Appeal by: Bristol Airport Limited

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

Proof of evidence of
Patrick Folley MA, BA(Hons)
Air traffic forecasting

Reference: NSC/W1/1

Jacobs

Bristol Airport Public Inquiry

Proof of Evidence - Air Traffic Forecasts Assessment

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Bristol Airport Public Inquiry

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1. Introduction

1.1 My name is Patrick Folley, Operations Director and Strategic Consulting Aviation Lead at Jacobs, a multi-disciplinary consultancy. I have over 23 years' experience working in aviation for both government and private sector clients, with a particular focus on traffic demand forecasting and market development, business and strategic planning.

1.2 I have a Masters degree in European Politics from the University of Newcastle upon Tyne.

1.3 During my consultancy career I have undertaken traffic forecasts and related studies for approximately 115 airports in over 50 countries. These range from the largest international airports such as London Heathrow and Hong Kong Airports to smaller regional airports in the UK and overseas. These traffic forecasts have been for government (national and regional), airport management, airport owners and investors. They have been used for master planning of facilities covering expansion of airports, for business planning, regulatory submissions and airport investment decisions. Traffic forecasts I have undertaken in the UK have covered Heathrow, Birmingham, Doncaster-Sheffield, Liverpool, Southend, London-City, Farnborough and Newquay Airports among others.

1.4 My work has also included strategic airline studies, having advised national governments in South Africa and Turkey on development strategies and due diligence for their own national airlines, directly for airlines, as well as undertaking research for bodies such as the European Commission, Airports Council International and the International Air Transport Association in the airline and airport fields.

1.5 I have been responsible for the appraisal of the appellant's air traffic forecast for the proposed development. I have been supported by a team of air traffic forecast specialists and I adopt their work as my own.

1.6 The evidence which I have prepared and provide in this Proof of Evidence is true and I confirm that the opinions expressed are my true and professional opinions.

2. Structure and Scope of Evidence

2.1 My statement covers the assessment of the air traffic forecast provided by the appellant in support to its proposal for an increase in operating capacity to 12 million passengers per annum.[1]

2.2 My statement is presented in the following structure:

1. Introduction
2. Structure and Scope of Evidence
3. Forecasting and Uncertainty
4. Annual Passenger Forecasts
5. Busy Day Timetable
6. Night Movements
7. Fleet Mix
8. Conclusions

2.3 The main issues that my statement highlights are:

a) Uncertainty around the assumptions underpinning the air traffic forecast and therefore its implications for the assessment of the environmental and economic effects of the proposed

[1] The appellant has described its air traffic forecasting methodology and results in document ref. CD2.21 (Passenger Traffic Forecasts for Bristol Airport to Inform the Proposed Development to 12 mppa (30 November 2020))

scheme. For instance, I question the assumptions regarding the recovery of business travel after the pandemic.

b) A lack of sensitivity testing for the busy day timetable and fleet mix, which have implications on the noise, air quality and carbon impacts of the proposed scheme.

c) The fact that the busy day timetable and fleet mix forecast were produced prior to the announcement of Jet2.com intending to commence operations from Bristol Airport.

2.4 The consequences of the issues I have identified from proposed development on noise, air quality, greenhouse gas emissions and the economy are not assessed in my Proof of Evidence but they are considered in the evidence of the other witnesses called on behalf of the Council.

3. Forecasting and Uncertainty

3.1 Forecasting the growth in the demand for air travel from a particular airport is inherently uncertain given the broad range of factors that determine the desire to travel, be they economic (e.g. general economic activity, oil prices, ticket prices), social (e.g. the destinations available) or environmental (e.g. the desire not to fly for personal carbon footprint reasons).

3.2 For example, Appendix A provides a comparison of the traffic forecasts of various UK airports in their plans to the actual traffic levels observed after those plans were implemented. The example airports used for this analysis are Belfast, Birmingham, East Midlands and Stansted. For these cases, the actual traffic figures ranged from +51% above forecast to -50% below forecast, with the closest being 26% below forecast. Thus, in practice there can be a wide margin of error in the forecasts produced.

3.3 One of the key inputs that is necessary in the assessment of the impacts of a proposed airport capacity expansion are the forecasts. For example, based on the annual passenger forecast (and a combination of other data and assumptions) the number and types of aircraft using the airport, number of night-time flights, number of cars accessing the airport, etc. are estimated. And based on these estimates, the impacts of the capacity expansion on health, the environment and the economy are assessed.

3.4 The appellant forecasts that the proposed expansion of Bristol Airport would accommodate 12 million passengers per annum (mppa) in 2030. Based on this, the appellant has estimated the fleet mix at the airport operating in that year. This fleet mix is then used to assess the impacts of the airport on air quality, carbon and noise levels in 2030. It is assumed that beyond 2030 the adverse environmental impacts of a 12 mppa airport will not be greater than they are in 2030. Generally speaking, this is likely to be correct since it is anticipated that overall aircraft fleets and surface transport will become increasingly more fuel efficient, less noisy and less reliant upon fossil fuels, whilst capacity will remain capped at 12 mppa.

3.5 In accordance with best practice, the appellant has produced alternative scenarios for its annual passenger forecast: slow, core and fast growth. I agree that this process of examining the implications of alternative growth assumptions is appropriate given the inherent uncertainties of traffic forecasts.

3.6 However, the appellant has only provided a forecast fleet mix and night movements for the core scenario case. Fleet mix and night movements forecasts are key inputs into air quality, carbon and noise assessments. Depending on the point in time under consideration, the nature of fleet mix in operation will give rise to different effects upon the environment.

3.7 As an illustrative example, the table below shows what could be the possible fleet mixes of easyJet and Ryanair in 2028, 2030 and 2032 (that is two years earlier or later than 2030). These are currently the two largest operators at Bristol Airport. This table compares the percentage of older generation aircraft in these airlines fleets to the percentage of cleaner and quieter next generation aircraft, such as the Boeing 737 MAX-8 and Airbus A320-neo (easyJet and Ryanair have large orders confirmed of these next generation aircraft).

3.8 As the table shows, the percentage of next generation aircraft could be up to 9 percentage points lower in 2028 and up to 7 percentage points higher in 2032. This means that the fleet mix at Bristol Airport (where easyJet and Ryanair are currently the largest operators) could be different if 12 mppa were reached earlier or later than 2030, and as a consequence the environmental impacts of the proposed development could also be different. This reveals the extent to which uncertainty may affect the appraisal of the environmental and economic benefits of the proposed development.

Table 1: Estimate percentage of aircraft by type (as percentage of the airline's fleet)[2]

	easyJet		Ryanair	
Year	Older aircraft	Next-gen aircraft	Older aircraft	Next-gen aircraft
2028	18%	82%	16%	84%
2030	11%	89%	7%	93%
2032	4%	96%	7%	93%

3.9 Thus, in general terms the fast scenario is likely to result in 12 mppa being accommodated in a fleet mix comprising a larger proportion of older, dirtier and noisier aircraft compared to the core scenario. Similarly, the slow scenario will have a different impact since 12 mppa would be

[2] Jacobs' estimate based on data from CAPA on current fleet, typical retirement age and aircraft orders from these airlines.

accommodated at a point in time where the fleet mix is likely to comprise a larger proportion of cleaner and quieter aircraft compared to the core scenario.

3.10 I say, "in general terms" because many things can happen at airports over time. For example, if new operators were to come to Bristol in the future who operate proportionally more older aircraft, there is the potential for the fleet mix to alter materially. Indeed, this has happened recently with the announcement in December 2020 that Jet2.com intends to commence operations from Bristol Airport. I address this further below.

3.11 The result of the above is that the decision maker in this appeal needs to take into account the extent of the uncertainty associated with any proposal to expand an airport. Unfortunately, the Environmental Statement and its addendum do not appraise the environmental or economic impacts of the slow growth or fast growth scenarios. The environmental and economic impacts that could arise may be materially different from those assessed, and the full range of those impacts has not been presented in the assessment produced to date.

3.12 The witnesses on behalf of the Council seek to address the implications of this uncertainty in their evidence to the extent that it is possible to do so.

4. Annual Passenger Forecasts

4.1 The appellant's annual passenger forecasts have been produced combining two methods:

a) A Bottom Up forecast that considers airline behaviour and any short-term impacts that would not be picked up through economics alone. This method is used to forecast traffic up to 2023; and

b) A Top Down forecast that uses mid- to long-term econometrics to model the underlying passenger demand at an airport or region. This is used to forecast traffic from 2023 onwards.

4.2 I consider that this methodology is appropriate.

4.3 However, uncertainty remains in the assumptions underpinning these forecasts, such as the impact of Covid-19 and the speed of the anticipated economic recovery, the impact of the UK leaving the European Union, changes in oil prices, etc. The uncertainty for the airports industry in the UK, given the pandemic and Brexit alone, is greater that it has been for decades and in my view this needs to be recognised.

Covid-19 impacts

4.4 For the long term, the appellant's forecasts have been based on economic projections with Covid-19 factored into them. In the short term (and based on those projections) the appellant has reduced the frequency of flights on some routes or completely removed the routes.

4.5 The appellant has also produced alternative scenarios that test the impacts of a slower/faster Covid-19 recovery on annual passenger numbers. This is in line with standard industry practice.

4.6 The appellant's core scenario sees passenger demand in the airport's catchment area recovering to 2019 levels by approximately 2023. The main trip purpose at Bristol Airport is leisure[3]. This market segment is thought to recover more rapidly than business as travel restrictions are eased[4]. In addition, Bristol Airport is an established base for large low cost

[3] https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Consumer-research/Departing-passenger-survey/Survey-reports/
[4] https://simpleflying.com/will-airlines-be-ready-when-leisure-demand-returns/

airlines (e.g. easyJet and Ryanair) that are capable of using pricing as a mechanism to attract back passengers and growth. This level of recovery is therefore considered plausible.

4.7 However, as previously mentioned, the appellant has not provided the future fleet mix and night movements for the slow/fast growth scenarios, only for the core scenario.

Brexit impacts

4.8 In 2019, 76% of the flights scheduled at Bristol Airport were to EU countries. And 10% of these (7.4% of total) were to Eastern EU countries, which in recent decades have been an important source of labour for the UK. With Brexit, there have been significant changes to the EU citizens' ability to work in the UK, and this could affect passenger demand for these routes.

4.9 The appellant's long term forecasts have been based on economic projections with Brexit uncertainty factored into them. The appellant has also indicated that (when choosing probabilities in the Monte Carlo simulation) it assumed the balance of risk was towards the downside (at the time) given COVID-19 and Brexit. I agree that this is a reasonable approach.

4.10 However, for the bottom-up forecast used in the short term, the appellant has not considered a reduction or levelling off of route frequency to EU worker markets (e.g. Eastern Europe). In my view, the end of freedom of movement between the UK and these EU worker markets may not have been appropriately reflected in the appellant's short term forecast.

4.11 The pandemic and Brexit are factors which weigh against any rapid growth at Bristol Airport in the short term; rather these factors are likely to affect the position so as to reduce the demand for travel in the short term. In my view this means that the fast growth scenario is less likely to materialise than the core scenario. Whilst there is the potential for growth to be slower over the longer term if the pandemic continues to impinge upon the ability to travel on holiday, it seems to me that this is less likely than a gradual recovery over the short/medium term given Bristol

Airport's strong leisure traffic component. As a result, I believe that the core scenario is more likely to materialise than the slow scenario. On that basis I consider the use of the core scenario for the assessment of the environmental and economic impacts to be appropriate although the uncertainty, and the potential difference in the scale of impacts associated with this, needs to be recognised and understood.

Business passenger forecasts

4.12 The appellant's Environmental Impact Assessment Addendum (dated November 2020) states: *"while business travel will probably take longer to recover, we expect it to recover substantially before the time period for this assessment"*.

4.13 The elasticities used by the appellant for forecasting business passenger growth are from the Department for Transport's (DfT) UK Aviation Forecasts 2017.

4.14 In the appellant's core case the average annual growth rates for business passengers and leisure passengers assumed for the 2019-2030 period are as follows:

Table 2: Passenger growth by trip purpose in the appellant's forecast

Trip purpose	Average annual passenger growth (2019-2030)
Domestic Business	3.0%
Domestic Leisure	2.0%
International Business	2.8%
International Leisure	2.9%

4.15 As the table above indicates, international business travel would grow at almost the same rate as international leisure travel, and that domestic business travel would grow quicker than domestic leisure travel.

4.16 According to the CAA's passenger surveys[5], between 2000 and 2019 business passenger numbers grew by an average 4.2% per year at Bristol Airport, while leisure passenger numbers grew by an average 8.1% per year. This showcases how even prior to the Covid-19 pandemic and Brexit, leisure travel was growing at almost double the pace than leisure travel at the Airport.

4.17 The pandemic has resulted in significant skilling up in the use of technology in order to conduct business (e.g. an increasing use in virtual meetings). This is likely to mean that business travel will not grow generally at the rates seen prior to the pandemic. In my view there is likely to be a slower long-term recovery for business travel than leisure.

4.18 This issue is more likely to be experienced at Bristol Airport than many others since the market demand it caters to primarily is that of leisure destinations as opposed to the key business centres within Europe.

4.19 Therefore, I question whether the elasticities specified in the DfT's UK Aviation Forecasts 2017 remain appropriate to forecast business passengers at Bristol Aiport, especially given the potential impacts of the Covid-19 pandemic and Brexit on business travel.

4.20 I also note that the growth rates provided by the appellant are for the average of the 2019-2030 period, so it is not possible to differentiate the assumed recovery profile from Covid-19 and the growth afterwards.

Assumptions derived from airline interviews

4.21 The appellant's traffic forecasting report states: *"A core element of this work on the short term forecast has been to engage with the key airlines at BAL, namely easyJet, Ryanair and Tui. In*

[5] https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Consumer-research/Departing-passenger-survey/Survey-reports/

order to provide the greatest value to the forecasting process, these meetings remain commercially confidential, but the intelligence gathered on airline intentions influenced the short-term forecasts and also provided validation on the long-term forecasts based on how the airlines view the market within the region. Furthermore, engagement with the airlines has allowed us to consider other relevant matters including expected changes in the fleet mix over time".

4.22 The notes from these airline interviews have not been provided due to asserted confidentiality constraints. This means that there is an element of input into the forecasting exercise which cannot be scrutinised by the decision maker, the Council or the public.

4.23 A number of points have been made in the clarification response from the appellant dated 21 January 2021 including the following:

a) There is a commitment by all key carriers to Bristol and a desire in all cases to grow at the airport;

b) That recovery projections ranged from 2021 through to 2024 for the key carriers;

c) That airlines expect to introduce newer variant aircraft to Bristol Airport ahead of some other airports; and

d) That the market is likely to remain relatively seasonal (as with other regional airports of a comparable size) and that there was no expected significant shift in operating patterns at the airport across the core airlines.

4.24 These points do seem to support the assumptions adopted by the appellant but there is no documentary evidence to support them – they are points which remain assertions. Further, the information provided is general and does not specify what each airline stated in particular. Nor

is any legally binding commitment from airlines provided or proposed. In addition, it is not clear when these interviews exactly took place in 2020. Given the rapidly changing pace of the pandemic, the extent to which the airline's views may have changed since is unknown.

4.25 The assumptions said to be drawn from these confidential interviews have an impact on airline growth and therefore the forecast fleet mix and business/leisure splits. In the absence of evidence to support them or the means of scrutinising them, they have to be treated with caution.

Route development approach

4.26 The appellant's traffic forecast report states: *"For potential new routes, market stimulation is applied based on evidence of historic rates of stimulation seen at Bristol Airport as new services have been launched"*.

4.27 The appellant has also provided the rationale for routes being picked, with some highlights as follows:

a) Short haul: All destinations that have 15,000 pax/year of demand in Bristol Airport's catchment area were initially picked.

b) Long haul: Some points that are capable of being reached (incl. US east coast and Middle East) were initially picked.

c) Reinstatement of routes from BMI Regional and Thomas Cook were also initially picked.

d) Of the above, only those routes that could sustain a load factor of over 85% on the forecast years were retained.

4.28 The rationale described appears in line with standard industry practice. However, it does not indicate how these routes support the assumptions made with regards to the projected business travel growth. When asked, the appellant has replied as follows (in its clarification responses dated 19 February 2021):

" While the 'bottom up' forecasts do consider market growth in terms of business and leisure travel, the extent of dislocation in the market in the short term is such that, in our view, it is only sensible to view the market in aggregate. As we have commented previously, it should be recognised that the short term is of limited relevance to the assessment of the application, as it is some time before relevant thresholds are reached in the forecasts."

"In relation to the longer term, the passenger volume forecasts are not undertaken on a route by route basis and hence it is not possible to provide such an assessment. As is stated in the Forecasting Report, the elasticities used within the growth modelling are adopted from the Department for Transport's UK Aviation Forecasts 2017. These were developed through a detailed and robust econometric modelling process. They provide a comprehensive, long term view of the relationships between market growth and income and air fare drivers. To the extent that there are differences between markets, these are a reflection of the underlying analysis undertaken by the Department."

4.29 Based on this response:

a) For the short term, I consider that the appellant has not demonstrated how this route development approach supports its projected growth business travel; and

b) Earlier in this proof of evidence, I have stated that I question whether the elasticities specified in the DfT's UK Aviation Forecasts 2017 remain appropriate to forecast business passengers at Bristol Airport given the potential impacts of the Covid-19 pandemic and

Brexit on business travel. Thus, I do not consider that the appellant's route development approach supports its projected growth in business travel in the long term either.

Logit model for airport choice

4.30 As mentioned earlier in this document, for the long term annual passenger forecast the appellant has used an econometric passenger allocation model (logit model) to determine how the underlying passenger demand base in the broad catchment area around Bristol Airport will split between it and a number of competing airports.

4.31 The logit model examines how passengers make choices between the different airports available based on factors including surface access time, flight time, the availability of the relevant destination, the 'quality' of service as represented by the level of service frequency offered, the availability of indirect options, airline type and fares on offer.

4.32 The appellant has indicated that the values assigned to each variable differ by market segment. However, the appellant has not indicated what values have been assigned to each market segment. Jacobs has asked numerous times for this information. The failure to provide it means that we are unable to understand the basis on which passengers have been allocated by market segment. Until that information is provided I have to reserve my position on whether the passenger allocation model is appropriate.

5. Busy Day Timetable

5.1 Busy day timetables provide outputs for surface access assessments and capacity planning. They also form the basis of annual fleet mixes and inform calculations related to the numbers of flights by time of the day, which are used for the assessment of air quality, carbon and noise impacts.

5.2 The appellant identified a 'typical busy day' to forecast a future busy day at 12mppa. The approach to selecting this 'typical busy day' (in accordance to its clarification responses) was:

a) The appellant first picked the day of the 30th busiest hour in the year (as in standard UK planning). However, that day had only 203 ATMs and sat outside of the 92-day noise period; and

b) So instead the appellant chose Friday 30th August 2019, with 212 ATMs. That is the 4th busiest day of the year and coincides with 11 other days.

5.3 This approach is considered appropriate.

5.4 The appellant used the ratio between a busy day and annual movements in 2019 to identify the number of flights on a busy day at 12mppa. The appellant sets out that historic changes in seasonality have been analysed, and concluded that keeping this ratio fixed is appropriate due to a lack of evidence of significant changes.

5.5 In a clarification question Jacobs noted that route development and varying growth in different traffic segments seasonality may change in the future. In response the appellant provided more detail on its top down approach, elasticities and route development assumptions. The methodology used appears sound.

5.6 The appellant added new flights to the schedule up to the projected number of movements for a busy day. Jacobs noted that it was unclear what routes and frequencies were considered and how these were added to the schedule. In the clarification responses received the appellant provided more detail on its assumptions, such as:

"it is important when looking out as far as 2030 to recognise that routes presented and included in the busy day schedule are indicative, and the actual routes which could be delivered may be

different over time. The inclusion of routes specifically in the schedule illustrates the types of routes which are likely to be served, and then allows schedules to be built for aircraft operating to destinations of this nature. However, in the early years, these are taken from the indicative bottom-up forecast list, whilst over the longer term they represent the types of destinations seen from other UK regional airports, but not yet at Bristol.

The result is that it is the profile and nature of operations which are more important than the actual destination, for example a route from Bristol to key Spanish holiday destinations will take approximately 2 hours 20 minutes to 2 hours 30 minutes regardless of whether it is Palma or Alicante and, therefore, we do not believe it is material whether the schedule shows one or the other destinations, but rather that it reflects what a schedule will look like if airlines operate to destinations such as these. The busy day timetables are built up from realistic profiles of aircraft operation. It is expected that, overall, there will be limited change in the nature of markets served from Bristol, focusing primarily on European routes with a mix of leisure and major city destinations."

5.7 In my view, the assumptions used appear appropriate at the point in time when they were produced.

5.8 The appellant also provided the profiles for the busy day schedule in 2019, 2024 and 2030, which overall seem aligned with the rationale which has now been provided.

5.9 However, since the production of the appellant's forecast, Jet2.com, a British low-cost leisure airline, have announced plans to open a new base at Bristol Airport, effective 01 Apr 2021[6]. The carrier plans to offer routes to 33 destinations and up to 56 times weekly movements from the airport. With this, Jet2.com may become the third main carrier at Bristol Airport (with easyjet

[6] At the time of writing this Proof of Evidence Jet2.com have not started their operations at Bristol due to the UK government restrictions on international travel. Operations are currently expected to start in the summer if these restrictions are eased.

and Ryanair). This announcement has the potential to alter the routes at Bristol Airport and therefore the busy day timetable. I examine the implications of this further below.

6. Night Movements

6.1 The number of night movements in the summer period are important to assess noise levels at night on the surroundings of the airport.

6.2 The appellant calculated the ratio of night movements in the summer of 2019 divided by the night movements in the busy day of 2019.

6.3 To forecast future night movements in the summer for existing routes, the appellant used this ratio (for the specific carrier) and multiplied it by the number of night movements in the busy day. For new routes, the appellant used the average ratio of the three main carriers in the airport (easyJet, Ryanair and Tui). I regard this approach as appropriate at the point in time when it was adopted.

6.4 However, as mentioned earlier in this document, the lack of sensitivity testing in this area is a concern. The appellant has provided a night movements forecast for the core scenario only and not for the slow and fast growth scenarios. However, this forecast of night movements was produced prior to the Jet2.com announcement (which may affect the busy day timetable and, thus, the number of night movements). I therefore believe that the calculation of the number of night movements by the appellant is not appropriate, as it does not reflect the Jet2.com operations and no sensitivity testing has been carried out.

7. Fleet Mix

7.1 The fleet mix is the breakdown of air traffic movements at an airport by aircraft type. This is a key input into the air quality, carbon and noise assessments of that airport, as different aircraft types have different emissions and noise levels.

7.2 The appellant has estimated a future fleet mix at Bristol Airport for the Core case forecast. That fleet mix shows the number of movements per aircraft type in 2030, the year when 12 million annual passengers are reached in that case.

7.3 As mentioned earlier in this document, the lack of sensitivity testing in this area is a concern: no fleet mix for the slow and fast growth scenarios has been produced and the environmental/economic impacts of these scenarios has not been identified.

7.4 According to the appellant's forecasting report, the historic busy day to annual ratio for each airline type (such as Low Fares, Charter, Full Service etc.) was identified. The appellant then applied these ratios to the airlines and their corresponding aircraft types in the busy day timetable, to multiply the day back up to annual. This provided the number of air traffic movements per aircraft type. In my view this approach was appropriate when it was applied.

7.5 However, since the production of the appellant's forecast, Jet2.com has announced plans to open a new base at Bristol Airport, effective 01 Apr 2021[7]. The carrier plans to offer routes to 33 destinations and up to 56 times weekly movements from the airport. Ryanair and easyJet operate at high frequencies from Bristol Airport and, given the Jet2 announcement, the three carriers are likely to dominate air traffic at the airport in future years.

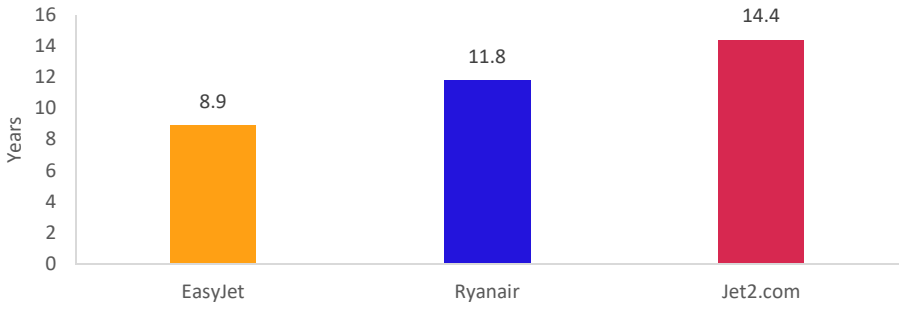
[7] At the time of writing this Proof of Evidence Jet2.com have not started their operations at Bristol due to the UK government restrictions on international travel. Operations are currently expected to start in the summer if these restrictions are eased.

7.6 Jet2.com has historically bought second hand or older generation aircraft, which are then operated for a long period. This is in contrast to easyJet and Ryanair, who tend to buy aircraft new and replace them at a higher frequency. This is reflected by:

a) a notable difference in average aircraft age (see figure below) between these airlines; and

b) the fact that easyJet and Ryanair have large orders of new generation aircraft (92 "A320neo" and 16 "A321neos" for easyJet and 135 "Boeing 737-Max8s" for Ryanair), whilst Jet2.com has no new aircraft on order at the time of writing this Proof of Evidence.

Figure 1: Average aircraft age in February 2021 (Source: CAPA)



7.7 Taken together this means the fleet mix in the forecast years at Bristol Airport may be materially different than that anticipated by the appellant. A more up-to-date fleet mix forecast (including Jet2.com's aircraft) will result in greater noise and air quality impacts than what the appellant has identified in the ES and ES Addendum.

7.8 I have produced an alternative 2030 fleet mix which takes into account Jet2.com's operation. This is to enable assessment of how this fleet mix may differ from that identified by the appellant. In order to provide a direct comparison to the appellant's fleet mix, I have taken the same approach when developing the fleet mix to include Jet2.com. Where appropriate, I have retained all of the appellant's assumptions as listed within its Passenger Demand Forecast Addendum (November 2021) and the appellant's Forecast Clarification Note (21 January 2021).

7.9 My assessment of the airlines' future fleet mix has been based on aircraft orders and age, with the following outcomes:

a) easyJet and Ryanair will transition largely to A320neos and 737-Max8s respectively, with a small percentage of A321neos and 737 Max10s expected in the year 2030.

b) Jet2.com will continue to operate 737-800's in the year 2030.

7.10 As a result, my 2030 fleet mix sees an increase of c.11,400 movements (+479%) of the Boeing 737-800 aircraft and a reduction in annual movement of the Boeing 737 MAX 8 (-2,676 movements, that is -19%) and Airbus A320Neo family (-1,495 movements, that is -4%) when compared to the appellant's forecast.

7.11 These are significant differences which are likely to have material implications in the noise, carbon and air quality impact assessments of the proposed development. These implications are addressed in the proofs of Evidence of the relevant consultants on behalf of the Council.

Table 3: 2030 fleet mix comparison

Aircraft	Appellant's 2030 Fleet Mix	Jacobs 2030 Fleet Mix	Difference
Aircraft used by Jet2.com (and others)			
Boeing 737-800	2,380	13,781	*+11,401*
Next generation aircraft			
Airbus A320neo	20,200	24,538	*+4,338*
Airbus A321neo	15,720	9,887	*-5,833*
Boeing 737 MAX 10	2,050	2,097	*+47*
Boeing 737 MAX 8	14,360	11,684	*-2,676*
All other existing generation aircraft			
Airbus A320	6,540	2,828	*-3,712*
ATR 72	8,360	5,225	*-3,135*
Boeing 737-700	750	2,397	*+1,647*
Boeing 767-400	-	300	*+300*
Boeing 777	-	300	*+300*
Boeing 787-8	510	599	*+89*
Embraer 190	2,240	599	*-1,641*
Embraer 195-E2	2,240	-	*-2,240*
Embraer RJ145	-	1,115	*+1,115*
Total air movements	**75,350**	**75,350**	-

8. Impacts of my Proof of Evidence to other areas

8.1 My proof of Evidence highlights the following issues that may have implications in the assessment of noise, air quality and the economy. These are further examined in the proofs of Evidence of the respective consultants on behalf of the Council.

Noise

8.2 The appellant has only provided the busy day timetable, number of night movements and fleet mix for its core case, with no alternative scenarios being quantitively tested. Furthermore, some of the assumptions underpinning these forecasts are based on airline interviews but, due to confidentiality, there is no detail on the statements made by the airlines or their level of commitment. And these forecasts have been produced prior to the Jet2.com announcement of starting operations at the airport.

8.3 Because the noise emitted varies from one aircraft type to another and older aircraft tend to be noisier than newer, this means that the noise levels produced by the proposed development and impacts that these may have on health and quality of life are likely to be higher than those which the appellant has estimated.

8.4 Mr Fiumicelli addresses in his evidence whether proposed conditions will control the impacts to the level's assessed by the appellant even if the fleet mix changes as I have identified above.

Air quality

8.5 The appellant's fleet mix forecast was produced prior to the Jet2.com announcement of starting operations at the airport. My assessment indicates that, due to this, the future fleet mix could have a lower proportion of "next generation" aircrafts than what the appellant has forecast, as Jet2.com has a relatively older aircraft fleet and no new aircraft orders currently in

place. This has the potential to increase the emissions to air of the proposed development. In addition, the appellant has only provided the fleet mix forecast for its core case, with no alternative scenarios being quantitively tested.

8.6 This means the emissions to air of the proposed development are likely to be higher than those estimated by the appellant. The implications of this are considered by Dr Broomfield in his evidence relating to air quality.

Economy

8.7 The appellant's route development assumptions for forecasting in the short term appear in line with standard industry practice. However, they do not provide sufficient evidence to support the growth assumptions made with regards to business travel in its forecast.

8.8 To forecast business passengers in the long term, the appellant has used elasticities from the DfT's UK Aviation Forecasts 2017. I question whether these elasticities remain appropriate after the Covid-19 pandemic (given the recent changes in business behaviour accelerated by the pandemic, such as a more established use virtual meetings) and Brexit.

8.9 This could mean that the economic benefits of the expansion may be lower than what the appellant has estimated both in the short and long term. The implications of this are considered by Mr Siraut in his evidence relating to the economy.

9. Conclusions

9.1 Air traffic forecasts are inherently uncertain. Uncertainty remains in the assumptions underpinning the appellant's air traffic forecasts, such as the impact of Covid-19 and the speed of the anticipated economic recovery, the impact of the UK leaving the European Union, changes in oil prices, etc.

9.2 Due to the inherent uncertainty of traffic forecasts, it is best practice to produce alternative scenarios. In accordance with this, the appellant has produced alternative annual passenger forecasts for the proposed development, that is: slow, core and fast growth. I consider that sound.

9.3 Of these scenarios I considered that the core scenario is the most likely to occur.

9.4 However, the appellant has only provided its forecast fleet mix and night movements for its core case. Fleet mix and night movement forecasts are relevant for air quality, carbon and noise assessments. This means that the full range of impacts associated with the uncertainty in the forecasts has not been assessed.

9.5 I also question some of the assumptions used by the appellant which cast uncertainty on the results of its air traffic forecasts and, therefore, their implications on the environment and the economy:

a) The appellant has used airline interviews to inform its forecasts, which is sound. However, the appellant has only provided high-level anonymised outcomes from these interviews, indicating that due to stated confidentiality it cannot provide more detail. The information provided is general and does not specify what each airline stated in particular, nor does it show a commitment from the airlines to follow through with these statements.

b) The appellant's bottom-up forecasts haven't considered a reduction or levelling off of route frequency to EU worker markets, e.g. Eastern Europe. I thus question whether the end of freedom of movement between the UK and these EU worker markets is accurately reflected in the appellant's short term forecast.

c) The appellant's route development assumptions for forecasting in the short term appear in line with standard industry practice. However, they do not provide sufficient evidence to support the growth assumptions made with regards to business travel in its forecasts.

d) To forecast business passengers in the long term, the appellant has used elasticities from the DfT's UK Aviation Forecasts 2017. I question whether these elasticities remain appropriate after the Covid-19 pandemic (given the recent changes in business behaviour accelerated by the pandemic, such as a more established use virtual meetings) and Brexit. I also note that the growth rates provided by the appellant are for the average of the 2019-2030 period, so it is not possible to differentiate the assumed recovery profile from Covid-19 and the growth afterwards.

e) For the long term forecast the appellant has used an econometric passenger allocation model (logit model) to determine how the underlying passenger demand base in the broad catchment area around Bristol Airport will split between it and a number of competing airports. The logit model examines how passengers make choices between the different airports available based on factors including surface access time, flight time, the availability of the relevant destination, the 'quality' of service as represented by the level of service frequency offered, the availability of indirect options, airline type and fares on offer. The appellant has indicated that the values assigned to each variable differ by market segment. However, the appellant has not indicated, when queried, what values have been assigned to each market segment. As a result I am unable to confirm whether the passenger allocation model is appropriate since I have been denied the information I need to be able to do this.

9.6 Since the production of the appellant's forecast, Jet2.com, a British low-cost leisure airline, has announced plans to open a new base at Bristol Airport, effective 01 Apr 2021. The carrier plans

to offer routes to 33 destinations and up to 56 times weekly movements from the airport. With this, Jet2.com may become the third main carrier at Bristol Airport (with easyjet and Ryanair). This announcement is likely to alter the busy day timetable, night movements and fleet mix at the airport.

9.7 Jet2.com has historically bought second hand and older generation aircraft which it operates for a long period. This is in contrast to easyJet and Ryanair, who tend to buy aircraft new and replace them at a higher frequency. Currently Jet2.com has an older fleet than these other airlines and it doesn't have new planes on order, whilst easyJet and Ryanair have large orders confirmed of cleaner, next-generation aircraft (A320neo family and 737 MAX 8, respectively).

9.8 This means that the fleet mix in the future years is likely to look different with the introduction of Jet2.com, with a larger proportion of older, noisier and dirtier aircraft. Using an approach aligned as much as possible to the appellant's, I have produced an alternative 2030 fleet mix with Jet2.com in it. The result is an increase of c.11,400 annual movements (+479%) of the Boeing 737-800 aircraft and a reduction in annual movement of the more efficient Boeing 737 MAX 8 (-2,676 movements, that is -19%) and Airbus A320Neo family (-1,495 movements, that is -4%) when compared to the appellant's forecast.

These are significant differences that can increase the noise, carbon and air quality impacts of the proposed development. These are further examined in the proofs of Evidence of the relevant consultants on behalf of the Council.