air Quality Assessment Levels.”*
- 5.3.8 I have presented a comparison between 2030 and 2017 concentrations in paragraph 5.2.34, where I show that, at all but a very small number of locations, air quality is indeed better with the Appeal Proposal than in 2017.
- 5.3.9 Parts of Felton Common close to the A38 are currently estimated to exceed the limit value for annual mean NO_x currently, due to emissions from the road. Concentrations are expected to decline in future, as air quality improves, and new cleaner cars enter the fleet. The road realignment that forms part of the Appeal Proposal will result in road traffic moving slightly further from Felton Common, meaning that the parts closest to the road and experiencing the highest concentrations will experience a fall in concentrations as a result of the Appeal Proposal.
- 5.3.10 It is correct that acid deposition rates at some parts of the SAC are higher than the critical load. This is almost entirely due to the existing background, which is up to 36% higher than the critical load function. (We have assumed that the background is the same in 2030 as in the most recent years for which data is available.) The contribution from the Appeal Proposal is less than 0.005% of the critical load function at these locations, which is not significant. It has been agreed by NSC, as part of the Statement of Common Ground, that air quality effects on ecological receptors are not significant. Natural England also have raised no concerns about air quality impacts on ecological receptors.

Monetisation of impacts

- 5.3.11 The PCAA, via their consultants New Economics Foundation, requested the monetisation of the air quality effects of the Appeal Proposal for inclusion within the economic case. This is addressed by Mr Brass as part of his evidence on socio-economic effects and so is not dealt with here.

Uptake of electric cars

- 5.3.12 The PCAA states: *“There is an assumption within the ES that the ban in 2030 on the purchase of new petrol and diesel cars will to some degree mitigate air quality but there is no certainty of take up of electric cars and many diesel and petrol cars will still remain in use.”*

5.3.13 The air quality assessment presented in the ESA has used Defra's forecast emission factors for road vehicles, which use DfT car sale projections (April 2019) including the uptake of low carbon passenger cars and light goods vehicles with electric and hybrid electric propulsion systems. These are the best available data and, therefore, the PCAA's assertion that this is a flaw in the ESA is unwarranted.

5.4 Summary

5.4.1 In responding to the issues raised by NSC and other parties, the key points of my evidence are that:

- The air quality impacts of the Appeal Proposal are small and are not significant, in accordance with widely accepted criteria;
- Overall air quality will remain at acceptable levels even with the Appeal Proposal;
- The assessment is robust and uncertainty about aircraft fleet forecasts and the year at which 12 mppa will be reached will not change the material conclusions of the assessment;
- The assessment addresses the pollutants agreed at the scoping stage, but also provides an indication of the likely impacts of UFP;
- The Appeal Proposal includes embedded mitigation to reduce the air quality impact of the development, and additional mitigation will be committed to under a planning condition; and
- The Appeal Proposal is fully consistent with national and local policy requirements to manage and improve air quality within a context of sustainable airport growth.

6. Conclusion

- 6.1.1 The ES which accompanied the planning application for the Appeal Proposal and the ESA submitted to the appeal represent a detailed and robust air quality assessment, in compliance with the requirements of the EIA Regulations and in accordance with a scope agreed with NSC. The methodology has followed best practice for assessments of this kind, using dispersion modelling to determine the concentrations of air pollutants arising from the various airport-related sources under various scenarios, and combining these with the future baseline.
- 6.1.2 The ES concluded that the air quality impacts of the Appeal Proposal were of moderate significance. Concentrations of all pollutants were forecast to be comfortably below their respective AQALs in 2026. Concentrations were highest close to the A38 road, especially where there was queuing traffic. Following submission of the application, further consultation with NSC led to the submission of additional information under Regulation 25.
- 6.1.3 Importantly, in recommending approval of the planning application, NSC's Officer's accepted the findings of the ES and concluded that *"all receptors comply with acceptable levels"*.
- 6.1.4 The ESA updated the ES with new forecast activity data and new data from third parties and also included a sensitivity analysis of faster and slower growth scenarios in order to take account of the uncertainty caused by the COVID-19 pandemic. The result of these changes to the assessment is that predicted impacts are considerably lower in the ESA than in the ES. Concentrations are now predicted to be well below the AQALs even with the Appeal Proposal, and the impacts of the Appeal Proposal are very small and not significant in EIA terms. Concentrations of PM_{2.5} are below the WHO guideline at all but two receptors, both with and without the Appeal Proposal.
- 6.1.5 BAL has included embedded mitigation measures which will directly reduce the air quality impacts of the Appeal Proposal, and intends to implement further mitigation measures, secured through a planning condition.
- 6.1.6 In its Statement of Case, NSC appears to accept these conclusions, but then claims that these insignificant impacts are contrary to planning policy which, NSC claims, requires any proposed development to demonstrate a net improvement in air quality. I have been unable to find any policy that I can interpret as prohibiting developments that result in an insignificant air quality impact.

- 6.1.7 NSC claim that uncertainty in the aircraft fleet forecast needs to be addressed. I have demonstrated that the conclusions of the assessment are robust to plausible levels of uncertainty in the aircraft fleet forecast.
- 6.1.8 NSC claim that the Appellant needs to demonstrate that there will be no significant impacts from UFP, a change from their Scoping Opinion. I have demonstrated that given the current state of knowledge about UFP, only limited assessment is possible, but UFP is a component of PM_{2.5}, for which effects are negligible.
- 6.1.9 Overall, I conclude that air quality is generally improving and will be better in future than in recent years, with or without the Appeal Proposal. The development of Bristol Airport to accommodate 12mppa results in small changes in pollutant concentrations at some receptors but these do not result in significant impacts. In regard to air quality, the Appeal Proposal is consistent with relevant policy including national aviation policy, the National Planning Policy Framework (NPPF) and the North Somerset Core Strategy 2017. I am able to conclude, therefore, that the air quality impacts of the Appeal Proposal are not proper grounds for refusing the Appeal.