

**DEVELOPMENT OF LONDON CITY AIRPORT TO ACCOMMODATE 9 MILLION PASSENGERS
PER ANNUM**

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PROOF OF EVIDENCE OF DR ALEX CHAPMAN

ECONOMIC IMPACTS

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1. Introduction

Qualifications and Experience

- 1.1 I am Dr Alex Chapman, a specialist in policy impact analysis and evaluation. I hold a BSc in Environmental Economics from the University of York and a PhD from the University of Southampton focused on the socioeconomic evaluation of infrastructure proposals and their climate impacts.
- 1.2 I currently work as a Senior Economist at the New Economics Foundation (NEF). In this role I lead a portfolio of aviation sector work. This includes airport expansion appraisal, aviation tax policy, and jobs and just transition in aviation.
- 1.3 For around five years I was an international consultant for the Asian Development Bank and World Bank, working in the area of climate risk assessment, and appraising the alignment of infrastructure pipelines with the Paris Climate Agreement.
- 1.4 My other recent projects include: acting as independent reviewer (through NEF Consulting) of the climate change aspects of the proposal to expand Southampton Airport for Eastleigh Borough Council; evaluating the business case for the proposed extension to the M4 motorway for the Future Generations Commissioner for Wales; evaluating the application to expand Leeds Bradford Airport for the Group for Action on Leeds Bradford Airport; and assessing the regional impacts of expanding Heathrow Airport for the No Third Runway Coalition.
- 1.5 I previously gave evidence to the inquiry into the expansion of Bristol Airport. Since that time, I have carried out significant additional work on the methodology for and practice of calculating the cost of the carbon impact of airport expansion (*Turbulence Expected* (Chapman & Postle, 2021), (CD3.5.24)). I have also produced a report, *Losing Altitude: the Economics of Air Transport in Great Britain* (Chapman, 2023) (CD3.5.11)), addressing the fact that the economic assumptions that are used to argue in favour of aviation capacity growth are typically dated and have not been reviewed for some years.

Scope of evidence

- 1.6 My evidence covers the economic, employment, and monetised social and environmental impacts associated with the proposed expansion of London City Airport, including notes on the generation of inputs to these topics through aviation forecasts.

- 1.7 I primarily cover the evidence put forward by the Appellant in Chapter 7: Socio-Economics of the Environmental Statement (CD1.14), supported by Volume 3: Need Case (CD1.60). However, reference will also be made to Chapter 4: Aviation Forecasts (CD1.11) as they underpin many of the conclusions reached elsewhere. I will also refer to Chapter 8: Noise (CD1.15) and Chapter 11: Climate Change (CD1.18) as these represent intermediate steps in the calculation of monetised environmental impacts.
- 1.8 Throughout I will refer to relevant Government aviation policy. As a result of the work I have done, in particular *Turbulence Expected* and *Losing Altitude*, I am familiar with the planning policies relevant to the determination of applications for airport expansion and will reference them where appropriate. I am not, however, a planning expert and so will not give evidence concerning planning policy.
- 1.9 I am providing independent expert evidence on behalf of HACAN East. The evidence which I have prepared and provide for this appeal in this proof of evidence is true to the best of my knowledge and belief. I confirm that the opinions expressed are my true and professional opinions based on the facts I regard as relevant in connection with the appeal.

2. Economic appraisal methodology

Introduction

- 2.1 It is common, particularly in undertaking environmental impact assessment, to present decision makers with evidence of direct economic impact calculations, most often in the form of employment and GVA impacts, to assist them with determining the economic impacts of a proposal. As recognised by the Institute of Environmental Management and Assessment (IEMA) since 2014 (CD3.10.2), this represents the minimum standard of evidence needed. An assessment of direct economic impact is proportional for schemes with little other economic or wider impact. However, for more complicated schemes, assessment must go further and include socio-economic impacts, such as:
- 2.1.1 Economic impacts arising from environmental harms – most typically monetised health impacts of effects such as noise or air quality, or the societal costs incurred via greenhouse gas emissions. These impacts represent real economic welfare costs to people, through reduced quality of life, changes in activities, and requirements to pay for greenhouse gas removals or climate change adaptation;
 - 2.1.2 Distributional impacts – where a scheme will have different impacts on recognised socio-economic groupings, particularly protected or more vulnerable groups. These different impacts should be recognised, particularly where benefits arise for one group but costs fall predominantly on another, for example this could be where there is a welfare gain for typically-wealthy business passengers but a noise impact on a local council-housing estate. Simply presenting gross impact values will not capture the distributional impacts;
 - 2.1.3 Place-based impacts – where a scheme’s impacts may be different at different geographic scales, place-based analysis provides value to a decision maker to allow them to consider both local, regional, and national impacts and priorities. For example, a scheme that results in net increases in local employment but no additional employment at the national level may still be beneficial if the employment is being relocated to an area in need of levelling up;
 - 2.1.4 Direct and indirect impacts to the Public Accounts – many interventions will impact spending, incomes and therefore tax receipts while other interventions may require or indirectly result in Treasury spending. An assessment should recognise these impacts upon public bodies, acknowledging that they typically represent transfers of resources.
- 2.2 To quote IEMA, “Without a full assessment of these issues, it is difficult for the decision maker to understand the extent to which proposals contribute to sustainable development” (CD3.10.2). This is particularly important in this case; as is made clear in aviation policy, a decision maker will often face the difficult

task of balancing diffuse economic impacts against a range of environmental costs.

- 2.3 Growth in the aviation sector, and expansion of particular airports or the relaxation of existing restrictions, is predicated on those expansions being “justified”, as is made clear in Flight Path to the Future (CD3.5.6, p.9). The way in which they can be justified is also clear. As described in the Jet Zero Strategy, they must deliver “results for the UK” and deliver “economic benefits across the UK” (CD3.5.7, Executive Summary, p.7). The “relevant planning authority” is required to pay particular attention to the economic, environmental and consumer benefits for the UK (CD3.5.3, p.9, 1.29). Applicants for airport planning are encouraged to “provide sufficient detail regarding the likely environmental and other effects of airport development to enable communities and planning decision-makers to give these impacts proper consideration.” (CD3.5.7, p74)
- 2.4 My view is that at no point do any of the government’s relevant policy or appraisal guidance documents sanction the exclusion, or otherwise exemption of greenhouse gas impacts from the assessment of the relevant balance of the economic and environmental impacts of an individual scheme. On the contrary, such assessment is essential to reaching a balanced conclusion.
- 2.5 The Jet Zero Strategy’s observation that the UK government can achieve Jet Zero “without needing to intervene directly to limit aviation growth” is not a blank cheque. An expansion needs to deliver economic benefits to the UK in excess of the marginal cost of the additional aviation emissions, as well as taking into account other environmental factors at the appropriate levels.
- 2.6 Based on the principles outlined in successive aviation policy, including Making Better Use, Jet Zero, and Flight Path to the Future, the modification of existing planning restrictions on an airport and the ensuing local impacts and changes in the aviation market require the judgement of the relevant planning authority (CD3.5.3, p.9, 1.29; CD3.5.7, p.54, 3.62-63), informed by an evidence base on economic and environmental impacts that is developed using best practice in proportion to the impacts and risks.

The DFT’s Transport Analysis Guidance

- 2.7 The approach to economic appraisal described above is supported by the Department for Transport’s (DfT) Transport Analysis Guidance (TAG) (CD3.10.3).¹ A robust evidence base is not just desirable but is critical to making a public decision. The TAG Unit A5-2 Aviation Appraisal (CD3.10.4) contains

¹ The overview document is included as a core document. For the other documents comprising Units A1, A2, A3, and A4, see: <https://www.gov.uk/guidance/transport-analysis-guidance-tag>.

detailed guidance on the impacts that should be included in such an assessment and in turn refers readers to other sections of the TAG guidance, and other government guidance documents such as the Green Book. Central to the process is the development of an economic case, which should feature impacts on consumers and producers, including monetisation of environmental impacts and consideration of the wider economic impacts (CD3.10.4, p.8, para 3.2.15). The most recent iteration of the TAG Aviation appraisal guidance was released in November 2022, post-dating documents such as the Inspectorate's Bristol Airport appeal report (CD8.1).

- 2.8 In addition to the core TAG documents, scheme appraisers should also take note of additional guidance released by the DfT in the interim between revisions to core documents. These releases advise scheme promoters of upcoming changes to guidance, and support promoters in ensuring their appraisals deal adequately with unexpected or unprecedented world events.
- 2.9 The November 2022 revision to the TAG Aviation Unit included amendments which clarify and strengthen the unit's applicability to private sector planning applications. TAG Unit A5-2 recognises that aviation schemes are "most commonly paid for by the private sector" (CD3.10.4, p.7, para 3.2.11). The guidance is set out as "best practice for the appraisal of aviation interventions", and the DfT "would assess the merits of any aviation intervention against this benchmark" (CD3.10.4, p.3, para 1.1.5). TAG use is not limited to the Department for Transport, the DfT "expect this guidance to be useful to other appraisal practitioners considering the impacts from non-government aviation interventions" (CD3.10.4, p.3, para 1.1.3). TAG A5-2 provides a framework for the impact appraisal of airport planning applications, from which assessments should be built. The guidance clarifies the DfT's view that airport planning applications will "take account of relevant material considerations which may include evidence relating to the strategic, commercial, financial, and management case of a development proposal" (CD3.10.4, p.3, para 1.1.4).
- 2.10 Government "interventions" are situations where government, at local and national levels, takes an action to affect a market or an outcome. As explained by the Office of Fair Trading, "markets will not necessarily deliver the best outcomes for consumers, companies or Government" and so government intervenes "either through direct participation (as a market maker or as a buyer or supplier of goods and services), or through indirect participation in private markets (for example, through regulation, taxation, subsidy or other influence)" ('Government in markets: Why competition matters – a guide for policy makers', CD3.10.9, p.1). The planning system and requirements to comply with the planning regime is one aspect of that type of "regulation".

- 2.11 Aviation, both in the UK and globally, is a regulated industry and planning requirements form part of that. Many airports have their operations restricted through "Movement Caps" or other planning restrictions on the use or operation of their development imposed by local authorities using their planning powers. From the perspective of an economist, these interventions have been made in order to address a number of perceived market failures, such as the localised impact of aircraft operation. The use of noise caps, enforced by movement caps if needed, was endorsed in the Aviation 2050 consultation (CD3.5.4, p.78, para 3.115).
- 2.12 To be clear, again from the economic perspective, "interventions" such as movement or noise caps relate entirely to influencing, changing, restricting or encouraging private sector investments. "Interventions" are a tool of policy – a movement cap or operating hours restriction on an airport reflects a decision maker's judgement that there exists a balance between the benefits of additional flights and the external costs that they impose. The DfT's WebTAG Aviation guidance exists to allow for a decision maker, be it a local planning officer, the Planning Inspectorate, or the Secretary of State, to have sufficient evidence to make a cogent decision about an "intervention". It provides a framework in which the economic and environmental impacts of an "intervention", such as permitting an increase in the movements through an airport, can be appraised.
- 2.13 This may not have been explained clearly in the Bristol Airport inquiry (CD8.1), where it was suggested that the use of the Green Book, and in particular the specialised guidance available through WebTAG, is the sole province of government and the DfT. The Bristol decision stated:
- "465. At the Inquiry a number of parties argued that BAL should have carried out a Greenbook or WebTAG assessment. However, as the relevant guidance makes clear, the role of WebTAG is to appraise "government interventions in the aviation industry" with "the main user of this guidance...expected to be DfT itself." The proposed development is a private sector investment and not a government policy intervention. The Panel is not aware that any of the other recent airport expansion schemes undertook a WebTAG assessment. Accordingly, the absence of a WebTAG assessment does not weigh significantly against the development."
- 2.14 There is good reason for a different approach to be taken in this inquiry. As set out above, "government interventions" include regulation via planning decision making, and "government interventions in the aviation industry" include making decisions on schemes such as this appeal. As set out below, one other airport expansion scheme – Gatwick – is using a WebTAG assessment.

- 2.15 The guidance itself recognises that the DfT is likely to be the main user. However, in the November 2022 update the DfT added text to make expressly clear that there will be other users (CD3.10.4, p.3, para 1.1.3). Just like the non-aviation focused sections of TAG, the guidance is available as an example of what should be considered to be best practice to the private sector. The DfT also gives guidance on when TAG should be used in its online introduction to the overall TAG guidance:
- “Projects or studies that require government approval are expected to make use of this guidance in a manner appropriate for that project or study. For projects or studies that do not require government approval, TAG should serve as a best practice guide”.²*
- 2.16 The current application is a project that requires government approval, via the planning system. So, although a private sector company may not generally need to use the WebTAG guidance, in this instance it is the relevant guidance to apply. Government policy is clear - it can only “support growth in aviation capacity where it is justified, ensuring that capacity is used in a way that delivers for the UK” (CD3.5.6, p.9). The onus is therefore on the private sector proponent of any expansion in aviation capacity to justify their planning applications, by reference to the relevant guidance.
- 2.17 This is also reflected in the Green Book (HM Treasury, 2023), which describes the purpose of economic analysis and appraisal as to “provide objective analysis to support decision making” (CD3.10.8, p.2, para 1.5). The use of this economic appraisal guidance is mandatory where the use of significant new and existing public resources is required, with the appraisal to be proportionate to the costs, risks and foreseen impacts. In addition, the Green Book directs readers to further supplementary and departmental guidance on appraisal which covers greater detail and specific issues and methods.
- 2.18 I recognise that a WebTAG Aviation appraisal is not the only way to provide evidence; however, it represents best practice and, where proportional, the methods and scope described provide the most robust evidence base. As the UK’s best-practice guidance for the economic appraisal of aviation schemes, the TAG methods and scope described in Aviation A5-2 have been adopted by Gatwick Airport in their 2023 submission to the Planning Inspectorate for a Development Consent Order to bring the airport’s existing Northern Runway into routine use. It is also proportionate in non-DCO applications like the current application to adopt the best practice standard set out in TAG.

² Introduction to online guidance on the use of TAG: <https://www.gov.uk/guidance/transport-analysis-guidance-tag>.

- 2.19 The TAG Guidance provides that there should be an environmental evidence base, which should feature a number of important topics.
- 2.19.1 Noise: identified as particularly important for any aviation appraisal. “Any appraisal of aviation schemes ought to take into account the impact of the scheme on noise, where these impacts are likely to be significant, such as for a major airport development” (CD3.10.4, p.9, para 3.3.1).
- 2.19.2 Air Quality: aviation appraisal should note that there are differential impacts for pollutants emitted at different altitudes, but default to valuations from TAG guidance if aviation specific values aren’t available.
- 2.19.3 Greenhouse Gases: specific attention should be paid to the calculation, valuation, and presentation of GHG emission impacts. The guidance makes clear the nuances that decision makers will need to understand and how a robust evidence base will allow them to take into account aspects such as internalised (i.e. traded) carbon costs and non-CO2 impacts (CD3.10.4, p.9, para 3.3.3).
- 2.20 Distributional and place-based impacts should be considered. Distributional impacts could be of particular weight to decision makers as the typical beneficiary of the removal or modification of aviation restrictions is different to those on whom costs are imposed. The aviation guidance suggests a screening process to highlight areas of further investigation (CD3.10.4, p.11, para 3.5.3) and redirects readers to other TAG chapters for further guidance. Place-based analysis may also be appropriate, as the areas which benefit from an aviation proposal (the passenger ‘catchment’) can differ from the areas that are negatively impacted.
- 2.21 The assessment should also include the presentation of how the scheme may directly and indirectly impact the Public Accounts through taxation (CD3.10.4, p.11, para 3.6).
- 2.22 Finally, it should be acknowledged that London Borough of Newham agreed to the methodology and scope of the direct economic assessment presented in Chapter 7 (CD1.14). It is correct that, in terms of evidence for a planning application, the methods and scope that are presented do meet the minimum standards typically used for construction projects and go beyond them in several areas. Nevertheless, for the reasons set out above, this type of assessment falls short of the evidence required for a decision maker to make a robust assessment of the relative merits of this major aviation intervention.

3. General issues with the Appellant's social cost benefit analysis methodology

Introduction

- 3.1 The evidence provided by the Appellant to assist decision makers in determining this application consists of a direct economic impact analysis (employment and GVA impact assessment) that is highlighted in the Non-Technical Summary ("NTS") (CD1.7). In addition, a mix of qualitative and quantified, but not monetised, assessments of noise, air quality, health impact and greenhouse gases are presented as well. In Chapter 7 and in the Needs Case, user and producer benefits and costs are presented, however they are excluded from the assessment of significance and are not carried into the NTS.
- 3.2 The "Socio-Economic Cost Benefit Analysis" includes an incomplete consideration of Greenhouse gas emissions, but does not include the monetisation of noise impacts, air quality impacts, or any consideration of the distributional impacts. Noise and related public health impacts are not monetised, though some carbon costs are (CD1.14, p.11, para 7.3.26).
- 3.3 It is my view that there are thus significant omissions from the evidence presented by the Appellant. Application of the relevant best-practice guidance would have been more appropriate than the 'pick-and-mix' methodology employed.

Guidance and best practice used by the Appellant

- 3.4 The 'socio-economic welfare effects' analysis portion of the ES describes itself as *"the same in concept as the economic elements of the DfT's WebTAG appraisal approach"* but acknowledges it is not a WebTAG appraisal, since the Appellant makes the claim that *"WebTAG is not intended for assessing the impact of private sector investments and is not commonly used standard in assessing airport socio-economic effects in relation to planning decisions."* (CD1.14, p.11).
- 3.5 As I have already set out in detail above, WebTAG is the relevant guidance for assessing the impacts of an aviation project requiring planning permission. The appraisal standards set out in the Green Book and TAG represent the standard of evidence that a decision maker should expect to be presented with when determining whether to grant planning permission. The Appellant has fallen short of these standards in a number of critical areas, leaving the decision makers with critical gaps.

- 3.6 It is my expectation that economic impacts will be granted significant weight in the appeal decision. In this context, it is vital that the methodology applied to assessing such impacts is robust and reliable.

Sensitivity testing and the underlying forecasts

- 3.7 All transport infrastructure schemes and economic interventions are subject to uncertainty about future trends and are limited by current knowledge in socio-economic and environmental systems. Models and forecasts will inevitably be influenced by the assumptions made when selecting model inputs.
- 3.8 Across research and practice one of the key tools established to support decision making in contexts of high uncertainty is sensitivity analysis. Green Book advises: *“At a minimum sensitivity analysis and the identification of switching values should be carried out on the preferred option from the shortlist appraisal. These results must form part of the presentation of results. If the costs and benefits of the preferred option are highly sensitive to certain values or input variables, sensitivity analysis will probably be required for other options in the shortlist”* (CD3.10.8 p.53, 5.61).
- 3.9 The only sensitivity testing carried out by the Appellant was in relation to faster growth/slower growth scenarios. However, these are not truly ‘scenarios’. The Appellant has not tested the variables that really matter when it comes to determining the relative merit of the proposed intervention.
- 3.10 As described in the Needs Case Appendix D: Forecasting Methodology (CD1.60), underlying passenger demand has been modelled through a Monte Carlo simulation approach. As stated, the “output from the Monte Carlo analysis is, therefore, a range of possible growth rates for air passenger demand across the UK ranging from high growth to low growth” (CD1.60, p.117, para 18). What it does not show are the different outputs directly associated with different combinations of specific input assumptions. Barring some minimal description at paragraph 5.49 of the Need Case (CD1.60, p.67) we have little idea what each scenario really entails. For example, what happens to carbon costs in the faster and slower growth scenarios? We can’t precisely say because inputs are amalgamated in the Monte Carlo simulation approach.
- 3.11 A specific view on an input is what makes something a ‘scenario’. The Appellant has provided outcomes from the modelling process, but these do not represent a specific scenario (or even an agglomeration of forecasts from a scenario run). Sensitivity/scenario testing should not be limited to the forecasts of passenger numbers. Useful scenarios for decision makers to consider might have been: (i) **What happens if airlines have to pay a price for non-carbon greenhouse gas emissions?** (ii) **What happens if the business travel does not bounce back from**

the pandemic? (iii) What happens if industry efficiency savings (productivity gains) take place at a faster pace than expected, leading to fewer jobs in aviation?

3.12 In the end, there is little meaningful difference between the three outputs presented by the Appellant. Each respective scenario results in the 9 mppa cap being reached two years earlier/later. Appendix H of the Need Case also reveals that there is little meaningful difference between the economic impacts of the scenarios. This is a reflection of the inadequate testing conducted, and the failure to sensitivity test key model parameters.

3.13 We do not know if the economic case put forward by the Appellant is truly robust. The Benefit-Cost assessment presented by the Appellant, at Table 7.26 of the Chapter 7: Socio-economics (CD1.14) only presents one scenario. We are not presented with any analysis of the carbon costs under high/low carbon price scenarios, nor any analysis on the uncertainty underpinning issues such as surface access time savings and air-fare savings (both of which will depend on the split between leisure/business travellers).

3.14 Conducting fully specified scenario analysis would be best practice. As an example, TAG Unit M4 (Department for Transport, 2023) states:

“The modeller must establish that the core scenario is robust to the key model uncertainties (model sensitivity analysis) that have been listed in the uncertainty log. This will demonstrate that the core scenario model results are significant given the model sensitivity tests, and the approach appropriate.” (CD3.10.5, p.9, para 3.2.2)

3.15 TAG Unit M4 suggests some “Common Analytical Scenarios” that would provide more understanding to a decision maker of the impact of/uncertainty on the scheme. Most relevant to this case would be a High Economy scenario and a Low Economy scenario, which would present the impacts under high GDP and population growth and low GDP and population growth, respectively.

3.16 TAG Unit M4 also highlights a deficiency in the presentation of the approach to forecasting, as it describes best-practice in Monte Carlo Simulation. As far as I have seen, there is no description of how the probabilistic inputs have been developed. This is particularly stark, as the probabilities assigned differ from the definitions of the inputs themselves. The lack of clear rationale to how these key inputs were chosen represents a massive gap in the ability of a decision maker to interpret the validity of any of the forecasts. This is emphasised in the relevant guidance, the TAG Uncertainty Toolkit [CD3.10.6]:

“[Monte Carlo analysis] can be very powerful in understanding a scheme’s range of outcomes, it is highly dependent on the specific assumptions imposed by the analyst (e.g. choice of probability

distribution). For this reason, analysts should be transparent regarding the distribution chosen, the rationale behind the decision, and the impact this has had on outcomes.” 3.73 TAG Uncertainty Toolkit, p.36, 3.73

- 3.17 An example of the potential for confusion as a result of this lack of rationale is in Needs Case Table D.3 (CD1.60). The table shows three UK GDP scenarios from the Office of Budgetary Responsibility: a ‘50th percentile’ (half of the OBR’s GDP forecasts are above this value, half are below this), a 70th Percentile (30% of forecasts are above this value), and a 30th Percentile (30% of forecasts are below this value). The Appellant has assigned the three scenarios probabilistic occurrence rates of 60%, 20%, and 20% respectively. This choice is not justified anywhere in the Case; yet it can be clearly seen that these probabilities are in direct contradiction of the definitions of these forecasts.
- 3.18 To be clear, if 30% of growth forecasts are below a certain value, then giving that value a 20% probability of occurrence in modelling is a deliberate choice to reduce its occurrence and impact from the OBR’s conception. Logically, the minimum occurrence in the model should be 30%, and the probability estimate should actually cover half-way to the median. If the Appellant had used the forecast probabilities without modification then they would be 20%, 40%, 40% respectively. This could have major impacts on the forecast outputs, particularly in terms of their variance. It can therefore be interpreted that the forecast modellers have made a choice that reduces model output variance but they have not indicated anywhere in the report on what basis this choice was made.
- 3.19 Another issue that arises from a review of the modelling is that it seems that little to no acknowledgement is made of the significant levels of correlation, cointegration, and variance-covariance between the input variables. There is a robust literature demonstrating relationships between variables such as GDP, oil prices and ETS prices. This could be addressed in the modelling in a number of ways, including through the assignments of the input probabilities. However, in the absence of any description of the assumptions behind the probabilities it may need to be assumed that this was simply not considered. It is notable that some of the disadvantages of Monte Carlo analysis are that it is *“Highly dependent on the accuracy of the distributions and assumptions used; Down to practitioners to specify probability distribution assumptions, which implies a lack of objectivity”* (CD3.10.6, p.37, para 3.75).

4. Business Passengers

Forecasting business passenger growth

- 4.1 A key uncertainty which has not been adequately addressed by the Appellant is the way in which travel for business purposes (henceforth business travel) will develop following the pandemic. Table D.6. of the Need Case (CD1.6) presents the growth rates of different market segments assumed with the Appellant's central forecast. The trajectories shown for travel for business purposes are not credible. The annual percentage change presented suggests that business demand for travel will have recovered to levels above their pre-pandemic (2019) level by 2023. This represents a recovery time of around 1-2 years. By 2035, the Appellant suggests that business passenger numbers will be more than 20% above their pre-pandemic level. The faster and slower growth outputs are not materially different.
- 4.2 Such a rapid rate of recovery and growth is not credible when seen in the light of trends in business travel over the past two decades. As set out in detail in my report *Losing Altitude* (CD 3.5.11, p.15) it has now been 15 years since the financial crisis of 2007/08 and the absolute number of business-purposes air trips has still not recovered. Why would we expect such a rapid recovery from the pandemic, especially given the dramatic acceleration in uptake of remote working technologies it has driven?
- 4.3 The latest post-pandemic data supports my position that the market has changed dramatically and business travel will recover slowly, if at all. The latest edition of TraveIpac, the ONS dataset on travel trends, covers Q2 2023 (CD3.10.11). This edition shows that over the three-month period there were around 2.6 million air trips made for business purposes. By contrast, over the same three-month period in 2019 there were 3.6 million trips. This represents a 28% decline. Furthermore, the share of the air travel market captured by business travel was down from 12% in 2019 to 9% in 2023. All indicators are suggesting that as of mid-2023, far from having exceeded pre-crisis levels, as suggested by the Appellant, business travel levels are actually significantly below their pre-crisis level. This is despite the fact that UK GDP has now returned to its pre-crisis, 2019, level. This points towards a step-change in demand which has not been captured in the Appellant's forecasting. . In my opinion, the central case is over-optimistic and should be revised, but as a bare minimum a sensitivity scenario should have been developed.
- 4.4 As the projections of business productivity impacts arising from the intervention proposed by the Appellant on page 83 of the Need Case (CD1.6) are heavily

dependent on the presence of business travel demand growth (as described in the methods on page 136) the evidence I have presented renders the Appellant's estimates unreliable.

Economic impact of business and leisure travellers

4.5 The Appellant puts forward the case that business passengers will lead to wider economic impacts through business productivity improvements, which have been quantified using a statistical relationship between business passenger numbers and economic output (CD1.60, Table 6.7). Generally, it is understood that business passengers produce greater economic benefits than leisure travellers.

4.6 My recent report, *Losing Altitude* (CD3.5.11), describes in detail some of the flaws with the uncritical usage of this statistical relationship. I repeat related key points here:

4.6.1 As far as I am aware the Appellant's approach has no grounding in anything mentioned in TAG and/or the Green Book.

4.6.2 The elasticity used by the Appellant, developed by Oxford Economics in 2013, relies on input data spanning 1980–2010. This period should be recognised as a different era of Britain's economic development (CD3.5.11, p.27).

4.6.3 In the UK, the number of business air trips per £million real GDP has been declining in the UK since at least 2006, highlighting the declining volume of business travel required to support British business and economic growth (CD3.5.11, p.30 and Figure 13).

4.6.4 The relationship developed by Oxford Economics suggests that a 10% increase in business travel and/or freight will result in a 0.5% increase in economic productivity. This relationship should be treated with a great deal of caution. In addition to the input data being outdated, several methodological questions are inadequately addressed. In particular, causality remains unaddressed - the extent to which business passengers cause or are caused by growth (CD3.5.11, p.25 and p.27).

4.6.5 I acknowledge, and have explained previously, that there is evidence from several periods and regions of a causal relationship between air transport growth and economic growth. This impact appears strongest in areas which are net recipients of tourism spending, and where business travel is being facilitated. In the UK, where there is a heavy tourism

spending deficit, and demand for business travel is diminishing, the case for wider economic benefits arising from air traffic growth appears weak (CD3.5.11, p.27).

- 4.6.6 Growth at smaller airports can even be *negative* for local economies where it expands leisure rather than business travel, as found in research undertaken over the last decade on airports across Europe (CD3.5.11, p.27). See *Losing Altitude* for a full discussion, however one such example is Pot and Koster (2022) who, in their recent pan-European study inclusive of the UK, state: “The absolute level of total air accessibility is negatively associated with a positive impact on GDP per capita for medium airports. This links to the notion of diminishing returns. In regions where air accessibility is already high, an expansion of a medium-sized airport may not bring many benefits, possibly because this class typically includes secondary airports operating point-to-point networks.”

Impact on predicted wider economic benefits of appeal proposal

- 4.7 As noted in the previous section, issues with the economic rationale behind the demand forecasts feed through to all aspects of the proposal, including the wider economic impact estimates.
- 4.8 The Appellant uses an elasticity developed by Oxford Economics based on 1980-2010 data; while the relationship was statistically valid for that period, even by 2009 and 2010 a potential statistical breakpoint had developed. More recent work reflects that the characteristics of aviation growth in the context of the contemporary UK is not statistically identical to those in the 80s or 90s.
- 4.9 The Appellant repeatedly notes that the core business rationale for the extension of operating hours is to allow for airlines, particularly BACF, to expand their selection of flexibility of leisure routes. This may result in some change in business passenger numbers but the case has not been made that this would be a sufficiently significant volume to create the level of business productivity that is being claimed.
- 4.10 The Needs Case outlines that adjusting the operating restrictions at London City Airport is likely to result in airline operators changing their Saturday focus to “leisure type routes” (CD1.60, 5.40, 5.41). There has been no attempt to present a disaggregation of the proportions of passenger types between the Do Minimum and Development Case.
- 4.11 In presentation, the general demand growth over time and the additional passengers resulting from this specific intervention to expand operating hours appear to be intermingled in the outputs. Without presenting the quantitative

proportions it is challenging to determine if the assessment reflects the description of the scheme, where there would likely be a slightly lower proportion of business passengers in the Development Case than the Do Minimum. Without this information it is difficult to assess whether the business productivity benefit could be what has been put forward by the Appellant, even if the Oxford Economics relationship held.

5. Employment

Displacement and study areas

- 5.1 The Appellant fails to differentiate between local and national economic benefits. For example, they argue (correctly) that expansion will create some additional local jobs but fail to acknowledge that many of these are likely to be filled by people moving from other jobs. In other words, expansion will result in few, if any, new jobs at a national level. Ultimately, the lack of clear and disaggregated impacts result from the repeated deviations from best-practice. Using a national-level study area, with place-based assessments then presented within that framework, would make clear any assumptions made by the Appellant as to the distribution of changes in employment as well as present the net national impact to a decision maker, to stand alongside the place-based assessments.
- 5.2 The displacement of economic impacts is a particularly significant issue where transport infrastructure is concerned. An economic impact assessment that makes claims to scheme benefits must demonstrate how and why they believe that these benefits will be truly 'additional' as opposed to just involving the relocation of a good or service from one place to another. A scheme's 'true' impact is its net impact after displacement of both costs and benefits is considered. This extends to the noneconomic factors as well.
- 5.3 A worst-case approach to displacement in each topic would mean assuming no displacement of negative impacts and total displacement of positive impacts. In my opinion, this approach is likely too pessimistic and so determining an appropriate level of displacement is essential in order to claim benefits. In fact, DfT guidance on assessing non-transformative transportation schemes has suggested that a scheme promoter should present credible evidence in order to claim anything other than 100% displacement at the appropriate geographical assessment area (CD3.10.4, p.3, para 2.2.11).
- 5.4 The Appellant notes that their assessment contains no investigation of the displacement of jobs and GVA as the study area is not felt likely to overlap other, non-constrained, airport catchments. It should be noted that it is the Appellant who sets the scope of the study area. By not including a UK-level assessment, they have structured their assessment to omit key information for decision makers (CD1.60, Appendix F, p.136, para 4 and 5).
- 5.5 In addition, it is claimed by the Appellant in the Need Case (CD1.60, p.136) that the 2020 Green Book "*removes the requirement for 100% displacement at more local levels*". I do not regard this to be an adequate interpretation of the cited

paragraphs of the Green Book (CD3.5.11, p.92, paras A2.6-A2.8). Paragraph A2.8 is quoted below. This clearly sets out that a UK study scale should be considered, and that employment effects should be adjusted for leakage, substitution and displacement. The Appellant has not considered these factors.

“In addition to the effects considered for UK level appraisal, place based appraisal may also include employment changes in the area under consideration. Where the proposal has geographically targeted objectives, appraisers should clearly specify whether the employment objectives relate to employment located in the area (including those taken by in-commuters), or to employment of residents of the local area (including in jobs outside the target area). Employment effects should be adjusted for leakage, substitution and displacement as set out below, noting that treatment of these effects depends on the employment objective above.” (CD3.10.8, p.92).

- 5.6 The Appellant contradicts themselves with regard to displacement. The methodology described for wider economic impacts (CD1.60, Appendix F, p.136, para 6) requires the assessment *“of the next best alternative to completing the same journey.”* This approach is described again in more detail in the methodology for Socio-economic cost benefit analysis, which states that *“The analysis considers the travel time for a passenger to LCY compared to the travel time for the next most popular alternative airport for the given passenger segment for the route in question”* and that *“the air fares paid by passengers using the airport with the Development Case were compared to the air fares available from the next most popular alternate in each case.”* (CD1.60, Appendix F, para 11, p.137 and 138). That is, the benefits are based on passengers who are displaced from one airport to another, in combination with genuinely additional passengers.
- 5.7 It should be apparent that the assessment of displacement is core to the calculation of these impacts, that the Appellant has carried out such an assessment where it allows them to state benefits, and yet has not applied the same rigour where it may reduce the benefits.
- 5.8 Despite the absence of an adjustment for displacement, the Appellant has chosen to apply location-based employment multipliers to their employment estimates. The claim in the Needs Case that *“operational economic impacts presented are in gross terms”* is therefore incorrect, as the use of multipliers is part of developing net impacts and should not stand alone without the other aspects of Additionality analysis. Due to this, the ‘indirect and induced’ proportion of operational economic impacts reflects a potentially misleading overestimate (CD1.60, Table 6.3).

Direct, indirect, and induced jobs

5.9 While there are methodological concerns with some aspects of the approach taken by the Appellant, I recognise that it is common for airports to measure their contribution to the economy through assessing employment, and that such employment can typically be measured across four indicators:

- (i) jobs in businesses directly delivering air transport services (e.g. air crew, airplane maintenance);
- (ii) jobs delivering other services in the vicinity of airports (e.g. retail, food, and accommodation) and/or in the service of air travel (e.g. travel agencies);
- (iii) jobs operating in air transport's supply chain (e.g. supplying fuel or other parts to air transport companies); and
- (iv) jobs which are 'induced' by air transport employment (i.e. jobs supported by the everyday expenditure by air transport sector employees).

5.10 Projections of future employment at the airport should be seen through the lens of recent trends and past projections made. In 2008 London City Airport had an application to expand approved which, at the time, was estimated to facilitate an increase in passenger numbers from around 2.5 million to 3.9 million. The Appellant's documentation suggested that upon reaching a 3.9 million passenger throughput, the airport would support around 2,277 direct full-time equivalent (FTE) jobs. When the target passenger throughput was eventually surpassed in 2015 (somewhat delayed as a result of the 08/09 financial crisis) the FTE employment reported by the airport was 1,830 some 400 jobs short of their previous projection.³ Or in other words, more than half of the projected job growth did not materialise. By 2019, when passenger throughput had reached 5.1 million (i.e. 1.2 million more passengers than assumed in the 2008 modelling), the airport reported direct, FTE employment of 1,785.⁴ The Appellant estimates direct FTE employment in 2023 at 2,060 jobs, still some 200 jobs below the 2008 forecast (which was made on the basis of a smaller airport).

5.11 In other words, the airport has produced far fewer jobs than originally projected, and its growth in recent years has produced minimal increase in direct employment. It is worth noting that the Planning Officer's report, granting London City Airport permission to expand in 2009 described the decision as "finely balanced" (CD7.5, PDF p.9). We can only speculate as to the outcome of that decision had the jobs projections presented been accurate.

³ London City Airport, 2015 Annual Performance Report, p. 31, para 7.2.4, <https://www.londoncityairport.com/corporate/corporate-info/reports-and-publications>.

⁴ London City Airport, 2019 Annual Performance Report, p. 17, para 3.2.2, <https://www.londoncityairport.com/corporate/corporate-info/reports-and-publications>.

- 5.12 The Appellant has used on-site employment as their measure of direct employment, based on information from the airport's annual performance report. The future levels of employment were then assigned to a mixture of different drivers: passenger growth, air traffic movement growth, spatial footprint growth. The Appellant does not present the rationale behind different job drivers.
- 5.13 The Appellant has then projected forward based on these drivers, using the outputs of regression analysis on employment and these factors. The Appellant does not reproduce their derived elasticities, the specifications of their regressions, or the statistical significance of the relationships. In fact, the description of the methods starts at assumed relationships, rather than using regression analysis to determine the most appropriate drivers or combinations of drivers. The details of the Appellant's regression analysis should be made available.
- 5.14 The Appellant's forecasts, derived from its unpublished regression analysis, look strange. The addition of 2.5 million passengers in 2031 is estimated to add 1,070 FTE direct jobs to the airport. This equates to 428 jobs per mppa. This level of productivity is similar to the level seen between 2015-2018, which averaged 426 jobs per mppa (based on my analysis of LCC annual reports). This is strange because we would expect a much larger airport to operate at much higher efficiency, and therefore to require fewer workers per passenger. For the purposes of comparison, my analysis suggests growth at Luton Airport between 2013 and 2019 added around 337 direct, gross jobs per mppa. It seems likely that the Appellant's jobs growth forecasts are too high.
- 5.15 My previous work, *Losing Altitude*, noted that when considering passenger movements there has been an industry-wide, longer-term decline in the number of jobs supported by air-transport per passenger (CD3.5.11, p.12). Indeed, there has been no overall growth in employment in aviation since before the financial crisis, despite significant growth in passenger numbers. Significant growth at London City Airport, accompanied by a shift towards leisure travel, could well follow this trend, with any employment gains due to passenger growth offset by productivity increases.
- 5.16 Little detail has been provided by the Appellant on their determination of Indirect and Induced employment. As noted in the previous section, economic logic would dictate adjustment for leakage, displacement, and substitution prior to the application of any type of employment multiplier. This is recognised by the Green Book, "Place Based Employment Multipliers: Where appropriate, employment multipliers can be applied following the adjustment for leakage, displacement and substitution" (CD3.10.8, p.93, para A2.11).

- 5.17 If the Appellant proposes 0% displacement for their study area, as seems to the case in their methodology (CD1.60, Appendix F, para 4) it would be clearer if they presented their figures as having been adjusted for 0% displacement rather than describing them as 'gross' figures.
- 5.18 It would then allow for a decision maker to determine if 0% displacement seems plausible and if there are conditions that could be imposed to mitigate negative impacts and secure benefits.

Job quality and inequality

- 5.19 It is worth noting that, as I have described in *Losing Altitude* (CD3.5.11, p.13), the increases in productivity and efficiency in air transport have not resulted in higher wages for employees. As I have noted, direct air transport employment ranks worst out of all 96 sub-sectors of the UK economy in terms of the real-terms median pay decline seen over the period 2008 and 2022 and second worst over the pre-pandemic period between 2008 and 2019 (this trend is therefore not attributable to the pandemic). The air transport sector and supporting activities performs significantly worse than the wider economy in terms of average and median pay change over that period. The wage declines in the sector are more than double those for the rest of the economy.
- 5.20 As I point out, wage trends in air transport are driven by unequal trends between higher and lower earners (CD3.5.11, p.14). The evidence suggests that the gains from increased productivity in air transport have accrued mostly to shareholders, partly to higher-paid workers, and not to locally-based middle and low-wage workers.
- 5.21 I am not aware of any publicly available data which would allow the Inspectors to examine trends in wages and wage inequity at London City Airport over recent years. The Appellant would be able to perform such an analysis using company accounts.

Impact on predicted employment benefits of appeal proposal

- 5.22 Direct employment estimates have likely been overstated as they do not adequately account for productivity increases over time, and as a return-to-scale. If direct employment is overstated then, due to the interdependence of the calculations, indirect and induced employment, and GVA will also have been overstated.

- 5.23 The Appellant has not factored for displacement, substitution, and leakage, resulting in an overestimate of the quantity of direct, indirect and induced employment and GVA.
- 5.24 Displacement should be considered within the air transport system, in a manner consistent with the methods applied to calculate travel-time savings. Substitution should also be considered. Increased spending on air travel goods will likely come, at least partially, at the expense of other sectors, including but not limited to, domestic tourism substitutes, and other spending on non-essential consumption.
- 5.25 Taken in the round, all of the above considerations suggest that the net employment effects of the expansion of London City Airport will be limited.

6. Cost of Environmental impacts

Noise

- 6.1 Aviation noise is considered to be an issue of central concern to decision makers. The Appellant makes reference to the way in which the proposal may bring forward fleet improvements, and therefore reduce noise, as a critical benefit of the scheme.
- 6.2 The monetisation of changes in noise impacts, and the holistic presentation of these environmental and health impacts, is conspicuous by its absence.
- 6.3 I am not commenting on the modelling of noise itself. This commentary relates to the inputs to the noise modelling, in terms of forecasts and fleet mixes, and the utilisation (or lack thereof) of noise model outputs.
- 6.4 The Appellant presents in ES Chapter 8 (CD1.15) an assessment of noise at different threshold levels, in line with extant policy. The chapter notes that these thresholds are based on effects on health and quality of life.
- 6.5 The qualitative and quantitative assessment presented in the chapter relies heavily on 'noise guidelines' to determine the significance of the modelled changes. It should be noted that a monetised assessment can be integrated as part of the wider economic assessment, allowing the significance to be weighed against the other impacts of the scheme.
- 6.6 Chapter 8 (CD1.15) considers broad categories of disturbance and also presents some more specific indicators. Standardised best-practice economic analysis of noise pollution pulls out the specific estimated impacts on sleep disturbance, Amenity (including 'annoyance' as discussed in Chapter 8), Acute Myocardial Infarction (AMI - 'heart attacks'), Strokes, and Dementia. The impacts of changes in noise, in terms of these costs or benefits, can be placed alongside the other aspects of the scheme in order to allow decision makers to meet the requirements of national aviation policy: to allow them to determine if the change in noise is justified by the other scheme impacts, or vice versa.
- 6.7 When considering the lack of this evidence in the Appellant's submission, it is worth keeping in mind that the economic valuation of noise pollution is not new, nor is it untested science. Nor is aviation an area that has not been considered. The latest publicly available tools include specific settings to value aviation noise changes, as they have done since at least 2014. In these models, most notably the *TAG Noise Assessment Workbook for the Appraisal of Aviation Proposals*, a change in experienced noise from one 'band' (a range of two decibels) to

another can be valued at amounts from £33 to £80 per person per year in terms of health and productivity impacts imposed or relieved.

- 6.8 Significant changes in operation at the London City Airport have the potential to impact hundreds of thousands of people. If, as the Appellant claims, the proposal will result in substantial changes to the operating fleet mix and then to reductions in the experience of noise then these impacts should be monetised as a benefit. This would make clear the importance of securing such benefits through conditions or other regulation of operation, and enable decision makers to weigh their magnitude against the scheme's negative impacts, such as on greenhouse gas emissions.

Calculating climate costs

- 6.9 The Appellant provides an assessment of Net Present Value (NPV) for socio-economic benefits with carbon costs included and excluded, putting the scheme's NPV at £371 million excluding carbon costs and £204 million including them. The Appellant puts the NPV of carbon at -£167 million. This is not correct for a variety of reasons that I will set out.
- 6.10 Before addressing the precise value presented, it should be noted that some amount of these carbon costs are internalised in the demand forecasts. The relevant guidance would say that this sub-component of the carbon costs should still be calculated and presented.
- 6.11 To explain this, I will refer to the words of York Aviation on behalf of Luton Airport in the ongoing DCO process: "Investment will also be required to ensure that carbon emissions from the Proposed Development are compliant with the objective of reaching Net Zero. This, again, reflects a cost to society, as these resources could be used for other activities." (Luton Airport Expansion, 2023, Need Case, p.204).⁵
- 6.12 Quite apart from this issue are the aspects of emissions which should be highlighted to decision makers but are, instead, absent.
- 6.13 In *Turbulence Expected* I reviewed the greenhouse gas emissions claims of 7 schemes to expand airports and modify existing restrictions, and laid out in detail the extant guidance and best-practice (CD3.5.24). Since that publication there have been a number of changes in national policy and best-practice guidance, the most significant of which have been the Jet Zero strategy (CD3.5.7

⁵ This document is not submitted as a core document because I refer only to one paragraph of its 204 pages. However, it can be accessed here:
<https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020001/TR020001-000830-7.04%20Need%20Case.pdf>

and CD3.5.10) and updates in the carbon values used in appraisal. I will repeat the most salient points from *Turbulence Expected* here, updating them in line with new developments where needed.

6.14 The broad best-practice methodology remains the same (see CD3.5.24, p.10):

6.14.1 Emission estimates are derived based on demand models, assumptions about the technology and fuel efficiency of those planes, and the distance they will travel. Assumptions around sustainable aviation fuel uptake, and their impacts on the results, should be clearly laid out. A key development in the Jet Zero Strategy is that the High Ambition scenario, which the policy aims to achieve, requires a 50% SAF uptake. Sensitivity tests should be made to protect forecasts against under-performance in future fuel efficiency gains and technological advancements.

6.14.2 Net climate impact is derived by integrating CO₂ emission estimates with the non-CO₂ climate effects of air travel. This is an area where the DfT recommends a quantitative assessment as a sensitivity test, drawing on the latest guidance on Global Warming Potential (“GWP”) factors and guidance from the then Department for Business Energy and Industrial Strategy (“BEIS”) on valuing greenhouse gas emissions.

6.14.3 Carbon values are applied to arrive at a monetary value for emissions over the lifetime of a proposed scheme, with appropriate discount rates used for future costs and benefits.

6.14.4 Internalised (traded) and external (non-traded) costs should be calculated. Forthcoming updates to aviation appraisal guidance (CD3.10.7) express that guidance will make clear that calculating “traded sector emissions will risk double counting emissions from within the traded sector due to existing carbon pricing mechanisms” and so “recommend that analysts make an adjustment to avoid such double counting using appropriate data and assumptions about current and future traded carbon prices”.

6.14.5 When establishing net impact, emissions displacement should be considered; i.e. the extent to which a scheme creates new activity (flights/passengers/business) versus relocating activity from one location to another. Forthcoming updates to aviation appraisal guidance (CD3.10.7) agree with this approach, recommending that “When proportionate and possible to do so, these changes in emissions and associated levels of displacement should be considered in an appraisal.”

- 6.15 Returning to the emissions presented in Chapter 11: Climate Change (CD1.18) and then monetised in the Needs Case (CD1.60), the Appellant has presented their assumptions around fuel efficiency, Sustainable Aviation Fuels, and the uptake of Zero Emission Aircraft. These assumptions are the same in both the Do Minimum and the Development Case. The impact of these assumptions is displayed graphically (CD1.18, Figure 11-4 and Figure 11-8), however the impact of these assumptions, and the sensitivities and risks implicit, do not appear to be explained.
- 6.16 The Appellant fails to present an integrated assessment of aviation greenhouse gas emissions, with two major deficiencies to note.
- 6.16.1 For the 'Climb, Cruise, Descent' (CCD) portion of aircraft operation, only departure flight emissions have been presented. The reason given for this omission is *"To be consistent with the international convention of reporting and allocating responsibilities for international aviation"* (CD1.18, 11.3.20). To be clear, the portion of emissions for which the UK is 'responsible' is critical to present to decision makers, as made clear in the relevant policy. However, this is no excuse to exclude the presentation of the total change that is brought about by the scheme. This is an impact assessment exercise, not a national emissions accounting exercise. BEIS guidance published in 2021 and updated in January 2023 is explicitly clear that emissions outside the target framework are still in-scope of an impact assessment (CD3.10.10, p.16, para 3.42). However, for the avoidance of doubt, the forthcoming update to TAG makes it explicitly clear that *"in line with HM Treasury Green Book appraisal guidance, any UK specific scheme or policy will require all associated changes in emissions to be appraised, which means that changes in emissions from flights both arriving and departing into the UK will need to be appraised."* (CD3.10.7, p.7). The Appellant should present to decision makers the full evidence on this matter: the emissions for which the UK is responsible, and the total emissions caused by the scheme. The decision makers can assign the appropriate weight to these.
- 6.16.2 Non-CO2 effects are discussed; however, no attempt is made to present *"a quantitative assessment... as a sensitivity test, drawing on the latest guidance on GWP factors and BEIS guidance on valuing greenhouse gas emissions"* (CD3.10.4, para 3.3.3). The qualitative assessment is limited to a comment that if non-CO2 effects were accounted for in the UK ETS then policy may be able to reduce them. The Appellant spends considerable time emphasising the uncertainty around the scale of the impacts of non-CO2 effects while misrepresenting the views and guidance of both the DfT and the Committee on Climate Change.

6.16.3 I do not dispute that there is some uncertainty as to the scale of the impact - indeed, the uncertainty is why the DfT recommends a sensitivity test of non-CO2 effects. However, BEIS 2023 guidance, specifically states: *“Where appropriate, proportionate and possible to identify the impact of the proposal on emissions overseas or that occur outside the target framework (e.g. radiative forcing from aviation), the change in emissions overseas should be valued at the Value of Carbon”*. (CD3.10.7, p.16, para 3.42)

6.16.4 The CCC advocates a more comprehensive approach than the DfT’s recommendation to consider non-CO2 effects as a sensitivity. It recommends that no aviation development should be brought forward in the absence of the assessment and control of aviation non-CO2 effects (CD3.9.2, p.15, p.37, p.267, p.416). Again, the Appellant should present the evidence. The decision maker can accord appropriate weight.

6.16.5 I therefore disagree with the view expressed by the Appellant at 11.6.60 (CD1.18) that *“guidance from the CCC and the DfT to date has been not to seek to quantify this effect for the purposes of environment assessment”*. On the contrary, the DfT, BEIS (DESNZ) and the CCC support quantification and the CCC regards it as essential.

6.17 The Appellant has made a further error in their calculation of carbon costs. As input to their carbon costing calculation, the Appellant appears to have used the Jet Zero time series of carbon prices. This is not the correct input to a carbon valuation exercise. This time series of carbon prices was simply a best guess input used by the DfT for the purposes of forecasting how carbon prices might impact on ticket prices over coming years. The correct series for the purposes of carbon valuation in appraisal is set out clearly by DESNZ and by the DfT in TAG, and specifically the TAG workbook on greenhouse gases. This applies the target-consistent values of carbon devised by BEIS in 2021. These values are higher than those used by the Appellant. I have re-calculated the climate costs of this intervention using the correct carbon values, including arriving emissions, and non-CO2 impacts, all as recommended by DESNZ and the DfT.

My estimate of climate costs

6.18 In order to understand the scale of the unstated emissions, I use the same approach as presented in *Turbulence Expected* (CD3.5.24). To account for both arrivals and departures, the presented aviation emissions are doubled. To account for the impact of non-CO2 effects, I use a multiplier to present a central potential impact, while acknowledging that this figure is subject to uncertainty. The figure we use derives from DESNZ guidance 2023: Government Greenhouse Gas Conversion Factors for Company Reporting (CD3.10.12, pp.103-107).

- 6.19 For an understanding of this uncertainty, the presentation of aviation emissions by the CCC is particularly illustrative, shown in Figure 10.4 (CD3.9.2). It can be seen that the national impact of non-CO₂ between 2012 and 2019 when measured as ‘Effective Radiative Forcing’ ranges from approximately 70% of CO₂ impact to more than 300% of additional impact. As such the multiplier I have used from DESNZ of 1.7 (i.e. 70%) may be a significant underestimate. In 2020 and 2021, due to the impact of the pandemic, non-CO₂ impacts significantly decreased, reflecting the short-term nature of the majority of these impacts, as well as their responsiveness to changes. Table 1 shows the emissions estimate I have used to calculate the scheme’s carbon cost, derived from the Appellant’s documentation. This should not be taken as an endorsement of the underlying emissions estimates which I have not examined in detail.

Table 1: Greenhouse gas emissions of the proposed intervention adapted from CD1.5

tCO ₂ e	Do Minimum Case	Development Case	Impact
Emissions from LTO and CDD Departures (UK accounts)	5,398,281	6,406,149	1,007,868
Emissions from LTO and CDD Arrivals (foreign accounts)	5,398,281	6,406,149	1,007,868
Traded emissions Sub-total	10,796,562	12,812,298	2,015,736
Impact inclusive of non-CO ₂ (Radiative Forcing factor of 1.7 (DESNZ, 2023))	18,354,155	21,780,907	3,426,751

- 6.20 Correcting to include the both arrivals and departures within the impact of the scheme results in an approximate doubling of accounted emissions. I recognise that this is inexact, as some aircraft may be involved in multi-leg journeys. Due to the origins and destinations served by London City Airport it is noted by the Appellant that 99% of flights are covered by UK ETS (CD1.18, 11.4.16); between UK ETS and EU ETS, the majority of arrivals and departures take place within the Traded sector. As a simplifying assumption, I have assumed an equal proportion of arrivals result in Traded sector emissions.
- 6.21 Incorporating non-CO₂ effects shows that there is a substantial non-traded emissions impact. If, as some research would suggest, the impact of non-CO₂ emissions on the climate is significantly higher than the 70% of carbon

equivalent emissions level assumed in the 1.7 multiplier, potentially as high as 3.0 times (as shown in the DESNZ guidance on company reporting, CD3.10.12, p.107), the non-traded impact would be even greater.

- 6.22 The carbon impacts can now be monetised, using the correct carbon values and appropriate treatment for each carbon emission source. The Net Present Values are in Table 2. Key values shown include the total scheme climate impact over the 60-year appraisal period, costed at £834m, and the value of those costs which are not already internalised within the forecasts – costed at £478m over the same period.

Table 2: My estimate of the scheme's climate costs using correct BEIS/DESNZ carbon values for appraisal

Impact domain	Notes	Present Values, £m, 2024-2084, 2021 values
Non-traded sector impact (tCO₂e)	External societal costs (UK responsibility)	£172
	External societal costs (Non-UK responsibility)	£172
	Total societal cost	£343
Traded-sector carbon (tCO₂e)	Costs assumed captured by pricing schemes in forecasts	£356*
	Costs not captured by pricing schemes assumed in forecasts	£134
	Total traded sector costs	£491
Net climate cost		£834
Net un-priced cost	Costs not already internalised within applicant forecasts	£478

*This is my equivalent of the figure presented by the Appellant, doubled to account for inbound flights.

- 6.23 In order to bring these values into a socio-economic cost-benefit analysis, it is imperative to understand what is being presented. The Appellant presents their calculation of Carbon Costs⁶, noting that to *“include them again within the socio-economic cost benefit analysis is to double count their effect”* (CD1.60, 6.55). I disagree. However, according with guidance, any internalised costs should still be presented (as the Appellant has done) because they are still associated with an opportunity cost to society.
- 6.24 However, two elements appear not to be internalised within the forecasts. First, there is a sizeable gap between the price assumed to be charged for carbon in the forecasts, and the true social value of carbon. This gap should not be lost as it represents a cost to society. Second, non-carbon gases are not internalised.
- 6.25 In conclusion, central climate cost for the purposes of the scheme’s NPV estimate in Table 6.8 of the Need Case (CD1.6) is -£478m. Using the BEIS/DESNZ higher and lower carbon values, we can put a range on this of between -£274m and -£650m. As a result, in the central case, inclusive of climate costs, the scheme has a negative NPV of -£107m.
- 6.26 There is an additional step in determining the final monetised impact - additional flights, and the associated emissions, may not be truly additional but may represent a movement between airports. The Appellant has made the case that this displacement of flights is effectively zero, due to the constrained nature of competing airports - CD1.18 has no consideration of how this may impact assessed emissions. If it is the case that there is likely to be no flight displacement, no application of displacement on the aviation emissions or their value need be applied. There is also an argument that a portion of the emissions resulting from the scheme could substitute for other sources of emissions in the economy linked to other areas of consumer spending (for example spending on competing substitutes for flying such as domestic tourism and leisure). While consideration of such emissions sources might reduce the climate cost of the scheme, they would concurrently reduce the claimed benefits. If there is displacement which reduces the values outlined above it must be applied consistently to the other relevant economic impacts as well.

⁶ Note: using the GHG emission data in CD1.18 and CD1.50 (particularly Tables 12 and 13 in CD1.50) I calculated the monetised value of just the LTO and CDD of aviation between 2024 and 2050. The NPV of these emissions is approximately £212 million. The Appellant states that they have calculated “the full range of carbon emissions associated with the proposed Amendments” (CD1.60, Appendix F, 11) for a period of 60 years. Despite this, their value is just £167 million. As noted in the section on forecasting, it seems that an outdated set of carbon prices has been used both to generate the forecasts and then to value them.

7. Summary and conclusion

- 7.1 There exists a robust body of guidance for the application of economic principles in the assessment, appraisal and presentation of the economic impact of 'interventions'. It is worth noting that the different guidance documents referred to throughout this proof are just that - collections of guidance to allow for the understanding of economic impact. They are not new research, they are not untested theories, they are often curated for certain users but typically have general application.
- 7.2 As in all other topics, deviations from guidance can be acceptable but should be explained, as they may reflect deviations from sound reasoning and accepted practice. The majority of the issues I have identified stem from not using guidance where it is available and clear. Application of the guidance combined with judicious and thought-out deviations from it to account for unique characteristics would have provided the decision makers, the relevant planning authority, with a full understanding of the evidence before them, including its drawbacks, its uncertainties, and where it is influenced by the Appellant's views.
- 7.3 The economic impacts of the scheme flow from the Appellant's forecasts. It is in the forecasts that the first issues arise - the Appellant has a view of the world that is far more certain than that of the Office of Budgetary Responsibility, meaning that their forecast results are commensurately more 'certain'. Deviating from guidance, the Appellant does not explain their reasoning.
- 7.4 A decision maker might have been able to account for this, had the Appellant presented a number of scenarios and tested those variables on which the forecasts would be sensitive. Deviating from guidance, the Appellant has instead marked out two outputs from their central forecast as a high and low output. These outputs are not useful.
- 7.5 The Appellant's forecasts are particularly unreliable when it comes to the issue of travel for business purposes. The forecasting methodology has failed to take account of pre and post-crisis trends in business passenger demand, and as a result dramatically overstating the potential for future growth. This undermines the Appellant's estimates of business productivity impacts.
- 7.6 Furthermore, in order to determine wider 'business productivity' uplift, the Appellant uses an elasticity developed by Oxford Economics based on 1980-2010 data. More recent work reflects that the characteristics of aviation growth in the context of the contemporary UK is not statistically comparable to those in the 80s or 90s. It is unlikely that this relationship still holds.

- 7.7 The Appellant does not consider displacement in their employment assessment or they consider displacement to be negligible. In contrast to this, they report other benefits derived from their calculations of displaced passengers, specifically, travel time savings reported in the socio-economic welfare assessment.
- 7.8 The factors used to determine future employment are unreported, are unlikely to be statistically valid, and do not appear to have incorporated reasonable assumptions regarding the continuing productivity and efficiency improvement in the air transport sector.
- 7.9 The Appellant has used an input-output employment multiplier approach without first considering displacement, substitution or leakage. Deviating from guidance, the Appellant has upwardly biased their employment projections.
- 7.10 The Appellant gives no presentation of monetised noise benefits, despite this being one of the major areas where there are claimed benefits of the proposed intervention. This information is key to understanding the importance of this effect and allowing a decision maker to determine the most appropriate way to secure this potential benefit.
- 7.11 The Appellant gives no presentation of monetised air quality impacts which would typically form part of the understanding of environmental impacts of the scheme in the economic assessment.
- 7.12 The Appellant has deviated significantly from current best-practice government guidance on the valuation of greenhouse gases. As a result, carbon costs are dramatically understated. Contrary to government guidance, arriving flight emissions are not valued, and incorrect carbon values are utilised. Non-carbon gases are not monetised, despite recommendations and methods provided by the DfT, BEIS/DESNZ, and the CCC.
- 7.13 Once carbon costs are integrated into the socio-economic welfare assessment the scheme has a deeply negative net present value (NPV) which I estimate at around -£105m. Alongside this, the employment benefits of the proposal appear to be limited, and the business benefits diminished as a result of recent societal shifts. The proposed intervention does not meet the government's tests as set out in aviation policy.