Chris Smith Aviation Consultancy Limited

London Luton Airport: Initial Review of DCO Need Case

Host Authorities

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Chris Smith Aviation Consultancy Limited is a company registered in England and Wales.
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Contents

1 Introduction

Purpose

1.1 CSACL was appointed in late July 2023 to assist five local authorities (The Host Authorities) in their response to a Development Consent Order (DCO) lodged by the owner, Luton Rising, of London Luton Airport (LLA/LTN) to expand the airport. CSACL was asked to examine the air traffic forecasting aspects of Luton Rising's Need Case.

1.2 This report is a review of the Need Statement (NS) produced by York Aviation Limited and published in February 2023.

1.3 York has indicated that it has produced 'Assessment' forecasts i.e. forecasts to test the impact of the proposed development. It was intended that any bias would err towards over-estimation of negative impacts such as surface access, noise and emissions, but in so doing it would also over-estimate the economic impact.

Background

1.4 CSACL has worked on the development of Luton Airport on several occasions in the past. In the early 1990s, it advised a potential investor seeking to acquire the airport, and played a similar role in 1998 working with the consortium which won the concession to operate the airport. During the mid-2000s it worked extensively for the airport company in assessing development options. In 2013, it carried out a capacity assessment on behalf of Luton Borough Council. It has also undertaken several projects for easyJet advising on both airline management issues and the carrier's contribution to the Davies Commission on airport expansion options in the London area.

Scope of this Report

1.5 This Initial Report focuses on the primary annual forecasts for passengers, cargo and aircraft movements, with limited examination of these demand elements for shorter time-periods.

1.6 The focus of the CSACL work has been on the Core Development Case, with limited consideration of the Slower and Faster Growth cases.

1.7 No assessment has been made of projections of economic impact, or of government policy.

Contents

1.8 Following an Executive Summary (Chapter 2), a more detailed analysis of the Annual Passenger forecasts is presented as Chapter 3. Chapter 4 covers forecasts of other demand elements, specifically cargo tonnage and aircraft movements, both annually and for other shorter assessment periods. The No Development Case is considered in the final chapter.

2 Summary

Annual Passenger Forecasts

2.1 York's approach to passenger forecasting has two main elements, which are firstly to estimate demand in the southern half of the UK, and then to assess how much of that demand would use London Luton Airport (LTN) taking into account the possible provision of an additional runway at Heathrow or Gatwick or at both. In practice, the second element exercises greater influence on future passenger volumes at LTN than the first.

2.2 The first element draws on the econometric forecasting approach used by the Department for Transport (DfT). While the methodology is reasonable, the assumptions which are used are likely to underestimate the impact of the several major events of the last few years, namely the Covid-19 Pandemic, the Russian invasion of Ukraine and to a lesser extent, Brexit, and possibly also the impact of Net Zero policies. These all represent down-side risk factors which mean that York's forecasts are likely to be too high.

2.3 The second element is critically dependent on the assumption made about new runway provision and the passenger handling capacities at Heathrow and Gatwick. York's Core Planning Case assumes that only one runway will be provided although it does not make a choice on the expanding airport. The assumption of one additional runway is reasonable, and CSACL considers that Gatwick is the more likely location.

2.4 York further assumes that passenger numbers at Heathrow stop growing when throughput reaches 90 mppa (million passengers per annum). As there is no legal limit on the passenger throughput of Heathrow (or Gatwick), CSACL considers this most unlikely as the number of passengers can continue to increase because of increases in passengers per Passenger Air Transport Movement (PATM): if Heathrow handled 100 mppa, the average passengers per PATM would only reach 211 passengers.

2.5 Not restricting passenger growth at Heathrow delays LTN reaching 32 mppa by five years or so. This conclusion is based on combining the most recent DfT forecasts published in March 2023 with the runway capacity assumptions outlined immediately above. These DfT forecasts suffer from similar down-side risks to those associated with York's. On this basis, LTN's throughput would not reach 32 mppa until the late 2040s or early 2050s.

2.6 In the event that no new runway were provided at either Heathrow or Gatwick, then LTN would be likely to reach 32 mppa soon after its physical infrastructure were provided, in the late 2030s or early 2040s.

2.7 These conclusions assume that the views and recommendations of the Government's advisor on Climate Change, the Climate Change Committee, do not reshape Government policy.

Other Traffic Projections

2.8 York's forecasts of cargo tonnage are probably too high for two different reasons. Firstly, while it has reasonably concluded that the market for cargo carried on dedicated freighter aircraft will not grow, it has maintained tonnage at the level seen in 2019, which in its own words was an isolated peak, rather than a fairly stable figure seen over a longer period. The second reason is that while York has reasonably assessed that long haul passenger services would also boost cargo traffic (carried in the belly holds of passenger aircraft), it has probably been optimistic about the number of long haul services that might be attracted to LTN. As York has noted, its forecasts are primarily for assessment purposes, so that an over-estimation here of cargo tonnages is unlikely to be a critical issue.

2.9 In relation to movements by dedicated freighter aircraft (Cargo Air Transport Movements (ATMs)), while York has chosen to take an historic average over several years rather than use the peak number seen in 2019, the actual number of movements is reasonable, as are the aircraft types projected.

2.10 The bulk of aircraft movements at LTN are by commercial aircraft providing passenger services, or Passenger ATMs. York's approach to developing these forecasts is appropriate and is based on developments in the average number of passengers per PATM. York has reasonably identified two factors which will reduce growth in this parameter below the rates seen historically. York may have erred on the side of caution and under-estimated both of these factors, thereby over-estimating PATMs. However, for the purposes of assessment of impacts, York's PATM forecasts are reasonable, as is its projected fleet mix of aircraft types.

2.11 York has forecast other aircraft movements which are largely associated with Business Aviation to remain constant, and this is reasonable.

2.12 York has developed a Busy Day Time Table (BDTT) of passenger aircraft movements at LTN on a representative day in the summer for an annual passenger throughput of 32 mppa. This has been prepared on a thorough basis taking into account all relevant factors. While not a uniquely valid projection of what might be experienced at this throughput, it is a reasonable representation and is a valid tool to assist in developing other forecasts.

2.13 The figure for aircraft movements during the Night Control Period (23:30 to 06.00) at 32 mppa is reasonable, but the assumption that cargo movements during the period can be reduced could be problematic. York considers that solutions can be found to achieve this reduction and that in any event the number of passenger operations affected would be small with airline scheduling options available to cater for fewer operations during the night. This is a plausible argument.

2.14 York's approach to forecasting movements in a 92 Day Summer period (used for noise assessment purposes) is based on assuming that movements in this period were the same proportion of the annual total as in 2019. These forecasts are consistent with using the BDTT as a starting point.

2.15 York's assumptions on the aircraft types that provide these future movements are reasonable for passenger and cargo operations. York rightly does not include potential future zero emissions aircraft in its Core Planning Case as their development will be challenging.

2.16 York has derived Busy Hour Passenger forecasts from its BDTT, sense-checking against longer term trends for airport traffic to be become less peaked as traffic volumes grow. This is a reasonable approach, although the resulting forecasts may be a little low as the load factor assumed is not significantly above the annual average load factor. However, this would only have an influence within the airport estate.

No Development Case

2.17 This case has been developed as a base to allow assessment of the impacts of the proposed development. Passenger volumes are held at the level of the current annual cap. York has also assumed that the number of passengers per Passenger Air Transport Movement is held constant as airlines maintain frequency of service. This is considered by CSACL to be unlikely as LTN predominantly serves leisure passengers for whom frequency is less important, while moving to larger aircraft lowers airlines' costs and emissions (on a per passenger basis). Hence, it is likely that PATMs are over-estimated on an annual basis, and possibly for the 92 Day period, although the effects may not be material.

2.18 Forecasts for other aircraft movements are reasonable. While forecasts for other parameters (such as passenger busy hours) are not given, it would be reasonable to assume that these were unchanged from their 2019 values.

3 Passenger Forecasts

Introduction

3.1 This chapter provides an analysis of the passenger demand forecasts of the Need Case prepared by York Aviation Limited (YAL/York). It considers in order (a) the approach adopted; (b) the assumptions used; and (c) the outputs produced, before offering conclusions on this element of the Need Case. Other forecasts are considered in Chapter 4.

Approach to Passenger Demand Forecasts

3.2 The approach adopted by York to produce long term passenger forecasts to 2050 has several steps:

- Apply an econometric approach to estimating demand over the forecasting period in a defined study area;
- Allocate that demand to individual airports (including LTN) assuming that there are no airport capacity constraints;
- Apply known capacity limitations at London area airports;
- Re-allocate unaccommodated demand to airports with capacity;
- Adjust for Covid-19, some airline service changes and for an assessed growth in long haul flights at LTN; and
- Assess potential demand for LTN against its assessed capacity.

3.3 This is a logical approach appropriate for forecasting future demand at LTN. Each step will first be discussed in turn.

Econometric Forecasts

3.4 The Base Year used by York is 2019. This is considered to be the only sensible choice given the extent to which the Pandemic disrupted the air transport industry over more recent years.

3.5 York has used national air passenger demand originating in the southern half of the UK as being within the wider catchment area of LTN. This is consistent with the demand pattern for the airport in 2019 when less than 0.2%[1] of passengers came from outside this area. Demand within this area is considered at a district level, and is then further sub-divided by journey destination in line with the DfT's latest categorisation (viz: domestic, South Europe, Rest of Europe, OECD and Rest of World)[2], and then further by both purpose of travel (Business or Leisure) and residency (UK or Foreign).

[1] CAA Departing Passenger Survey, 2019, Table 4.3a

[2] The categorisation given in Paragraph 6.3.2 (b) of the Need Case (viz: domestic, European, North America and other long haul) is incorrect.

3.6 The appropriate growth rate applied to each of these elements of demand is based on the work of the Department for Transport (DfT), using the DfT's 2022 income and price elasticities (and their maturity factors), and assumptions about the development of key economic and price drivers of demand. In general, York has adopted the same assumptions used by the DfT unless more up-to-date independent assumptions of economic development were available (as discussed in more detail below). Based on a number of input assumptions on costs, York has made its own assessments of the impact of these cost changes on air fares. The passenger growth rates derived from these inputs have the added feature of having been derived using a Monte Carlo simulation approach, preventing development of an audit trail.

3.7 York's use of the DfT's work is certainly appropriate as this offers the best foundation for building passenger forecasts. However, two factors should be noted:

- A number of changes (one or possibly two significant) in the DfT's model were made prior to the production of the Jet Zero Strategy in 2022, so that the performance of forecasts from this variant of the model has yet to be compared with actual outturn; and

- The Climate Change Committee (CCC), the Government's advisor on this subject, considers the Jet Zero Strategy as high risk and advocates holding down passenger demand.

Changes to the DfT Model

3.8 The DfT forecasts published in March 2022 used the model that has been developed over a very long period by the Department, and indeed it was this that was used for those published in 2017. Between these two forecasts, however, in addition to having a 'normal' re-calibration of relationships between the drivers of growth (such as GDP and price changes) and the expected numbers of passengers, the model also had other changes, including two potentially more significant changes in (a) the segmentation of passenger demand by geographic region, and (b) developing air fare changes by region rather than using a global assumption as applied in earlier versions.

3.9 The revised (2022) model produced an interesting forecast. Despite the impact of the Covid-19 Pandemic, the 2022 forecast for UK passenger traffic in 2050 was virtually unchanged from that of the 2017 forecast at some 495 million passengers per annum (mppa), notwithstanding that an important driver of future demand, namely UK GDP growth, had been revised significantly downwards between the two forecasting exercises.

Table 3.1: Comparison of the DfT Air Passenger Forecasts, 2017 and 2022

Passengers	2017 Forecasts	2022 Forecasts
Passengers in 2025 (mppa)	325 mppa	322 mppa
UK GDP Growth, 2025-2050	+2.2% pa	+1.6% pa
Passengers in 2050 (mppa)	494 mppa	493 mppa

Source: DfT Forecasts

3.10 The comparison in Table 3.1 is between the 2017 Central Unconstrained scenario and the 2022 'Continuation of Current Trends' (or Base) scenario, before Climate Change actions are factored into the calculations. York has stated that it has based its forecasts on a different 2022 scenario which takes account of some further changes made in response to Climate Change considerations. However, the 2050 forecast for this scenario (High Ambition) is only slightly lower than the base 'Continuation of Current Trends', at 482 mppa (vs 493 mppa).

3.11 As noted earlier, to refine the relationships between demand drivers and forecast passengers, the model has traditionally segmented demand between journey purpose (viz. business or leisure), residency (viz. UK or foreign), and domestic or international, with international being further sub-divided into four distinct geographic regions.

3.12 In the 2017 forecasts, there were 19 demand segments in total: two domestic (split by journey purpose), 16 international, with the four regions further divided by both residency and journey purpose, and a final category for those passengers connecting between two international flights at a UK airport. The 2022 forecasts also had 19 categories, but the international regions were different, with 2017's 'Western Europe' being divided into two parts (Southern Europe (SE) and the Rest (RoE)), since in 2017 the Western Europe region had accounted for 79% of the total international demand. For the 2022 forecasts, these two new categories represent approximately 36% and 42% of international demand respectively. To accommodate this division in 2022 the two smallest regions in 2017 (Newly industrialised Countries (NIC) and Less Developed Countries (LDC) and accounting for just 11% in total) were consolidated into a single Rest of World (RoW) region. The fourth region, other OECD countries (10%), was maintained.

3.13 In its 2017 forecasts, the DfT provided details on its assumptions of the contributions of four different cost components, namely fuel price, the cost of carbon, Air Passenger Duty (APD) and other airline costs, to the level of air fares. In its 2022 forecasts, the DfT again used the same cost components but did not provide any detail on the contributions which each made to air fares on a regional basis, and there is likely to be a material variation between regions.

3.14 Very detailed examination of the changes made to the DfT's model leads to the conclusion that division of the European market into two components has probably off-set the effects of the lower UK GDP forecast. However, the changes do represent a significant change in the model (in fact sufficient to offset the effects of the Pandemic), so that it remains to be seen how well its new formulation predicts actual outturn of passenger demand.

Climate Change Committee Reservations

3.15 York uses the forecasts associated with Government's Jet Zero Strategy published in July 2022. It is important to note the existence of the 6th Carbon Budget, and the associated report of the CCC published in December 2020, as well as the annual report by the CCC as the Government's advisor on climate change presented to Parliament in June 2022, the month before the Jet Zero Strategy was published. The CCC has since presented its 2023 report to Parliament.

3.16 One of the recommendations of the CCC in its 6th Carbon Budget Report was that there should be no net expansion of airport capacity in the UK as one mechanism for managing down demand for air travel[3]. This and other recommended demand management measures resulted from the CCC's assessment that reductions of aviation emissions in various ways and off-setting of remaining emissions in other sectors and by other means would be insufficient to allow the aviation sector to reach Net Zero by 2050 unless growth was held down. In 2022, the CCC was obviously also aware of the contents of the forthcoming Jet Zero Strategy, as it was critical in its report to Parliament on the lack of progress on (and inclusion of) demand management measures. Its 2023 report to Parliament suggests that it had not been convinced over the intervening year of any arguments which may have been made by the DfT in support of the Jet Zero Strategy as it continued to advocate its position of no net expansion of airport capacity.

3.17 The CCC stated in its 2023 Report to Parliament that the Jet Zero Strategy approach "*…is high risk due to its reliance on nascent technology…*"[4]. In its report supporting the 6th Carbon Budget, the CCC indicated that in its central scenario (Balanced Pathway) total passengers at UK airports in 2050 should be held to no more than 365 mppa[5], a figure which contrasts with the forecast on which the Jet Zero Strategy is based of 482 mppa in 2050. The forecasts produced in Luton Rising's Need Case would look very different if a future government decided to follow the CCC's advice.

Distribution of Southern UK Passengers

3.18 The next step in York's forecasting process is to estimate how much of this traffic from the southern half of England goes to each of the 11 primary airports in the area. York indicates it has used a detailed model using historic preferences, surface journey time and costs, air service range and frequency offered (or assumed to be offered) at each airport. The range and frequency of flights is updated each modelled year based on growth in passenger demand allowing more flights to be offered. This is a logical and very detailed approach.

3.19 This step produces passenger demand forecasts assuming that no airport has any physical infrastructure or planning constraints that limit their capacities. The next step in the exercise is to assess whether any such constraints exist at airports other than LTN, and then to increase the price associated with the use of the airport, until demand is reduced to the level of the capacity which is available. The demand which is 'priced-off' by this approach is then assessed to have either (a) decided not to fly at all, or (b) diverted to the next most attractive airport.

3.20 York assessed that only Heathrow and Gatwick would be operationally constrained, with assumed capacities being 90 mppa and 50 mppa respectively, but with the possibility of

[3] The CCC's recommendation was not applied by the Inspectors to a Public Inquiry into the expansion of Bristol Airport held in 2021, and this decision was announced in February 2022, before the publication of the Government's Jet Zero Strategy.
[4] CCC "Progress in reducing UK missions: 2023 Report to Parliament", June 2023 Page 267
[5] CCC "Sixth Carbon Budget: Sector summary Aviation", December 2020 Figure P8.2

new runways at both increasing capacities from 2033 and 2030 to 135 mppa and 70 mppa. At this stage, the longer term capacity of LTN was limited to 32 mppa (but with no reflection of any phasing of expansion) in order to produce quasi 'unconstrained' forecasts for LTN.

Further Adjustments

3.21 Three adjustments are next made to the forecasts for LTN. The first is to lower its traffic to reflect the Pandemic[6], with passenger volumes recovering to the 2019 demand level in 2024/25. The second adjustment relates to short term airline decisions (some known) to meet demand: no further information is provided on this other than that the adjustments are minor. The third adjustment is for new long haul services at LTN. York has analysed demand from LTN's main catchment area for long haul destinations within range, given the limitations imposed by the length of LTN's runway. This 2019 demand on a route-specific basis has been grown using the approach described earlier for short haul markets and the share which LTN might capture of this demand, before then considering if and when a new long haul destination might be viable from LTN. The modelling approaches to these adjustments appear reasonable.

Final Forecasts and Scenarios

3.22 These three adjustments are then made to the other forecasts. The outputs are initially presented as LTN 'unconstrained' (viz. up to 32 mppa at LTN). Six scenarios are presented, four of which are based on the Central Demand Growth Scenario but with different runway options at Heathrow and Gatwick. These are outlined in Paragraph 6.4.4 of the Need Case, and are considered reasonable. The other two scenarios are based on slower and faster (overall) demand growth, with the former being associated with no new runway at either Heathrow or Gatwick, and the latter with new runways at both airports. Again, these scenarios are realistic and should represent Common Ground between the Luton Rising and the Host Authorities.

3.23 These scenarios are then reduced to three, based around Central, Slow and Faster Demand Growth but with different runway developments assumptions at Heathrow and Gatwick, namely:

- Central Demand with one additional runway at either Heathrow or Gatwick;
- Slower Demand, which combines Slower Demand[7] with Central Demand and new runways at both Heathrow and Gatwick; and
- Faster Demand, which combines Faster Demand[8] with Central Demand and no new runways.

[6] The econometric projections did not lower traffic volumes to the traffic levels actually experienced during the Pandemic.

[7] As described in Figure 6.3 of the Need Case, although described in Para 6.4.8 as 'reasonable lower bound' growth

[8] As in Figure 6.3, but now described as 'reasonable upper bound' growth

3.24 York has indicated to CSACL that these three hybrids have not been derived through a precise mathematical calculation but have been developed judgementally. This judgemental intervention nullifies any close examination of the forecasts' evolution.

3.25 While at first sight, Slower Demand is less likely to see two new runways built, both these factors would result in lower demand forecasts at LTN. Similarly, Faster Demand would be more likely to see two runways constructed rather than no runways, but both these factors act to increase demand forecasts at LTN. Hence, the combinations are valid for the purposes of this exercise.

3.26 The phasing of LTN's proposed expansion is then added to produce constrained forecasts. Available capacity is assumed to grow initially to 19 mppa, then rising first to 21.5 mppa (after approval of the DCO and some works in the current terminal, T1) and then increasing in stages to 32 mppa beginning in 2037 with the commissioning of LTN's second passenger terminal. It is these final forecasts, presented as three scenarios, which are used for assessment purposes of the DCO application.

Assumptions Used

3.27 The approach applied by York is very detailed and requires a large number of assumptions to be made. Commentary on the forecasts is therefore limited to the higher level and more important assumptions, covering those economic and price forecasts driving demand growth, and those concerning infrastructure capacity at the major airports.

Economic Assumptions

3.28 Table 3.2 below summarises the econometric data sources used by York, including the year in which these assumptions were produced. The corresponding DfT Jet Zero Strategy sources are also shown.

Table 3.2: Sources of Assumptions used by York

Assumption	Primary Source	Source Date	Used by DfT
Economic Drivers			
UK GDP to 2026	OBR	March 2022	No, uses Oct 2021
UK GDP from 2026	OBR	July 2020	No, uses March 2020
Foreign GDP	OECD	Oct 2021	No. IMF (April 2021) to 2026
			OECD (July 2018) from 2026
Price Drivers			
Oil Price	Modified BEIS to reflect high oil		BEIS Feb 2020
ETS Carbon Cost	BEIS (via DfT)	March 2022	Yes
CORSIA Carbon Cost	BEIS (via DfT)	March 2022	Yes
Fuel Burn	DfT 2017	October 2017	Yes
Fuel Efficiency	DfT Consultants	March 2022	Yes, in High Ambition[9]
Non-Fuel Costs	DfT 2017	October 2017	Yes
Air Passenger Duty	HMRC (via DfT)	March 2022	Yes
Elasticities	DfT	March 2022	Yes
Monte Carlo Probabilities	OBR/York	2023	N/A

Source: CSACL summary of cited sources

3.29 It may be seen that York has used more recent forecasts of the main economic variables than did the DfT for the Jet Zero Strategy, although the sources still largely pre-date the Russian invasion of Ukraine. York argues that "*…these projections, thus, take into account the potential range of economic recovery outcomes following the Covid-19 pandemic, as well as the impact of BREXIT…*" on the basis that later OBR projections published in November 2022 indicate that while these forecasts "*…downgraded the short-term projections for growth but, over the medium-term, the rates of economic growth are similar to those used in the demand projections with some slowing of economic growth in the longer term towards 2050…*". In fact the cited document only gives UK GDP outlooks to 2027/28, while the most recent DfT forecasts published in March 2023 use OBR long term forecasts from May 2021. The OECD forecasts for foreign GDP were published before the Pandemic was over, and therefore are less likely to reflect accurately its impact.

3.30 In the three years since the longer term OBR forecasts were produced, the World saw in addition to the stresses of the Pandemic (and the subsequent recovery), the Russian invasion of Ukraine with all the economic consequences that that has led to, including in the UK to a high inflation rate and a cost-of-living crisis. Additionally, the UK left the European Union in in January 2020, with the transition period extending to the end of that year.

3.31 For the price assumptions, York has largely adopted those used for the Jet Zero Strategy. York adopts Government forecasts for both Air Passenger Duty and the two Carbon costs, these being for the purchases which airlines must make to acquire allowances to emit Carbon Dioxide. York's oil price assumptions are derived from the BEIS (Department for Business, Energy & Industrial Strategy) 2019 forecasts, published in February 2020. In order

[9] Jet Zero Further Technical Consultation March 2022, Para 2.4

to reflect the high oil price in 2022, York adopted the BEIS High forecast for that year for both its Central and Low scenarios, and then assumed that in these two scenarios the oil price would migrate over the following six years to the BEIS forecasts for 2028. This is a reasonable approach to developing oil price assumptions.

3.32 Fuel efficiency assumptions are those which form the basis of the Jet Zero strategy's preferred High Ambition scenario, which the DfT's consultants advising on this aspect described as 'optimistic': the consultants' central forecasts were included in the 'Continuation of Current Trends' scenario. Fuel burn assumptions come from DfT's 2017 forecasts, as do non-fuel (i.e. other airline) costs. Despite the focus on the assumptions for the other air fare components, these latter non-fuel costs constituted 70% of an average air fare in 2016, and in the 2017 forecasts were expected to still account for more than 50% in 2050[10]. The forecasts for changes in these non-fuel costs comes from a DfT analysis of historic trends in their evolution.

3.33 As noted earlier, the DfT not only published significantly less supporting data with its Jet Zero forecasts but also changed the specification of its fares module, moving from having in 2017 a single future air fare assumption covering all markets, to having separate fare assumptions for each of the four international regions modelled in 2022. York has constructed its air fare assumptions using these components of air fares. The approach applied is reasonable, although no details of the results have been disclosed (though were not sought).

3.34 The income and price elasticities used by York are those used in the Jet Zero Strategy. These elasticities come from regression analyses undertaken for these DfT 2022 forecasts and these were undertaken on data for a period before the Covid-19 Pandemic. Hence, they "*…therefore assumed that the long-term relationship between demand and key drivers estimated from historic* data *is unaffected by the pandemic…*"[11]. Maturity factors for income elasticities for business categories include allowance for technological changes, such as video-conferences.

3.35 During the Pandemic, video-conferencing became much more widely practiced. When linked with organisations' growing awareness of Climate Change, their own 'green footprint' and also of their cost bases, some diminution of business travel seems likely, at least when in relation to internal company business: flying for internal meetings, training etc has in the past accounted for some 30% of business travel at UK airports. York has argued that the likely increase in the use of video-conferencing was known before the Pandemic, so that it is reasonable to assume that its impact is incorporated into the long term forecasts even if there has been a short term acceleration. That may well be the case, but mathematically with the formulation of the forecasting model, an earlier maturing of a market would result in a lower passenger forecast at the end of the forecasting period.

3.36 Use of a Monte Carlo simulation requires a probability distribution of outcomes around the mean of the range. While the OBR does provide such distributions for some of its

[10] DfT 2017 UK Aviation Forecasts, Table 54
[11] DfT Jet Zero Modelling Framework, Para. 2.17

forecasts, other forecasters do not publish them. York has assumed symmetrical distributions around the mean in these circumstances, and this is reasonable.

3.37 In summary, however, there are potential weaknesses in many of the assumptions used by York:

- Timing of production of its forecasts has forced York to use independent GDP forecasts which generally pre-date the end of the Pandemic, as well as the Russian invasion of Ukraine with its consequences for inflation and the cost of living crises now affecting many countries;
- Higher staff costs which airlines, airports and support service providers are having to pay in the UK in the face of staff shortages after the Pandemic and high inflation rates, are not included in non-fuel costs;
- The need for all private sector companies involved in the air transport sector to re-build their balance sheets, service loans and recommence dividend payments to shareholders after the ravages of the Pandemic would also be likely to have increased non-fuel costs, and there are already signs that this is happening;
- Although the March 2023 Budget limited increases in APD to below-inflationary levels, the likelihood is that Government, faced with seemingly ever-increasing burdens, will soon need to strengthen the country's finances, and that real-term increases to Air Passenger Duty levels will be seen as an easy target, with or without a green spin: air travel is largely a discretionary activity undertaken by those not struggling with paying for essentials; and
- The cost premium of Sustainable Aviation Fuel (SAF) over Jet A1 Kerosene (as discussed below) is not explicitly included in the DfT's forecasts.

3.38 These considerations are all 'down-side' risks which if they materialised would lower demand below current predictions.

Sustainable Aviation Fuel

3.39 A further factor which could also reduce demand forecasts is that the DfT has indicated to CSACL in response to a Freedom of Information Request that SAF costs are not explicitly included in the air fare assumptions and that implicitly any additional costs are assumed to be absorbed by the airlines rather being passed on in air fares. Such an approach may be consistent with assuming that any additional costs in using SAF are off-set by avoiding buying carbon allowances. However, an initial analysis based on a low cost of SAF suggests that this equilibrium may not be achieved with the current assumptions in the medium term.

3.40 While Kerosene is a product of 'cracking' crude oil, SAF may be manufactured in one of many ways by effectively 're-cycling' other sources of carbon from a range of feedstocks, used cooking oil being much the most frequently cited. The great advantage of SAF is that it has many of the characteristics of Kerosene (but much lower levels of emissions[12]) and may be used in existing aero-engines and airport ground infrastructure. SAF represents the cornerstone of short- and medium-term efforts of the aviation industry to reach Net Zero: for example, the UK Government's Jet Zero Strategy is based on a 10% replacement of Kerosene with SAF by 2030, and a 50% replacement by 2050.

3.41 The major disadvantage of SAF is its cost. The Royal Society recently published a paper[13] on SAF and included an assessment of its cost of production by various processes. The current minimum fuel selling prices include the costs of both the feedstock used and the energy needed in its production process. The Royal Society recognised that these costs would change drastically with time: *"…on the one hand, new technologies and economies of scale could reduce costs, while on the other hand, resource limitations could make some processes more costly than at present…".* The Royal Society estimated that SAF would cost between 2 and 6 times the price of Kerosene[14].

3.42 This range is in line with that given by the DfT in a recent consultation document: "*…SAF will be around 2-5 times the cost of kerosene (without a carbon price) in 2025, falling to 1.2-2.8 times the cost by 2040…*", albeit these multiples were based on a price per tonne comparison (rather than the price per unit of energy comparison used by the Royal Society).

3.43 It should be noted that the DfT's Jet Zero Strategy based on a 50% use of SAF in 2050 assumes *"…it is also likely that power-to-liquid[15] SAF would need to be deployed at scale…"*[16] because of feedstock constraints applying to other production channels. The Royal Society suggests this SAF has the highest multiple of price above Kerosene prices of all the potential production pathways, estimated by CSACL to be 5.9 times.

Airport Capacity Assumptions

3.44 York has assessed that the most important issues on capacity relevant to LTN are those relating to Heathrow and Gatwick and whether new runways will be constructed at either or both of these airports. York's assumptions about the capacities and timings of any new runways are generally reasonable, although it does assume that without an additional runway, the capacities of the airport would be capped at 90 mppa and 50 mppa respectively, figures which have been used in previous DfT modelling exercises. In practice, the capacities would be likely to continue to increase as a result of an ever-increasing number of passengers per Air Transport Movement (ATM).

3.45 Table 3.3 illustrates what the capacity of these two airports might be in 2050 as a result of increases in passengers per ATM at or below historic rates, assuming 2019 levels of

[12] While its combustion still produces similar amounts of Carbon Dioxide to Kerosene, since this CO_2 had been previously released but then re-captured, climate scientists, policy makers and governments have approved SAF's use as a low/zero emissions fuel.

[13] Royal Society Policy Briefing Net Zero Aviation Fuels, February 2023.

[14] Multiples estimated by CSACL based on an oil price of US$ 79 per barrel.

[15] Power-to-liquid is one of the processes of producing SAF.

[16] DfT Jet Zero Strategy Analytical Annex (Illustrative scenarios and sensitivities) July 2022, Paragraph 3.3.

passengers per ATM apply in 2024[17]. It may be seen that in 2050, annual passenger capacities would be higher than the caps applied by York while average passengers per ATM would still be eminently achievable.

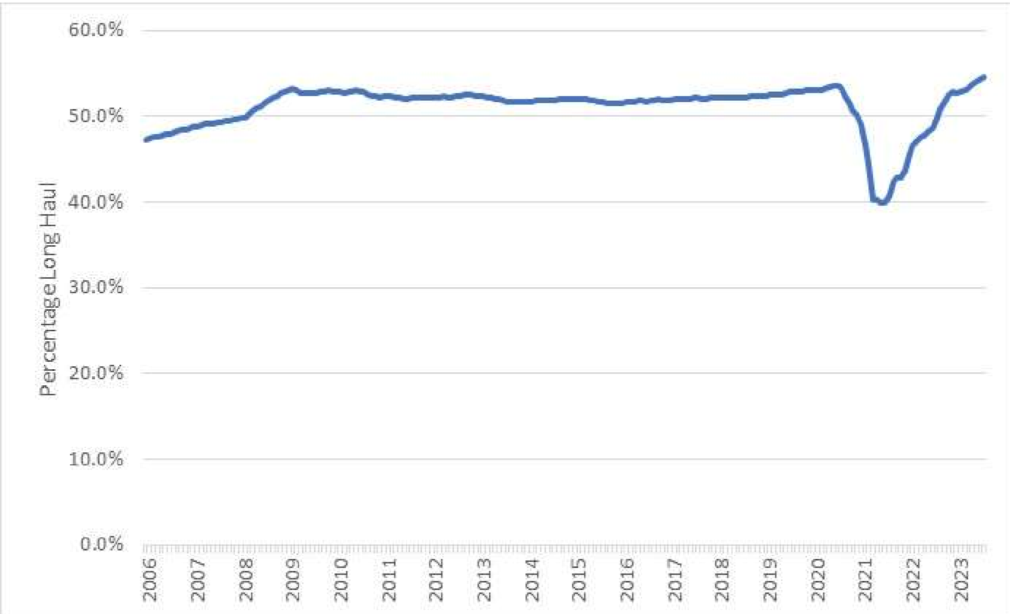
Table 3.3: Illustration of Possible Future Capacities of Heathrow and Gatwick

Airport	Heathrow	Gatwick
Annual ATMs	480,000	283,000
Increase Passengers per ATM, 1999-2019	+1.0% pa	+1.4% pa
Passengers per ATM, 2019	168.6	164.7
Increase Passengers per ATM, 2025-2050	+1.0% pa	+1.0% pa
Passengers per ATM, 2050	218.4	213.3
Capacity 2050	104.8 mppa	60.4 mppa

Source: CSACL analysis

3.46 Neither Heathrow nor Gatwick have legal caps on their passenger throughputs, so that the private sector owners of the airports will endeavour to extract maximum value from their assets by increasing passenger throughputs as much as possible. York has indicated that increasing passengers per ATM at Heathrow would be dependent on increasing the proportion of long haul traffic at the airport, although prior to the Pandemic this had been very stable at around 52% over the previous 10 years. Long haul markets are generally less mature than short haul ones so that they are more likely to be faster growing over the long term in any event.

Figure 3.1: Percentage of Long Haul Passengers at Heathrow



Source: Derived by CSACL Heathrow Monthly Statistics

[17] In the 12 months to the end of June 2023, Heathrow's average passengers per ATM was 168.3, and Gatwick's 155.2

3.47 Additional capacity at Heathrow (or at Gatwick) would result in fewer passengers using the other London airports, including LTN. During the 2040s passenger growth rates are expected to be quite low (e.g. York's rates are *circa* 1% per annum (Table 3.4 below)), so that more capacity at Heathrow has a noticeable delay on when LTN might reach a throughput of 32 mppa.

3.48 The combination of different growth and different runway developments are used to prepare constrained forecasts for LTN. As noted earlier, the assumptions for Heathrow and Gatwick are reasonable, other than assuming that they will reach a maximum and then cease to increase from continued growth in number of passengers per ATM. In relation to the capacity of LTN, an approval of this DCO application is assumed in 2024, but the opening of the initial phase of T2 is not included until 2037.

3.49 The 13 years to build the first phase of T2 after the grant of permission is *prima facie* a long period measured against a yardstick of other projects. However, the topography of the site and access to it appear difficult while construction must take place alongside the operation of the existing airport. The construction programme presented as part of the Environmental Statement is detailed, and the opening date of the initial phase of T2 of 2037 may well be realistic. It is possible that the status of LTN as one of the few UK airports to be operated under a concession from its owners, may also be acting to delay work and complete T2: the current concession is due to end in 2032.

3.50 A further assumption is that in the Faster Growth Case, airlines will expand into off-peak periods from 2026 when forecast demand reaches 21.5 mppa to allow a throughput of 23 mppa to be handled at LTN until T2 opens. However, such a spread into off-peak periods is not included in the Core Planning Case in which demand is held at 21.5 mppa from 2027 (just a year later than in the Faster Growth Case) until T2 opens. This is inconsistent, and not a valid justification of the higher capacity in the Faster Growth Case. Such a higher capacity could however be justified as a reflection of the imprecision of determining airport capacity (as indeed is alluded to in Para. 7.5.33 of the Need Case).

Assessment of Outputs

3.51 Passenger forecasts at LTN are a function of two considerations: growth in general air passenger demand in the southern part of the UK, and assumptions made about the runway capacity of Heathrow and Gatwick and the provision or not of additional runways at these airports.

3.52 While the basic approach to forecasting overall passenger demand applied by York is reasonable, the economic and price assumptions used are likely to generate forecasts which are too high in the Central Demand Growth scenario. This arises from:

- economic assumptions made before the long term effects of the Pandemic, of Brexit and of the Russian invasion of Ukraine may have become fully apparent;
- price assumptions which may not fully incorporate the financial damage done by the Pandemic and the need to respond to the Climate Change challenge; and

- the acceleration which the Pandemic gave to video-conferencing and remote working.

3.53 Many of these factors if and when incorporated will tend to reduce passenger demand and represent down-side risks.

3.54 The passenger annual average growth rates for the market in the southern half of the UK produced by York are summarised below. These growth rates generate forecasts before further adjustments for the Pandemic are made.

Table 3.4: Underlying Passenger Demand Growth Rates: 50th Percentile 'Most Likely'

Demand Segment	2019 to 2030	2031 to 2050
Domestic Business	1.6% pa	1.3% pa
Domestic Leisure	2.5% pa	1.0% pa
International Business	1.4% pa	0.9% pa
International Leisure	3.1% pa	1.0% pa
Overall	2.8% pa	1.0% pa

Source: Need Case, Table 6.2

3.55 York has indicated that it has not derived unconstrained forecasts for all airports as part of this process, although it might be possible using the above growth rates, so to do. On the basis of these rates, York's unconstrained forecasts appear to be similar to the DfT's Jet Zero forecasts.

3.56 Within this, the approach to estimate the overlay of long haul passenger demand is also reasonable. However, an exercise of this type is some distance from an airline deciding to commence a service. For the nine cities identified by York as capable of supporting services from LTN, it may be seen from Table 3.5 that Heathrow dominates the offering from the London area airports.

Table 3.5: Long Haul Scheduled Passengers from London Airports, 2019 (x 1,000)

Route	Heathrow	Gatwick	Stansted	Luton	London City
New York	4,169	700	0.3		10.5
Dubai	2,333	980	318		
Orlando	0.7	973			
Toronto	1,152	437			
Chicago	1,250	98			
Washington	978				
Cancun		336			
Abu Dhabi	1,120				
Doha	1,265	372			
Total	12,268	3,896	318	0	10.5
London %	74.4%	23.6%	1.9%	0	0.1%

Source: CSACL analysis of CAA airport statistics 2019, Table 12.1

3.57 In 2019, Dubai was the only point served with a meaningful offering from three airports, this being influenced considerably by the network strategy of its home carrier, Emirates. While Gatwick had a virtual monopoly of services to the leisure destinations of Orlando and Cancun, it was a distant second to Heathrow to other points for which it offered services, and did not have flights to either Washington or Abu Dhabi. This historic perspective offers some guidance on the challenge facing LTN in attracting long haul services.

3.58 LTN's best chance for long haul services would be to the leisure destinations of Orlando and Cancun, provided that airlines are confident that they could offer high reliability of service given weather variations over the period of service, since *inter alia* wind and temperature affect aircraft range. Services to one or possibly two Middle East hubs (viz. Dubai and/or Doha) would also be likely. Although airlines might be discouraged by previous failures of New York services from both LTN and Stansted, flights might be possible in the future. However, there must be considerable uncertainty about securing airline service on other routes.

3.59 Should services to long haul destinations not materialise, it is likely that passengers would be replaced in due course by travellers to short haul destinations. However, cargo forecasts (discussed below in Chapter 4) would be significantly reduced.

3.60 York has not provided forecasts for airports other than LTN, so in order to provide some context for the passenger forecasts for LTN, a number of forecasts for total UK demand are summarised in Table 3.6 below.

Table 3.6: Long Term UK Passenger Forecasts

Forecaster	Year	Scenario	Passengers (mppa)	
			2040	2050
DfT	2017	Central Unconstrained	422	494
DfT Jet Zero	March 2022	High Ambition	422	482
DfT SAF Mandate	March 2023	High Ambition	394	435*
CCC	Dec 2020	Balanced Pathway	321	365

* Forecast extends to 2040 only. Grown to 2050 by CSACL at 1.0% per annum, the overall average rate determined for the 2030-2050 period by York
Source: As in first column

3.61 The similarity between the two earliest DfT forecasts has been highlighted previously, and while the most recent DfT forecasts associated with a consultation exercise on a SAF Mandate are lower, they are still above those issued by the Climate Change Committee in association with its advice to Government on the 6th Carbon Budget. The most recent DfT forecasts are based on some macroeconomic forecasts made later than those used by York (viz. UK GDP to 2026/27: November 2022 vs March 2022; UK GDP from 2026/27: May 2021 vs July 2020; and foreign GDP to 2026/27: October 2022 vs October 2021). However, not all of the DfT's assumptions may fully reflect the Russian invasion of Ukraine, and they are still exposed to many of the down-side risks noted above (Paragraph 3.52).

3.62 Despite these reservations, the DfT's most recent forecasts (extrapolated to 2050 at 1.0% per annum) have been used to assess the likelihood of passenger volumes reaching 32 mppa at LTN, under two different scenarios, the first with no new runways and the second with an additional runway at Gatwick. The capacities of Heathrow and Gatwick are based on the assumptions set out above (Paragraph 3.45), and demand is assumed to make maximum use of available capacity at these two airports. The remaining demand is then divided between the other four London area airports in (approximate) proportion to their 2019 throughputs, with 55% to Stansted, 35% to Luton, and 10% shared between London City and Southend. When Stansted reaches its planning limit cap of 43 mppa, the bulk of the remaining passengers are allocated to Luton. The results of this exercise are summarised in Table 3.7.

Table 3.7: Impact of New Runway Decision on LTN Passenger Demand

	No New Runways	New Gatwick Runway
Year Stansted reaches planning cap	2035	2042
LTN Passengers when STN = 43 mppa	21.5 mppa	28 mppa
Year Luton reaches 32 mppa	2037	2048

Source: CSACL analysis

3.63 This is *per force* a high-level approach but being based on the known attractiveness of the different airports it is considered a valid method to assess if and when LTN might reach 32 mppa[18]. It also highlights the sensitivity of the conclusion to a factor not controlled by Luton Rising, namely whether there should be another runway in the London area. This exercise allows capacities at Heathrow and Gatwick to continue to increase as a result of growth in passengers per ATM (although only to perfectly achievable levels), while York has applied caps.

3.64 If caps were to be applied, with Heathrow limited to 90 mppa and Gatwick throughput with a new runway held at 70 mppa, LTN would reach 32 mppa in 2041. York's Core Planning Case has LTN reaching 32 mppa in 2043. This suggests that York's forecasts are similar to the DfT's March 2023 forecasts, but more importantly that the timing of when LTN might reach 32 mppa is also dependent on whether demand at Heathrow and Gatwick stops growing. Neither airport has a cap on passenger throughput as part of a planning condition or any other intervention, so there is no obvious reason why growth should stop. History shows that passenger demand can keep rising: at the Stansted/Terminal 5 Public Inquiry in the early 1980s, the capacity of a four terminal Heathrow was assessed to be 38-42 mppa; in 2007, the year before Terminal 5 opened, Heathrow handled 68 mppa – over time ways can be found to create terminal capacity.

Conclusions on Passenger Forecasts

3.65 The approach adopted by York is in most respects reasonable. However, so many of the assumptions used have considerable down-side risks that the forecasts are likely to be too high.

[18] York's approach to this question is more detailed and mathematical but is ultimately based on each airport's attractiveness and passenger preferences which will have been exercised for many years.

3.66 The major influence on demand at LTN is the airport capacity available at Heathrow and Gatwick. This is related to both whether there is a new runway at one or both of these airports, and also how the number of passengers per ATM evolves at each airport.

3.67 In relation to the first point, the development of new runways at both airports is unlikely. York's Core Planning Case is based on the development of one new runway, and this is a feasible outcome. However, in the absence of any legally binding caps on passenger demand, the average number of passengers per ATM would continue to increase, with airport management finding ways of moving more passengers to, through and from their airports.

3.68 If no new runway is constructed, it is likely that LTN's potential capacity of 32 mppa would be used relatively soon after the planned completion of Terminal 2, in the late 2030s or early 2040s. If one new runway is provided, then a passenger throughput of 32 mppa would slip to the late 2040s or possibly later.

3.69 These conclusions assume the views of the Climate Change Committee remain unchanged but unadopted by Government.

4 Other Projections

Introduction

4.1 This chapter investigates the other air traffic demand forecasts and capacity assessments made by York.

Cargo Forecasts

4.2 Unlike the situation with passenger demand, the number of independent forecasts for air cargo demand are few and infrequent. Air cargo handled at UK airports had shown very limited growth over 20 years until the onset of the Pandemic, with LTN's cargo throughput showing similar behaviour. With this background, York's approach to forecasting cargo demand is reasonable. Holding cargo carried on all-freighter aircraft constant is justifiable, although given that throughput in 2019 was materially higher (at some 35,700 tonnes) than the average (28,000 tonnes) over the previous ten years, the lower average figure might have been more appropriate. York though has noted that it has produced forecasts used to assess, *inter alia*, surface access impacts, so that its approach is reasonable.

4.3 York is correct to consider the carriage of freight in the belly-holds of long haul passenger services, and its approach of multiplying the number of forecast operations by an assumed load (dependent on aircraft type) is broadly correct. Doubt has been expressed above (Paragraph 3.57 *et seq.*) about attracting airlines to operate such services. Assuming that there are services to Dubai, Doha, New York, Cancun and Orlando only but at the frequencies and average load per flights[19] projected by York, cargo tonnage from the long haul operation would be some 27,000 per annum at a throughput of 32 mppa at LTN. This compares with York's forecast of 44,000 tonnes annually on long haul services.

4.4 Combining these qualifications, cargo tonnage at LTN might reach between 55,000 and 65,000 tonnes per annum, with a passenger throughput of 32 mppa. York's objective of producing assessment forecasts is though relevant.

4.5 York's forecasts for Cargo Air Transport Movements (i.e. those by all freighter aircraft) assume that there will be no increase from historic levels. However, in contrast with its approach to cargo tonnage forecasts (described in Paragraph 4.2 above) rather than taking the actual (peak) movements in 2019, it has used an average over four years of 2,300 dedicated Cargo ATMs, this figure including empty positioning movements of all-freighters.

[19] The average load on flights to and from the leisure destinations of Orlando and Cancun (which have limited cargo potential) using B787-8 aircraft has been reduced to 0.7 tonnes per flight, which was the average load in 2019 of Tui Airways' B787 fleet (assuming all of the airline's cargo that year was on these wide-bodied aircraft)

Passenger Air Transport Movements

4.6 York has developed its forecasts of Passenger Air Transport Movements (PATMs) by dividing its passenger forecasts by an assessed number of passengers per movement in future years. This is a widely-used and standard approach.

4.7 The two factors which determine the average number of passengers per PATM are the percentage of seats on each aircraft occupied (the passenger load factor) and the number of seats on each aircraft. York has reasonably identified that at LTN the potential for increases to both these factors is limited: load factors for the main airlines operating there are already high and are unlikely to increase greatly. Similarly, the main airlines operating at LTN have already fitted their aircraft with the maximum number of seats possible (or very close to the maximum number), so that increases in the number of seats would need to arise from replacement of existing aircraft with larger ones. While there is some potential for easyJet to do this (moving up the Airbus family from its current mix largely of A319s and A320s, to a mix of A320s and A321s), LTN's other main airline, Wizz, was in 2019 already operating with a mix of some 40% of the largest A321s. Until LTN's Terminal 2 and associated aircraft parking apron is available, the airport is limited to Code C aircraft[20] or smaller.

4.8 Over the 20 years to 2019, passengers per PATM at LTN increased at an average rate of 1.8% per annum, reaching 164.6, although the growth rate was higher in the second half of this period at 2.9% per annum. The Pandemic reduced the figure but by the end of June 2023 it had almost fully recovered to 163.3 on a Moving Annual Basis.

4.9 York has indicated that it has grown passengers per PATM by averages of approximately 1% per annum to the mid-2020s, then slowing to 0.25% per annum for the rest of the forecasting period (Need Case, Para 6.6.16)[21]. These assumptions take passengers per PATM to 171.3 in 2024 and 180.7 in 2043 (its forecast year for 32 mppa). Thereafter, the figure is assumed to remain constant. These growth rates are low relative to historic performance but reflect York's views on the limitations of growth on load factors and seats per aircraft, as discussed above.

4.10 York indicates (Para 6.6.14) that average load factor across all airlines at LTN had grown to an estimated at 87% in 2019. It then argues that this growth was not sustainable because of the inability to increase the seating capacity of aircraft using LTN. This is illogical as the achievement of a load factor is most dependent on the nature of route, airline type and commercial policies, and has very little linkage to the size of the aircraft. Indeed, examination of the 2019 performance of major UK short haul airlines suggests if anything that higher load factors are generated on higher capacity aircraft. As York is projecting an increase in average seating capacity at LTN, if anything there should be some further growth potential for load factors. York's argument most certainly is not a justification for capping load factors at 2019 levels: there may be a reason for this, but it is not the one cited by York.

[20] The primary Code C aircraft are the Airbus A320 family and the competing Boeing B737 family.

[21] The average rate from the 2019 base to 2025 (based on Core Planning Case forecasts in Tables 6.5 and 6.8) is 0.8% per annum.

4.11 York then discusses (Para 6.6.15) other factors which have informed its judgement on growth in passengers per PATM, including:

- The number of A319s (156 seats) in easyJet's fleet, although it does not mention the ability of easyJet to bring in more (larger) A321s (235 seats);
- The now larger proportion of overall traffic accounted for by Wizz Air diminishes the impact which its fleet changes can have on increases in passengers per PATM: this airline has been an early adopter of the A321 and in 2019 operated some 43% of its LTN flights with this type which has some 55 more seats than the airline's A320s, meaning that continued replacement of the smaller type could provide increases to the average passengers per PATM (c.f. historic trend illustrated in Figure 6.11 of the Need Case);
- While Ryanair's new B737-Max 8s with 197 seats carry only 9 passengers more than the aircraft they are replacing, its recent order of 150 B737-Max 10s has 228 seats;
- York suggests that load factors pre-Pandemic were stabilising at 93%, and suggests that this figure is the maximum figure that might be used, albeit noting the LTN is slightly below this network average; and
- York notes that other services would generally operate at lower load factors.

4.12 Average network-wide load factors of around 90% were typical for 'no-frills' airlines in 2019, with the larger Code C aircraft generally operating above this figure.

Table 4.1: Passenger Load Factors of UK No-frills Airlines, 2019

Airline/Aircraft	Average Passengers	Average Seats	Load Factor
easyJet			
A319 100	139.5	156.0	89%
A320 200	166.9	183.5	91%
A320 200neo	169.3	184.2	92%
A321 200neo	216.5	235.0	92%
Jet2.com			
B737 800	171.3	189.0	91%
Thomas Cook			
A321 200neo	200.7	220.0	91%
Tui Airways			
B737 8 (MAX)	173.0	189.1	92%
B737 800	175.8	189.0	93%
Wizz Air UK*			
A320 200	162.2	186.0	87%
A321 200	200.7	230.0	87%
Average of Above	168.0	185.0	91%

* Wizz Air UK is one of the operating companies of Wizz Air, and aircraft from sister companies may have been operating to LTN in 2019, so that these may not be representative figures

Source: Derived by CSACL from CAA 2019 Airline Statistics, Table 1.11.2

4.13 Average passenger load factors are indeed different on other types of airlines offering other types of services. Table 4.2 provides a similar illustration for regional airlines/services and for long haul services.

Table 4.2: Passenger Load Factors for Regional and Long Haul Services, 2019

Airline/Aircraft	Average Passengers	Average Seats	Load Factor
BA CitiFlyer			
ERJ190 100	73.3	98.0	75%
Flybe Ltd			
DHC8 400	60.8	78.0	78%
ERJ 190 200	94.7	118.0	80%
Average Regional	68.0	88.2	77%
British Airways			
A350 1000	265.4	331.0	80%
B787 8	177.9	214.0	83%
B787 9	173.3	216.0	80%
Norwegian			
B787 9	288.2	344.0	84%
Tui Airways			
B787 8	283.2	302.2	94%
B787 9	323.4	345.0	94%
Virgin Atlantic			
A350 1000	281.8	335.0	84%
B787 9	212.3	264.0	80%
Average Long Haul	226.6	268.0	85%

Source: Derived by CSACL from CAA 2019 Airline Statistics, Table 1.11.2

4.14 The bulk of future operations at LTN will be provided by No Frills airlines operating Code C aircraft, and it is these flights (and assumptions) which are critical in determining future average passengers per PATM. Examination of York's projections in the area of fleet mix suggests that it has assumed an average annual load factor for these operations of 89%, a little higher than the average for LTN in 2019, but below the average for these types of operations across all airports in 2019 of 91% (as set out in Table 4.1 above).

Table 4.3: Passengers by Aircraft Type

Aircraft Type	Operations	Average Seats	Load Factor	Passengers (x 1,000)
Embraer E190-E2	2,520	110	77%	213
Dash-8-Q400	4,410	76	77%	258
Boeing-787-10	1,890	330	85%	530
Boeing-787-9	1,260	299	85%	320
Boeing-787-8	4,410	269.3	85%	1,009
Airbus A321LR	630	161	85%	86
Airbus A350-900	630	330	85%	177
Airbus A320Neo	75,640	186	89%	12,521
Airbus A321Neo	54,210	235.5	89%	11,362
Boeing 737-800W	1,890	189	89%	318
Boeing 737-Max8	23,950	198.6	89%	4,233
Boeing 737-Max9	630	175	89%	98
Boeing 737-Max10	5,040	220	89%	987
Total/Average	177,110	205	88.5%	32,114

Source: Derived by CSACL from Need Case

4.15 This assumption may prove to be a little conservative as airlines strive to increase their load factors to improve both their financial and environmental performances, but for the purposes of assessment it is not unreasonable.

4.16 A 91% average load factor on the No-Frills airlines would allow a throughput at LTN of some 32.8 mppa, while at 93%, some 33.4 mppa would be the throughput with an average passengers per PATM figure of 188.8, representing an increase averaging 0.7% per annum from a presumed 2023 figure of 164.6. Alternatively, fewer PATMs would be required to carry a throughput of 32 mppa at the higher load factors.

4.17 York's fleet mix for a 32 mppa shown in Table 6.12 of the Need Case (and reproduced in Table 4.3 above) shows that the A319s have been phased out and 73% is forecast to comprise a mix of A320 neos and A321 neos. This is a reasonable assumption as LTN's two current main airlines operate these Airbus aircraft, and it would not be realistic to expect only the larger type to be included.

4.18 The next most frequent types are from the B737 family, which form the core of the fleets of LTN's next two most important airlines, namely Ryanair and Tui Airways. These constitute 18% of the 32 mppa fleet and are mainly B737-Max 8 aircraft with 199 seats. Ryanair has ordered the larger Max 10 but relatively few of these aircraft are included in York's projected fleet. LTN is a relatively minor operation for Ryanair, so York's assumptions are reasonable.

4.19 The remaining aircraft operate shorter regional routes or longer intercontinental services, and the type selections by York are reasonable, and consistent with its passenger forecasts.

Business Aviation Forecasts

4.20 In addition to Passenger and Cargo Air Transport Movements, there are some 30,000 other aircraft movements annually. The majority of these, 94% in 2019, are categorised as Business Aviation. York has assumed that there is no material growth in number of aircraft movements for Business Aviation and other purposes, and forecasts them to remain constant at an upper bound of 30,000 movements annually. In view of the constraints on space at LTN, this seems reasonable.

Busy Day Time Table

4.21 York's approach to producing a Busy Day Time Table (BDTT) is reasonable. York first assesses the likely number of movements that there would be on that day based on observed trends for airports to become less peaky as traffic levels increase. Starting from an existing schedule, it adds additional flights based on plausible destinations, aircraft types, flight timings and arrivals and departures for both based and 'visiting' aircraft, within a general requirement to offer commercially acceptable timings. It may be appreciated that thousands of judgements are necessary, and there are as many other outcomes which would be similarly reasonable.

4.22 The mix of aircraft types in the BDTT for 32 mppa is virtually identical to that for annual movements, and again this is sound.

4.23 A time table for an October day has also been produced to assess surface access impacts to be assessed. While no details of this have been presented (and indeed have not been requested), the same approach has been adopted.

Night Period Aircraft Movements

4.24 LTN is subject to limitations on the number of aircraft movements permitted in the night period. Two different periods of restrictions apply, with the shorter, control period also including limitations on the amount of aircraft noise that can be generated, controlled via a Quota Count (QC) system with each aircraft type given a specific QC value. The BDTT shows a total of 84 Passenger ATMs in these night periods.

Table 4.4: BDTT Night Period Movements

Time Period	Arrivals	Departures	Total
00:00 to 05:59	19	1	20
06:00 to 06:59	10	36	46
23:00 to 23:29	11	0	11
23:30 to 23:59	7	0	7
Total Control Period	26	1	27
Total	47	37	84

Source: CSACL derived from York BDTT

4.25 Nearly 5% of the BDTT's flights are in the Control Period, and some 15% in the longer night period. As may be seen from Table 4.4, there are more scheduled arrivals than departures and these are concentrated in the late evening and post-midnight periods.

Departures are almost entirely within the 06:00 to 06:59 hour, as airlines seek to 'launch' their based aircraft for a full day's flying. The arrivals also include six long-haul flights, all in the 06:00 to 06:59 hour.

4.26 On an annual basis, York has forecast that there would be 8,600 PATMs in the Control Night Period with a throughput of 32 mppa, which is the same percentage as in the BDTT[22]. This is a reasonable figure, although it does assume that the ability to accommodate other aircraft movements in the period is reduced to maintain the current limit of 9,650. While this is a reasonable assumption for Business Aviation movements, this is not the case with Cargo ATMs.

4.27 As York notes (Paragraph 6.6.62), cargo operations need to be able to operate in the night period in order to support overnight delivery of express cargo. Like all operations at LTN, the cargo operators need to hold slots for all flights, such slots being allocated by Airport Co-ordination Limited twice a year. As such, provided that they maintain a minimum usage of these slots, they are legally entitled to be awarded them in future allocations. Given the criticality of these slots to their business model, cargo operators may not lightly surrender the 500 slots that York's 32 mppa forecasts would require (Need Case, Table 6.17): being able to operate immediately after the end of the Control Period may not be attractive to cargo operators, and so it is uncertain at this stage whether the passenger flight operations can be achieved.

4.28 York considers that solutions can be found by working with the cargo operators and that stricter night noise controls might also encourage either movement out of the night period or transition to quieter aircraft with higher payloads. In the event, were this not possible, York considers that the number of passenger aircraft movements not able to operate in the night period would be small, and that airlines would have scheduling options to accommodate this. Such possibilities are feasible.

92 Day Movements

4.29 This period lasting from mid-June to mid-September is used as one of the noise assessment periods. York has developed projections of movements in this period by assuming that their ratio to the annual total remains unchanged from the 2019 level of 28.6%. While York acknowledges that peak spreading of aircraft movements will occur, it suggests (Need Case, Paragraph 6.6.66) that some of this spreading will result in growth in movements in June and September, implying thereby that the annual percentage can be maintained. This is possible, but in 2019 there was very little variation in the average daily movements across the four months, limiting scope for spreading into these months.

[22] The York figure does include an increase of 5% to allow for delayed flights arriving later than scheduled and using up some of the night movement availability. This is a reasonable adjustment.

Table 4.5: Average Daily Aircraft Movements at LTN, Summer 2019

	June	July	August	September
Monthly Movements	13,027	13,554	13,057	13,084
Days	30	31	31	30
Daily Average	434.2	437.2	421.2	436.1
of which				
ATMs	10,096	10,761	10,888	10,494
ATM Daily Average	336.5	347.1	351.2	349.8

Source: Derived by CSACL from CAA Airport Statistics, Table 3.1

4.30 In a similar vein, in June 2023 there was very little difference in average daily movements between the first and second halves of the month. The number of the busiest days (Fridays) and number of the quietest days (Saturdays) that fall in each half makes a difference to the number of movements in each period. In order to eliminate this effect, the analysis below is based on taking a daily average over a seven day period thereby including each day of the week in each average figure. It may be seen that there is little difference between the averages in the first and second halves.

Table 4.6: Daily Variation in Aircraft Movements in June 2023

Daily Average Movements										
1st Half										
Date	7th	8th	9th	10th	11th	12th	13th	14th	15th	Average
Average	389.7	392.6	392.8	390.4	390.7	388.7	392.6	397.3	399.6	392.7
2nd Half										
Date	16th	17th	18th	19th	20th	21st	22nd	23rd	24th	Average
Average	401.1	401.9	397.4	399.9	395.6	392.7	390.7	391.9	389.0	395.6

Note: 'Average' is daily average for the week ending on the date shown. Each average therefore includes all days of the week.

Source: Derived by CSACL from EuroControl data

4.31 On these bases, it would be more likely that the 92 Day Movement total would represent a lower percentage of annual traffic than in 2019, so that York's projections would be over-estimating the number of flights in the period. Applying the 2019 percentage of 28.6%[23] to York's 2043 aircraft movement of 209,410 (Need Case, Table 6.9) would suggest a 92 Day movement figure of some 59,000.

4.32 The Need Case does not give forecasts for the whole of the 92 Day period (just for the night time flights), but details of projected aircraft types on an 'average summer day' in a 'Do-Something' scenario are given in Table 6.41 of Appendix 16.1 of the Environmental Statement. This shows a total of 643 movements on an average day in 2043. Within this, the distribution of movements between different passenger aircraft types is very similar[24] to that in the BDTT

[23] EuroControl data suggest in fact that the percentage was 28.0%, although for an average Summer day Table 6.39 of Appendix 16.1 of the Environmental Statement suggests a figure of 28.7%. These differences are not material.

[24] For the most important types it is identical

for the 32 mppa scenario, although the total number of passenger aircraft movements on the day at 551 is slightly below that of the BDTT (565 movements): movements in the night period though are 85, one more than in the BDTT.

4.33 The ‘Do Something’ Case corresponds to the Core Planning Case[25] and assuming that an ‘average summer day’ may be multiplied by 92, then movements in this period would equal 59,174, which would represent 28.3% of York’s annual movement forecast with a 32 mppa throughput. This provides a cross-check for these forecasts.

4.34 The starting point for the exercise could justifiably be the BDTT. This is stated by York “*…to represent a typical busy day…*” and “*…As the airport has a fairly consistent pattern of daily operations over the busy summer period, this is considered a representative day…*” (Paragraph 6.6.25, Need Case).

4.35 The Need Case only provides details of the 92 Day Movements in the eight hour Night Noise Period (Table 6.18), and this shows 8,221 movements for this period in 2043. The BDTT has 84 PATMs in this eight hour period, which would lead to 7,728 PATMs in the 92 Day period, leaving 493 movements for cargo ATMs. York indicates (Paragraph 6.6.69) that it has applied the current 92 Day to annual ratio to estimate cargo ATMs, and this is some 470 movements. Subject to the comment made earlier (Paragraph 4.27 above) in relation to the ability to move cargo movements out of the (shorter) Noise Control Period and the acceptability of post 06:00 slots for cargo operators, the 92 Day Night Noise Period forecasts are reasonable.

Cargo Fleet Mix

4.36 The cargo fleet replacements proposed by York (Need Case, Paragraph 6.6.55 *et seq.*) are reasonable[26].

Passenger Aircraft Fleet Mix

4.37 York’s Core Planning Case is rightly based on existing aircraft types (which in the main have recently entered commercial service) or their known ‘descendants’. In recognition of the efforts to respond to concerns on Climate Change and acknowledging the Government's Jet Zero Strategy, it has developed an alternative fleet mix scenario incorporating low or zero emissions aircraft types. Development attention has been focused on electric and hydrogen powered aircraft, although Ammonia powered aircraft are also being proposed.

4.38 These zero emissions aircraft come with significant development challenges. Among the issues which need to be addressed with electric aircraft are battery weight which leads immediately to concerns regarding payload and range, and the possible need to use composite materials in their construction. Hydrogen aircraft are faced with the challenge of the volume required for onboard storage of the fuel, leading immediately to the technological

[25] Appendix 16.1, Paragraph 16.5.48

[26] The data presented as actual for 2019 suggests cargo ATMs were 2,826 (Need Case, Table 6.15), while CAA statistics record 2,117 cargo ATMs for the year. It is possible that York’s data contain empty positioning flights which are not classified by the CAA as ATMs. This will be discussed with York.

problems associated with working at exceptionally low temperatures (circa -253°C) if Hydrogen is liquified. All new types are likely to face considerable certification scrutiny from airworthiness authorities around the world. The financial costs of owning and operating these aircraft will also need to be assessed.

4.39 Airbus is working on developing a family of hydrogen powered aircraft with an initial entry into service date of 2035, although there is some industry speculation that this date may be slipping.

4.40 York is rightly restricting the inclusion of these types to its Next Generation Fleet Mix Case.

Passenger Busy Hours

4.41 York has derived Passenger Busy Hour forecasts from its BDTT. This is one of the possible approaches, two others being analogy with similar but busier airports and extrapolation of long term trends for peakiness to decrease as airports handle increasing numbers of passengers. York has combined these two approaches to act as a sense-check on the reasonableness of the outputs of its BDTT approach[27]. This is a reasonable overall approach.

4.42 York has applied a load factor of 90% to all services in the BDTT (Need Case, Paragraph 6.6.38). This is only a little above the year-round average figure estimated by CSACL at 88.5% (Table 4.3 above). The Busy Day is "*…normally based on the day containing the 30th busiest hour in the year…*" (Need Case, Paragraph 6.6.25), the 30th Busy Hour being widely adopted as the basis for the determination of the size of airport terminal facilities.

4.43 Use of a load factor of 90%, just 1.5 percentage points above the annual average across all 8,760 hours of the year, is likely to under-estimate demand in the one of the busiest hours of the year (c.f. the achievements of airlines operating through LTN in achieving high year-round load factors across their networks as shown in Table 4.1 above for example). York has indicated that analysis of the BDTT shows a busiest departure hour of 5,800 passengers, although it has rounded this down to 5,500 in Table 6.11 (Need Case). When considered alongside the BDTT's inherent assumption that all flights operate at their planned times, a more prudent decision might have been made to round the BDTT estimate up to 6,000 departing passengers in the 2043 Busy Hour, in order to not understate the impact of the development. York is though of the view that at this stage in the planning process, its estimates are appropriate. As this issue does not have any material impact outside the airport estate, it does not therefore affect issues of concern to the Host Authorities.

4.44 While it is likely that the passenger Busy Hour forecasts are a little low, use of a 90% load factor across all hours of the Busy Day is justified. This is more applicable for estimations of surface access flows which are based on the October Day Time Table.

[27] The last two approaches capture the reality of actual operations with delays, whereas the BDTT approach *per force* assumes that flights operate to schedule.

5 No Development Case

Introduction

5.1 This chapter discusses the forecasts related to the No Development Case. These provide the benchmark against which the impact of the proposed airport expansion may be judged. The underlying assumption is that the present cap on passenger throughput at LTN of 18 mppa remains in place[28].

York's Core Assumption

5.2 York's primary assumption for this Case is that when faced with a passenger cap "*…airlines will seek to maintain frequencies of service rather than increase aircraft size…*" (Need Case, Paragraph 6.6.18), and this is based on its discussions with airlines.

5.3 It is not obvious in fact that all airlines would in practice behave in this fashion across all their markets, for two basic reasons:

- While frequency of service is important for business passengers, it is much less important for leisure passengers for whom price is generally a more important consideration: in 2019, more than 87% of LTN's passengers were travelling for leisure reasons;
- For a given generation of aircraft, the larger the aircraft the lower are the costs per passenger (and per passenger-kilometre[29]) so that an A321 neo will have lower costs per passenger than an A320 neo, for example. As some of these cost advantages arise from a lower fuel burn per passenger, emissions per passenger will also be lower. Hence, airlines have incentives to continue to maximise the size of their aircraft.

5.4 The majority of services at LTN are provided by airlines operating at many other UK and foreign airports. Decisions made about how to respond to an annual passenger cap at LTN will be made within a wider network context, including those on fleet mix. The principal objective of the airlines will be profit maximisation, and cutting costs is an important tool for them. CSACL considers it likely that passengers per PATM would continue to grow even if there were an annual passenger cap at LTN.

5.5 If the rate of increase in passengers per PATM were half that assumed by York (and as discussed above these are considered conservative) in the No Development Case, then PATMs, rather than being static at 105,800 per annum forecast by York (Need Case Table 6.8), they would gently decrease to 103,000 in 2042. Such a forecast decline in PATMs is indeed

[28] Should the recent Planning Inquiry raise this cap to 19 mppa the discussions of this chapter would not be altered, save for an appropriate adjustment to all forecasts for the slightly higher cap.

[29] A passenger-kilometre is a measure of production used by the airline industry, with a passenger-kilometre being generated for every kilometre that a revenue-paying passenger flies.

seen in York's Core Planning Case between 2027 and 2036 when LTN's terminal capacity is constant at 21.5 mppa.

5.6 It is also apparent from Appendix 16.1 of the Environmental Statement that some reduction in aircraft movements over time in the 'Do Minimum' (No Development) Case is expected during the summer period, forming a basis for 92 Day Movement forecasts. However, while Table 6.39 indicates a 2019 base activity of 350 commercial flight movements on the average summer day (with 58 during the night period), and the number reduces in 2027 (Table 6.40) to a 335 per day (with only 50 during the night period), these figures remain unchanged for the other assessment years of 2039 and 2043 shown.

5.7 In conclusion, it is likely that annual PATM forecasts in York's No Development Case are too high, thereby narrowing the difference with the three development scenarios and consequently reducing the assessed environmental impacts of development, although the differences may not be material.

5.8 The other components of aircraft movements, namely cargo ATMs and Business Aviation operations are held constant in the No Development Case, and this is reasonable.

5.9 There may be some variations in other parameters in the No Development Case, but none is identified by York. The presumption is that York has applied 2019 values for these parameters, and this is reasonable: while there might be some variations in Busy Hour and Busy Day numbers, these would be unlikely to be material for impact assessment purposes.