LBN/PoE3

Proof of Evidence
Dr Christopher J Smith

APPEAL BY: London City Airport Limited

SITE AT: London City Airport, Hartmann Road, Royal Docks, London, E16 2PX

APPEAL AGAINST THE REFUSAL OF PLANNING PERMISSION FOR WORKS TO DEMOLISH EXISTING BUILDINGS AND STRUCTURES AND PROVIDE ADDITIONAL INFRASTRUCTURE AND PASSENGER FACILITIES (INCLUDING TAXIWAY EXTENSION, FOUR UPGRADED AIRCRAFT STANDS, SEVEN NEW AIRCRAFT STANDS, TERMINAL EXTENSION, NEW PASSENGER PIER AND ASSOCIATED FACILITIES)

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London Borough of Newham

Newham Dockside

1000 Dockside Road

Chris Smith Aviation Consultancy Limited

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London City Airport Planning Application

London Borough of Newham

February 2016

Chris Smith Aviation Consultancy Limited is a company registered in England and Wales.
Company Registration Number: 7268506. VAT Number: GB 992 8200 96

Contents

1 Introduction

My Background

1.1 My name is Christopher James Smith and I am the founder of Chris Smith Aviation Consultancy Limited. I have worked in the air transport industry for my entire professional career of more than 41 years.

1.2 I hold the degrees of BA (Hons) and MA in Physics from the University of Oxford, where I was an Open Scholar at Keble College, and PhD from the University of Aston in Birmingham. My Doctorate was awarded for research into the development of a regional airport and its relationship with local commerce and industry. During this research I was an employee of West Midlands County Council, the then owner of Birmingham Airport. I then worked for Thomson Travel Limited for three years, before becoming a management consultant specialising solely in the air transport industry. My consultancy career started with a small boutique consultancy, before 14 years with Coopers & Lybrand/PricewaterhouseCoopers. I then became Managing Director of the London offices of two specialist air transport consultancies. I established my own firm in July 2010.

1.3 During my career I have worked for airport operators, airlines, air traffic control organisations, government bodies and other agencies, as well as private sector investors in more than 70 countries around the world during the course of more than 200 individual project assignments. I have specialised in the several aspects of preparing business plans, covering market analysis and traffic forecasting, and for airports aeronautical revenue, pricing policies and economic regulation, commercial revenue projections, operating expenditure projections, and capital expenditure reviews. I have undertaken work of this nature on or for 150 airports on six continents. I have also worked on some 40 airline projects.

1.4 My project experience of the London Airports system includes:

- Expert witness for Hertfordshire and Essex County Councils during the first Stansted Public Inquiry (1980 to 1983);
- Assessment of impact of night curfews at London airports for the British Air Transport Association, the trade association for UK airlines (1997);
- Preparation of traffic and aeronautical and commercial revenue projections for the consortium that acquired a 30 year concession to operate London Luton Airport (1997-98);
- Review of BAA traffic forecasts for the Stansted G1 expansion for Uttlesford District Council (2005 to 2008), and preparation for the subsequently cancelled G2 Inquiry (2008 to 2009);
- Traffic forecasts, aeronautical and commercial revenue projections and a capex review for the Goldman Sachs consortium in its bid for BAA plc (2006);
- Traffic and capacity assessments for potential Lending Banks to a consortium bidding for London City Airport (2006);
- Extensive advice to London Luton Airport Operations Limited on traffic forecasts, financial viability of expansion, potential restructuring of its concession agreement, competitive position, and economic regulation of BAA (2005 to 2008);
- Study of the resilience of Heathrow's (and to a lesser extent, Gatwick's) runway system for the CAA (2008);
- Development of a secondary slot trading product for Airport Co-ordination Limited for Heathrow and Gatwick (2009);
- Traffic forecasts and potential airline incentive schemes for TPG Capital LLP, a leading US private equity fund, during its bid to acquire London Stansted Airport (2011 to 2012);
- Capacity assessment of London Luton Airport for Luton Borough Council as part of its consideration of a Planning Application (2013);
- Advice to easyJet on its assessment of London airport development options during the Davies Commission investigation (2014); and

- Advice to the London Borough of Bromley on the request for extended opening hours by London Biggin Hill Airport Limited (2015).

CSACL

1.5 Since establishing CSACL in 2010, I have worked on more than 20 engagements covering airports, airlines, ground handling companies and air navigation service providers for owners, operators, investors, planning authorities and other government agencies in some 15 countries around the world.

1.6 In October 2014, CSACL was appointed by Amec Foster Wheeler on behalf of the London Borough of Newham (LBN) to review the original Need Statement (ONS) prepared by London City Airport Limited's (LCY[1]) advisors, York Aviation, and also to review the possible impacts on the air transport industry of potential temporary closure of LCY to avoid 'Out Of Operational Hours' (OOOH) construction.

1.7 CSACL was further contracted in the summer of 2015 to advise on the air transport issues associated with the appeal lodged by LCY against the decision made by the Mayor of London to refuse its application to expand facilities at the airport.

Structure of Proof of Evidence

1.8 I begin this Proof with an Executive Summary (Chapter 2). I then describe some unique features of LCY and the development of its traffic in Chapter 3. Chapter 4 considers traffic forecasts, while I consider airport capacity issues in Chapter 5.

Scope of Evidence

1.9 My evidence covers only air transport matters and specifically focuses on the forecasts of demand for facilities at LCY, and the capacity of the airport. I have not undertaken any specific work on air transport policy, which is covered by others, or on the economic

[1] LCY is used to refer to both the company owning and operating the airport, as well as to it as a physical entity, the context generally permitting understanding of which is being referred to.

impact of LCY. Noise matters have been the concern of Mr Rupert Thornely-Taylor, and Robin Whitehouse for LBN, who also addresses air quality.

1.10 In assessments of this type, it is customary to begin with an examination of the traffic forecasts, before then assessing the airport capacity needed to meet this demand. However, as some of LCY's current constraints would not be removed by the proposed developments, the impact of those remaining are incorporated into the traffic forecasts. It is relevant to note that York Aviation, LCY's consultants for aviation matters, has been involved in a series of demand and capacity studies for LCY for more than six years. Hence, rather than a simple linear progression in the development of demand forecasts and capacity assessments, there is a greater degree of iteration in their development for LCY. This is reflected in the contents of this proof, although it retains a traditional structure.

1.11 I have also advised LBN on the potential impacts of the air transport industry of temporary closure of LCY to avoid Out of Operational Hours (OOOH) construction activity. I do not speak to that advice at length in this Proof, but append a short report I prepared for LBN in November 2015 to this proof (Appendix A), and include a short summary of my conclusions arising from that report in the Executive Summary.

2 Summary

Forecasts

2.1 Growth in passenger numbers at LCY was very strong in the 12 months from November 2014. To a material extent this is likely to have been linked to the launch of operations at LCY by Flybe in Autumn 2014. Over the 12 months to the end of December, passenger numbers at LCY increased by 18.4%, taking the Moving Annual Total (MAT) over the period to 4.32 million passengers. These increases have also led to an increase in the average number of passengers per ATM (Air Transport Movement) reaching 54.5 in the 12 months to December 2015. Over the period since 2004, passengers per ATM have increased at an average rate of 5.1% per annum.

2.2 Traffic growth this year has confirmed the suggestions made in the CSACL January 2015 report that York's forecasts under-estimated future demand.

2.3 There have been changes in passenger and aircraft movement forecasts in the Update to the Need Statement (UNS) from the Original Need Statement (ONS), although the approach to forecasting remains the same.

2.4 York's forecasts have changed significantly at the detailed level between the ONS and the UNS, although much less at the aggregate level. In the three years or less since York prepared its forecasts in the ONS, there have though been significant changes in the frequencies offered on individual routes and the number of passengers forecast on individual routes. These considerable changes illustrate a weakness of York's approach. More importantly, though, they limit the confidence in those conclusions which are based on the very detailed approach applied by York in relation to, for example, the number of movements that can be accommodated, and the load factors that can be achieved.

2.5 When deciding on the detailed assumptions to be made, York appears to have been guided more by historic experience and maintaining the *status quo* rather than endeavouring to capture the dynamism of the airline industry and making judgements about how it might react to changes in the market environment within which LCY operates. York has indicated that the latter approach would be too speculative: in my opinion, it is no less speculative to assume that current/historic behaviours will continue, and the possibility of change should not be dismissed without consideration of all relevant factors.

2.6 The approach to forecasting adopted by York would not normally be used to produce medium to long term projections. However, given the circumstances of LCY, its application is appropriate. This does though mean that the forecasts are dependent on a very large number of judgements about the intentions of airlines over the next ten years.

2.7 While the detailed assumptions are individually reasonable, collectively they lead to output passenger forecasts which are likely to be too low at 5.99 mppa in 2025 in the With CADP scenario. It is quite plausible that load factors at LCY will increase over the period. In contrast, the output of York's With CADP forecast assumptions indicates that the average load factor in 2025 would fall to 61.8% from a 2014 actual figure of 65.0%. Additionally, the average number of passengers per ATM is forecast by York to increase to just 55.4 passengers in 2025 in the With CADP scenario, an implied increase of less than 0.2% per annum from current levels.

2.8 Future passenger volumes could well reach 6.5 million passengers per annum (mppa), and in the absence of an annual limit, would go beyond this figure through a combination of larger aircraft and higher load factors. For example, combination of York's Faster Move to Jets sensitivity test and load factors of 65% or higher would see annual passenger volumes reaching the proposed cap. In my view, this is likely to be seen before 2025.

2.9 For this reason, a new restriction on annual passenger numbers is required.

2.10 Overall, ATM forecasts (commercial and business aviation) are forecast to be some 111,000 per annum in 2025 with CADP. Application of likely Noise Factors for each aircraft type, produces an equivalent Noise Factored Movements figure of 120,000 per annum, with the number of business movements being controlled to achieve this limit. These existing annual movement limits need to be continued.

Capacity

2.11 York's approach to the determination of capacity requirements is reasonably clear and appropriate for runway and apron capacity estimation, although the assessment of passenger terminal requirements is less robust. The assessment lacks definition of explicit service standards and of the terms 'busy' and 'peak'. While this detracts little from the assessment of runway, taxiway and aircraft apron requirements (and provision of seven additional stands, and extension of the parallel taxiway to the full length of the runway does appear justified), it is less satisfactory for consideration of terminal expansion.

2.12 It is not possible to determine if the capacity expansion proposed by LCY is matched to the forecast demand in all capacity elements, since capacity is dependent on the service standards to be applied. In my view an expansion of the terminal building has been justified, although I regard the use of a blanket 85% load factor and the analysis of peak hours as not being best practice. Consequently, I have not been able to conclude whether the quantum of the increase is either adequate or excessive. However, if the latter, the extent of the consequences of the excess could be controlled by an annual passenger limit.

2.13 The UNS indicated (Paragraph 4.3) that a new taxiway link between current Taxiways Charlie and Delta is to be constructed under Permitted Development procedures (it does not form part of the CADP) to avoid the need for some back-tracking on the runway. The UNS states that this taxiway is "*…to improve operational efficiency and increase resilience…this has no impact on overall runway capacity…*". I do not accept this view, but the imposition of a planning condition to restrict the number of aircraft movements per hour would nullify any increase in capacity created by this proposed taxiway.

2.14 The York analysis has indicated that it would be possible to handle additional commercial traffic at the airport, through either peak spreading and/or provision of new taxiway between Taxiways Charlie and Delta. However, business aviation movements would need to be reduced to comply with the current annual noise factored ATM limit.

Out of Operational Hours Construction

2.15 A range of options for avoiding or reducing OOOH construction has been considered by LCY and LBN. Notwithstanding my opinion that York Aviation has exaggerated the impact on the air transport community of closure of LCY, I do consider that the option of closing the airport for several months would be severely detrimental for the airport community and its stakeholders. I consider though that shorter periods of closure, while unpopular with the airline customers of LCY, could be sustainable. However, I understand that the amelioration measures proposed by LCY are acceptable to LBN and that no additional closures of the airport to accommodate construction activities are considered necessary.

Conclusion

2.16 There is certainly additional passenger demand for travel through LCY. Indeed, I believe that LCY's consultants have under-estimated demand and that it would certainly exceed the figure of 5.99 million passengers per annum forecast by York for 2025 if permission were granted for the development.

2.17 To achieve the currently permitted level of 120,000 aircraft movements per annum, additional facilities are required on the airside of the airport, specifically the provision of seven additional stands and a full-length parallel taxiway. While the analysis of peak hour passenger demand to support expansion of the passenger terminal has some considerable weaknesses, I consider that it does support the need for some expansion in this area.

2.18 In view of the probable under-estimation of demand (used of course to assess the impacts of expansion), it is necessary to continue the application of the existing aircraft movement limits, and to apply new hourly aircraft movement and annual passenger limits, so that the impacts of expansion are not greater than those assessed.

3 London City Airport

Introduction

3.1 In this chapter, I first describe a number of unique features of London City Airport, before examining the growth in the demand it has experienced.

London City Airport Constraints

3.2 LCY has a very short runway which limits both the destinations that may be served and the aircraft types which may use it. The airport uniquely in the UK closes for 24 hours over the weekend, in addition to having a full closure every night. LCY has the highest proportion of business passengers of any UK airport (55%), with Heathrow being the next largest (32%), against a UK average of 22%[2]. This potentially makes LCY a high fare airport with knowledgeable but demanding customers.

3.3 Currently, LCY operates within a number of physical and legal constraints that determine the volume of traffic that it can handle. The permitted operating hours and the various planning constraints on number of aircraft movements, including the annual limits of 120,000 Air Transport Movements (ATMs) (both actual and noise factored), are the principal non-physical constraints.

3.4 The physical constraints start with the short, single runway, and continue airside with the absence of a parallel taxiway and the consequent need for aircraft to taxi along the runway and to manoeuvre on the taxi-lane at the back of the aircraft stands. There is a limited number of stands, many with aircraft size restrictions and with only a few able to handle the largest aircraft using LCY; even with these limitations aircraft are required to be parked at an angle rather than nose-in to the terminal. The taxi-lane immediately in front of the Terminal is narrow, and larger

[2] Derived by CSACL from UK Civil Aviation Authority Passenger Survey Report 2014

aircraft are not able to use it when aircraft are parked on the stands in this area. The Terminal building is hemmed in between the apron and the line of the Docklands Light Railway (DLR).

3.5 The proposed City Airport Development Programme (CADP) would remove some but not all of these physical constraints. Specifically, the CADP seeks to provide a full length parallel taxiway and seven additional aircraft stands capable of accommodating A318 and C-Series aircraft (the largest planned to use the airport), as well as significantly expanding the passenger terminal building.

3.6 It is also relevant to note that LCY is a Schedule Co-ordinated airport under the terms of European Commission Regulation 793/2004. This means that all aircraft operators wishing to use the airport must obtain in advance a 'slot' from LCY's co-ordinator, which is Airport Co-ordination Limited (ACL). ACL is an independent company owned in trust by the leading UK airlines. ACL's primary task is to ensure that the movements planned at the airport do not exceed any of its agreed capacity parameters.

3.7 For commercial operations, airlines apply for slots some six months prior to the start of a Winter or Summer season[3]. Airlines that have previously operated a slot at a specific time are entitled to the same slot again in the next corresponding season (subject to having operated a minimum percentage of those slots in the previous season). Business Aviation operators also require slots to operate but as they are generally only aware of their need a few days prior to operation, inherently they are obliged to fit the time of their operation around the slots still available.

3.8 As noted, Regulation 793/2004 gives operators of slots the legal right to claim the same slots in one season as they held in the previous corresponding season, provided that over the season the

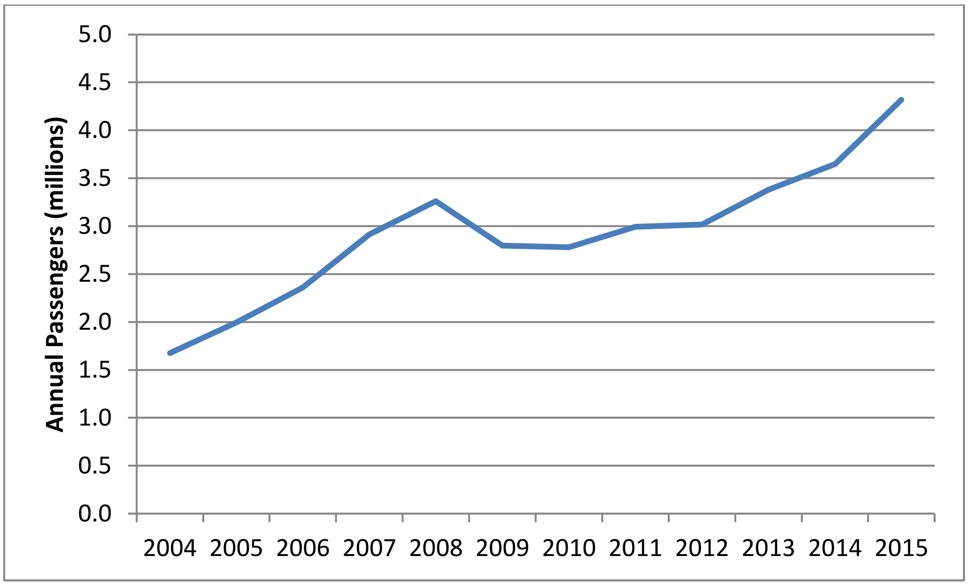
[3] The air transport industry has defined two periods of the year (November to March and April to October approximately) for convenience of operation.

slots have been used on at least 80% of the occasions for which they were allocated. This could give rise to some legal issues if the conditions on maximum levels of use associated with the grant of planning permission discussed in this proof (and elsewhere) and as agreed by LBN and LCY are imposed. I discuss this further at Paragraph 4.64 *et seq.*

Historic Traffic Development at LCY

3.9 Growth in passenger numbers at LCY has been very strong in the recent past. To a material extent this may be linked to the launch of operations through LCY by Flybe in Autumn 2014. Over the 12 months to the end of December, passenger numbers at LCY have increased by 18.4%, taking the Moving Annual Total (MAT) over the period to 4.32 million[4], very close to LCY's/York's forecast of 4.79 mppa (million passengers per annum) in 2025 in the Without CADP Case in the Update to the Need Statement (UNS). The rate of passenger growth has slowed significantly from the start of November, since a full-year of Flybe's operation is now reflected in the traffic base.

Figure 3.1: Growth of Passenger Traffic at LCY, 2004 to 2015



[4] All statistics in this report come from UK CAA Airport or Airline Statistics for the relevant period, unless otherwise specified.

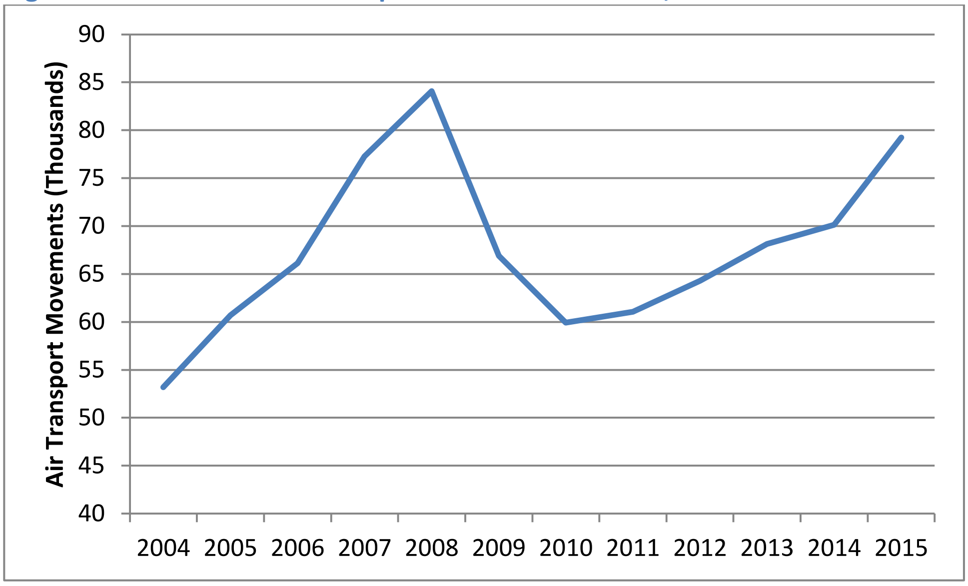
Source: CSACL analysis of CAA Statistics

3.10 The passenger growth rate of 22.5% over the 12 months from Flybe's launch of service at the end of October 2014, will certainly not be sustained in the 12 months starting in November 2015. It is possible that Flybe's commencement of services from LCY prompted increased fare competition between the airlines and created some unsustainable demand and weakened the financial performance of the three main airlines. It is not inconceivable that there could be some readjustment of demand and service consolidation over the next year or so, as the airlines move towards a more stable environment.

3.11 There has also been a strong growth in Air Transport Movements (ATMs) (excluding air taxi movements) in the last year, with the CAA's Statistics indicating an MAT of 79,251 in the 12 months to end December 2015[5]. It may be appreciated (Figure 3.2) that ATMs reduced significantly after the start of the financial crisis in 2008, but have been recovering in recent years. As a reference point, LCY's Without CADP Case forecast in the UNS for 2025 is 86,050, slightly above the previous peak level of 2008 (84,074 ATMs).

[5] In the remainder of this proof, the term 'Air Transport Movement' is used to refer to commercial movements (i.e. excluding Air Taxi operations), and Air Taxi operations are included in Business Aviation movements.

Figure 3.2: Growth of Air Transport Movements at LCY, 2004 to 2015



Note: ATMs exclude air taxi operations
Source: CSACL analysis of CAA Statistics

3.12 While ATMs form the bulk of aircraft movements at LCY, there are other categories of movements (Table 3.1). The non-Air Taxi ATMs are commercial operations carrying fare-paying passengers by airlines. It may be appreciated that there are slight differences in these statistics from those given in the UNS, although I regard such differences as not material.

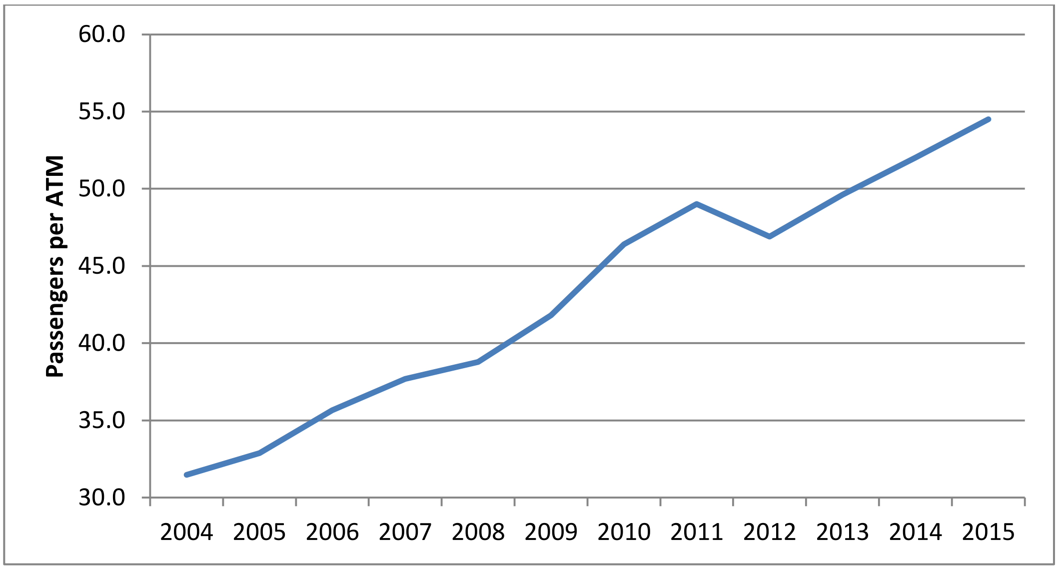
Table 3.1: Aircraft Movements at LCY, 12 months to end November 2015

	Movement Type	Number
Commercial Movements	Air Transport Movements	83,690
	of which Air Taxi	4,435
	of which non-Air Taxi ATMs	79,255
	Positioning Flights	611
	Local Movements	0
Non-commercial Movements	Test and Training	254
	Other Flights	1
	Aero Club	0
	Private Flights	0
	Official	0
	Military	0
	Business Aviation	241
	Grand Total	84,797

Note: More detailed statistics for calendar year 2015 were not available at time of submission of Proof
Source: CAA Annual Statistics, Table 3.1

3.13 In parallel with these increases in traffic, there has also been an increase in the average number of passengers per ATM, and this important parameter reached 54.5 in the 12 months to December 2015. This is close to LCY's forecasts for 2025 in the Without CADP Case in the UNS (55.6 passengers per ATM), and even closer to its 2025 With CADP Case figure of 55.4 in the UNS. As may be seen (Figure 3.3) this measure of performance continued to increase throughout the Financial Crisis, and suffered only a slight dip in 2012, perhaps associated with the London Olympics: host cities of major sporting events such as the Olympics normally see a diminution of traffic as 'normal' travellers avoid the destination in anticipation of a crowded and expensive experience. Over the period since 2004, passengers per ATM have increased at an average rate of 5.1% per annum.

Figure 3.3: Growth of Passengers per Air Transport Movement at LCY, 2004 to 2015



Source: CSACL analysis of CAA Statistics

3.14 Overall, traffic growth this year is in line with the suggestions made in the CSACL January 2015 report that York's forecasts under-estimated future demand.

4 Traffic Forecasts

Introduction

4.1 In this chapter, I review the traffic forecasts produced by York Aviation in support of the Planning Application. The forecasts are for passenger traffic and aircraft movements only: air freight is agreed not to be relevant for LCY. The forecasts with the proposed developments in place are reviewed first, before the forecasts if no developments take place are considered.

4.2 There have been changes in passenger and aircraft movement forecasts from the Original Need Statement (ONS), although the approach to forecasting remains the same. I commence with a brief description of the LCY approach to forecasting. I then assess the assumptions applied to this approach, although my judgements on them are based on the output forecasts which result from them. Although the passenger and Air Transport Movement (ATM) forecasts are closely linked, I initially assess them separately.

Passenger Forecasts: Approach and Assumptions

4.3 York has used the same approach to preparing its traffic forecasts as in the ONS. I consider this approach to be reasonable, albeit requiring many micro assumptions on routes, frequencies and aircraft types since in essence it is a bottom-up approach. The vulnerability of such an approach has been demonstrated by the commencement of services at LCY by Flybe, a UK regional airline: such operations had not been considered in the ONS[6], although they are now reflected in the UNS.

4.4 York uses a largely bottom-up approach to forecasting traffic at LCY. This is based on consideration of traffic development on

[6] York has indicated that while it was aware of the potential for Flybe to launch operations, for reasons including uncertainty and commercial confidentiality it could not include this development in its forecasts. It did though incorporate a significant increase in Flybe's primary aircraft type in its LCY fleet mix, and might have include an extra sensitivity test of expansion by an unnamed airline.

individual routes. Such approaches are normally restricted to short term forecasting (two to three years), when there is some knowledge of airline operating intentions. Beyond this two or three year period, it would be more customary to apply a top-down technique based around some form of econometric analysis linking historic passenger increases to known changes in external variables such as GDP and the price of air travel, and predicting air passenger forecasts based on changes in these variables. The location of LCY within the London airports system and catchment area does though create some challenges in the application of such a technique to any of the London airports individually, although the approach remains valid for the system as a whole. Hence, I consider the approach adopted by York to be appropriate for this situation.

4.5 York has incorporated some aspects of a top-down approach by applying overall growth rates from the Department for Transport's (DfT's) econometric forecasts to its route-level consideration of demand. Demand at a route level from within LCY's catchment area is grown at the DfT's rates, with some adjustments made for expected faster growth in employment in the Newham and Tower Hamlets Boroughs of East London. York has selected a number of routes in Europe, including those currently served and those considered to have potential over the next ten years. Included in this second group are cities in central and eastern Europe that are expected to come within range with the introduction of new aircraft types and variants.

4.6 Overall demand in each borough of LCY's catchment area to each destination is grown at the appropriate rate, and an assessment made of the share of each demand category that might be captured by LCY based on LCY's current capture rate for each borough and market type. The frequency of service presumed to be offered on each route is an important factor in determining market capture. There is a degree of iteration in balancing the unconstrained market demand with aircraft types assumed to be operating on each route, and the frequencies that are offered. For each destination, York has assumed a maximum year-round average load factor: if market demand and seat offer result in a load factor above this level, either frequency is increased or the route is categorised as 'constrained' and excess demand is assumed not to be handled at LCY. In York's Base Case forecasts, for business-oriented routes the load factor is set at 65% year round, while for leisure-oriented routes it is higher at 78%.

4.7 York has made a series of judgements about the provision of frequencies and the viability of off-peak services, so that this element of demand forecasting is very closely linked to the development of a representative daily schedule. In particular, decisions/assumptions are required on airline behaviour on whether to add an additional flight to a route if it cannot do so in the morning or evening peak period.

4.8 From a short haul airline's perspective, although it would normally expect its peak morning and evening services to be its most profitable, it must also decide what to do with the aircraft operating these peak services for the rest of the day. The choices are essentially to (a) keep the aircraft on the ground; (b) operate a service to a different destination where the potential market is less sensitive about the time of day it flies (and hence the provision of some LCY services to leisure destinations); or (c) operate an additional frequency on the (business) route served in the morning and evening, accepting that profitability of a middle of the day flight will be lower. There are almost certainly examples of all three options in the current operations of LCY's airlines. However, to the extent that an airline decides to operate a flight during the middle of the day, then that will consume more of the legally permitted annual movements at LCY, and potentially prevent peak movements at some later time (after capacity has been expanded or peak demand has grown).

4.9 York's forecasts have changed significantly at the detailed level between the ONS and the UNS. These changes have resulted from:

- The slippage in the dates when different aspects of the CADP are completed and brought into operation (thereby affecting the capacity available for operations);
- Extension of the forecast period from 2023 to 2025;
- Some reflection of the growth in passenger traffic at LCY since the original forecasts were prepared; and
- Incorporation of known developments into the projection, such as Flybe's launch of operations at LCY.

4.10 The last of these has probably been the source of greatest change, and York has used a more recent schedule as the base-line to refresh its forecasts, albeit a significant increase in Q400 aircraft, Flybe's primary aircraft type, had been included in the ONS.

4.11 In the three years or less since York prepared its forecasts in the ONS, there has been a significant change in the frequencies offered on individual routes, albeit there is limited change in the destinations served. These changes in daily frequency forecast to be offered highlight a weakness of York's approach. Developments on two of the busiest routes illustrate this point: Dublin and Edinburgh have both seen increases in forecast frequency from the ONS. This is most striking for the Dublin route where frequency doubles from 7 daily to 14 daily (Table 4.1).

Table 4.1: Examples of Detailed Route Changes between the ONS and the UNS

Route	ONS (2023)		UNS (2025)	
	Frequency	Passengers	Frequency	Passengers
Dublin	7	222,849	14	493,200
Edinburgh	12	438,004	18	591,000

Source: ONS and UNS Tables 3.12 and 3.12A

4.12 A more comprehensive comparison is given as Appendix B. These changes demonstrate the vulnerability of the forecasting technique to individual airline decisions as the changes have been driven by changes in frequencies between the original base year (2012) and the current base year (2014). More importantly, though, they limit the confidence in those conclusions which are based on the very detailed approach applied by York in relation to, for example, the number of movements that can be accommodated, and the load factors that can be achieved. This is discussed further below.

4.13 When deciding on the detailed assumptions to be made, York appears to have been guided by historic experience and the *status quo* rather than endeavouring to capture the dynamism of the airline industry and making judgements about how it might react to changes in the market environment within which LCY operates. York has indicated that the latter approach would be too speculative, but I consider it is a responsibility of forecasters to examine the evidence and external environment in order to decide whether or not key input parameters might change.

4.14 York's approach has required it to make further assumptions about the future fleets of the main airlines operating into LCY. These appear to be reasonable based on existing knowledge of individual airline intentions. There are signs that Bombardier (the manufacturer of several aircraft types assumed to be operating at LCY) has some financial troubles (e.g. it has been reported to be looking for a take-over partner), and the Quebec Provincial Government has become a Joint Venture partner in the C Series aircraft programme under development. There are though suggestions that this support may not be sufficient, indicating continuing concern over the future of the manufacturer. In any event, there are other alternative and similar aircraft types in production or planned.

4.15 As York has undertaken similar exercises for LCY several times over the last five or so years (e.g. for the ONS), there is likely to have been an iterative process, with capacity constraints incorporated into the route demand forecasting. For example, some of LCY's stands can only handle the smallest aircraft types operating into the airport, and so York is likely to have ensured that routes suitable for these types are included in its demand schedule.

4.16 Overall, I consider that the approach adopted by York to forecast passenger demand is reasonable, although perforce the outputs of the exercise are reliant on a very large number of assumptions. York's judgements on each have generally been reached over a number of years through an iterative process recognising certain constraints of the airport. While few if any of the assumptions are unreasonable individually, there are a great many alternative assumptions which would be similarly reasonable but which could lead to different outputs and different conclusions on the level of facilities required. The assumptions may only be sensibly judged on the basis of the output forecasts which they collectively produce. However, as these forecasts are to a greater or lesser extent constrained by the number of aircraft movements, it is necessary to review first how these have been produced.

Aircraft Movements: Approach

4.17 In forecasting exercises, it is more common to forecast annual passenger demand and then convert it into an annual total of aircraft movements, and from this to decide the number of flights to include in a representative daily schedule of flights (often used for facility planning purposes). For LCY, York has in fact worked from a daily flight schedule of commercial movements to an annual total. In view of the constrained nature of LCY, I consider this to be a reasonable approach.

4.18 York's schedule in the UNS is based on a typical busy Tuesday in June 2014. The representative busy day schedules for three future years (2020, 2023 and 2025)[7] were developed in conjunction with the passenger forecasting exercise, recognising passenger demand; airline service provisions in response to this demand; aircraft types assumed to be in each airline's fleet; aircraft availability and profitable use; runway movement availability (especially in peak periods); and aircraft stand availability. The outputs represent a significant exercise to achieve a reasonable balance across these many variables.

4.19 The movements in the representative daily schedule are converted to annual movements by[8]:

- Dividing by 17.53%, the typical percentage that the movements on a weekday represent of the weekly total;
- Multiplying by 4.29, the number of weeks in June;
- Adjusting this figure to an annual month by multiplying by 8.333% and dividing by 8.83%, the percentages of movements in average and peak months respectively;
- Multiplying by 12 to give an annual number; and
- Making a further adjustment for York's belief that the New York service has a more regular pattern of operations throughout the year.

4.20 With the exception of the last adjustment, I consider that York's derivation of annual movements from a daily starting position is reasonable. I do though question making an adjustment for a single route: other routes or services (e.g. a UK domestic operation) are *prima facie* as likely to have or not have as a regular pattern of services as the New York service. However, the impact of this last adjustment is unlikely to make a material difference to the annual forecasts, and I do not pursue this point further.

[7] Forecasts for other years were interpolated

[8] This was the calculation used in the ONS, and I understand that the UNS is based on the same or a very similar calculation, and I doubt that any differences would be material

4.21 Business Aviation movements are projected on the basis of Eurocontrol growth rates, although adjustments have been by York to reflect the slower recovery from the financial and economic crisis of 2008. However, when necessary, the Business Aviation movements are controlled downwards to ensure that the annual LCY movement limits for both actual and Noise Factored movements are respected. I believe that this approach reflects the reality of the situation at LCY.

Aircraft Movement Results: With CADP

4.22 In the With CADP Development Scenario, York has forecast annual commercial movements in 2025 for LCY at 108,250, and Business Aviation movements as 2,800[9], giving a total of 111,050 movements (UNS, Table 3.10A). When Noise Factors are applied, the total becomes 120,000 movements[10]. The forecast of Business Aviation movements is lower than their current level, which is generally to be expected at an airport with a shortage of runway capacity.

4.23 In summary, commercial movements are forecast by York to increase by an average of 4.0% per annum between 2014 and 2025.

Passenger Forecasts: Outputs

4.24 York's forecast in the With CADP Base case is for 5.994 million passengers in 2025, a growth rate averaging 4.6% per annum from 2014. Overall, the share of the London air passenger market taken by LCY is forecast to rise from 2.5% in 2014, to 3.5% in 2025. Given the airport infrastructure capacity shortages in the London system, particularly at LCY's prime competitor of Heathrow, an increase in LCY's market share over this period is very likely.

[9] The total of individual aircraft types in Table 3.10A of the UNS in fact comes to 2,810 movements.
[10] The total is 120,009 although I attach no importance to this slight excess.

4.25 With passenger growth averaging 4.6% per annum, the average number of passengers per movement is forecast to increase to 55.4 passengers per movement in 2025. This figure is extremely modest when compared with the 4.8% growth seen in 2015 to 54.5 passengers per movement. If there were to be no further growth in this parameter this year, to reach the York figure of 55.4 passengers in 2025 would require an average annual growth of less than 0.2% per annum over the next ten years. This should be compared to the long term average of 5.1% per annum between 2004 and the end of 2015 (Paragraph 3.13). I consider the growth in this parameter implied by the York forecasts to be too low.

4.26 In general, an airport with constraints on the number of aircraft movements it can handle, would be expected to record an above average increase in passengers per movement. Indeed, since the onset of the global recession there has been a discernible trend for enhanced increases in passengers per movement worldwide. Counteracting this trend for LCY is, of course, the limitation on the size of aircraft that it can handle. This will act as a natural regulator of the rate at which average passengers per movement can increase. However, York's commercial movement forecasts indicate an increase in average seats per movement between 2014 and 2025 of an average of 1.1% per annum.

4.27 In addition to aircraft size (as reflected in number of seats), the number of passengers per movement is dependent on the proportion of seats occupied, that is, the average passenger load factor or seat factor. The York passenger and movement forecasts imply a reduction in this between 2014 and 2025, with the average load factor reducing from 65.0% to 61.8%. A reduction is possible (e.g. as a result of termination of above average leisure-oriented services), but I consider this to be unlikely especially since York's peak hour forecasts[11] suggest that even with the CADP developments in place, LCY would be coming under capacity pressure from 2021 onwards.

4.28 Overall, while both the passenger and movement forecasts are reasonable, there are indications that they are not consistent, with the passenger forecasts being lower than would be expected for the movement forecast provided. The more important conclusion I make though is that there is certainly an ability to carry more passengers through LCY than are currently being forecast for 2025 within the annual movement limits. The likelihood is therefore that even if the actual traffic outturn were in line with York's forecasts, 2025 would not represent a year in which LCY would have reached the maximum passenger throughput that a developed airside system could support.

4.29 The load factor and the average number of passengers per ATM in 2025 are also outputs of the forecasting exercise and respectively appear to me to be too low in comparison to the 65% load factor of 2014 and the rate of increase of passengers per ATM seen over the last 12 months. The 2025 figures must also be seen in the context of the expectation of passenger demand in the London area greatly exceeding airport capacity. York argues that (a) aircraft size increases at LCY beyond those which it has assumed is very limited, and (b) the nature and pattern of demand prevents the current year-round maximum load factor being exceeded. I can accept the first of these arguments but not the second.

Load Factor Development

4.30 Network-wide load factors in 2014 for BA CityFlyer (mainly LCY focused) and for British Airways' A318 fleet (which operates exclusively to and from LCY) were 71.2% and 73.5% respectively[12]. CityJet's reported load factor (again network wide although this was

[11] Discussed further at Paragraph 5.36

[12] CAA Airline statistics

80% LCY focused in 2014) was 61.0%[13], while Flybe's Q400s achieved 71.5%[11] across its whole network (much wider than just LCY which represented about 3% of the airline's production). In contrast, in 2014 British Airways' narrow-bodied operations (excluding LCY aircraft and essentially covering short haul operations) achieved a network wide load factor of 78%.

4.31 A criticism I make of York's forecast is that it assumes that its input 65% maximum year-round load factor on business oriented routes will not change over the next ten years, irrespective of what is happening in the surrounding environment. As the 65% figure has been observed for many years, York considers that it would be speculation to incorporate as a base assumption that this would change. However, in my view it is the role of forecasters to anticipate changes in such key parameters if there are sufficiently strong reasons for considering that this might happen.

4.32 The maximum annual load factor that can be achieved is effectively 'controlled' by the nature and pattern of traffic and peak load factors. When a load factor on a particular flight reaches 100%, some demand may be unsatisfied and may 'spill'. As more flights on a given route reach 100% load factors, airline planners consider the introduction of more capacity (additional frequencies and/or larger aircraft). On short haul routes, the traditional rule of thumb for capacity increases was when annual load factors were around 70%. The nature and pattern of demand at LCY as reported by York suggests that the trigger for LCY has been an annual load factor of 65%, although LCY's most important airline (BA CityFlyer) achieves a much higher figure. Additionally, the greater sophistication of airline revenue management systems suggests that the general trigger for capacity increases may now be higher than 70% and perhaps closer to 80% (c.f. British Airways' short haul load factor of 78%).

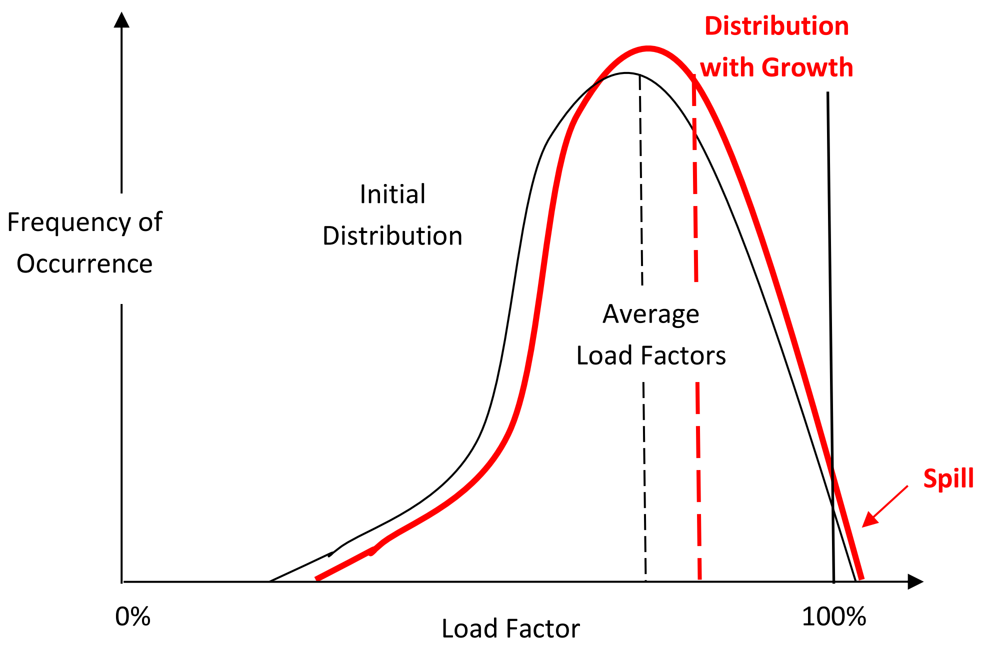
[13] Flightglobal.com database

4.33 However, if it is not possible for an airline to increase its seat capacity, there are a number of possibilities for this 'spill' traffic:

- it can seek to use another airline and/or another airport;
- it could choose an alternative destination (possibly only an option for leisure travellers);
- it could choose flights at a different time or on a different day; or
- it could choose not to fly.

4.34 The likely shortage of airport capacity in the London area over the coming decade will reduce the ability to use other airlines and airports, so that the proportion of thwarted passengers accepting a sub-optimal timing is likely to higher than would normally be the case. This will change the profile of demand, and will shift the distribution of load factors thereby increasing average annual load factors (Figure 4.2).

Figure 4.1: Illustration of Frequency Distribution of Load Factors



4.35 I believe there is scope for this, since not only does LCY have a reasonably stable profile of traffic over many weeks of the year, but also as York notes[14] an 85% load factor is consistent with the 30th highest load factor in the peak period, meaning that in 2014 there were only some 30 peak periods when the average load factor across the flights in those hours exceeded 85%. This means that there is only one period every 10 days or so when the load factor averaged across all the flights operating in that period is above 85% - and even then there would still be many empty seats in those very busiest periods.

4.36 The ability for load factors at LCY to increase may be illustrated by consideration of the asymmetry in load factors between morning and evening peak periods: load factors are higher on flights arriving in the morning than in the evening, with a reversed pattern for departing flights. Looking forward several years when there is an increasing shortage of available airline seats departing the London area in the morning, airlines (and if not airlines then consumers and particularly business travellers) are likely to identify seat availability from LCY, even though for some consumers it might not be their preferred departure point. This effective widening of LCY's catchment area would result in an increase in both average load factors and in passenger throughput at LCY. This development is not factored into the York forecasts for LCY, even though it would apply to both With and Without CADP Base Cases.

4.37 Using the limited information previously supplied on this asymmetry of load factors, an illustration of the scale of this market development may be provided. As noted arrival load factors are higher in the morning peak than in the afternoon peak. If the afternoon arrival load factors were the same as the morning load factors, and if a similar development occurred for departing flights, overall load factors would increase by nearly five percentage points,

[14] Terminal Capacity Assessment Briefing Note, York Aviation, 22 October 2015

based on data for three busy days in 2014 (Table 4.2). I recognise that a sample of three days is not an adequate base for a forecast, but I do consider it a reasonable basis for an illustration.

Table 4.2: Illustration of Load Factor Increase with Removal of Asymmetry

	Current Pattern			Potential Future Pattern	
	Passengers	Load Factor	Seats	Load Factor	Passengers
Arrival Flights					
Morning	6,046	73.3%	8,253	73.3%	6,046
Afternoon	5,678	64.3%	8,828	73.3%	6,467
Total	11,724	68.6%	17,081	73.3%	12,513
Departing Flights					
Morning	5,977	60.4%	9,898	69.6%	6,891
Afternoon	6,693	69.6%	9,614	69.6%	6,693
Total	12,670	64.9%	19,512	69.6%	13,584
Overall					
Morning	12,023	66.2%	18,151	71.3%	12,937
Afternoon	12,371	67.1%	18,442	71.4%	13,160
Total	24,394	**66.7%**	36,593	**71.3%**	26,097

Source: Current Pattern - York Aviation as detailed in Table 5.1 of this report; Future Pattern – CSACL generated

4.38 In a similar fashion, more leisure passengers may be attracted to LCY from other areas of London. As demand in the London airport network builds up at a faster rate than airlines can increase the number of flights that they offer (because of infrastructure constraints), the airline revenue management systems will offer fewer seats at the lowest price levels. The pattern of demand at LCY, driven by the high proportion of business travellers, is likely to see a number of other periods during a typical day and during a typical week when there are airline seats available at LCY. The revenue management systems will endeavour to sell these seats to leisure passengers either unable to find seats from another London airport or unwilling to pay higher fares at Heathrow and Gatwick, so allowing further increases in load factors at LCY.

4.39 York contends (UNS Paragraph 3.21) that peak period load factors at LCY will have an upper bound of 85% because of "…its preponderance of business travel and a high proportion of full fare ticket holders…". It is not immediately obvious to me why these two features of the LCY market should place a limit on peak period loads of 85%. Airline revenue management systems are designed to maximise the revenue generated for the airline[15]. In a situation in which there is a shortage of airline seats in the London area and with demand exceeding supply, the airline revenue management systems are unlikely to be programmed to stop selling seats in peak periods if loads are likely to hit 85%: airlines will not intentionally (or normally) hold seats back in case a full fare passenger might have a change of plans and need it, since full fare tickets only give the right to change if seats are available.

Comparison of With Development Forecasts between ONS and UNS

4.40 The major elements of the With CADP forecasts in the ONS and the UNS are summarised in Table 4.3.

Table 4.3: Comparison of With Development Forecasts between ONS and UNS

With CADP	2014	2019	2020	2021	2023	2025
Commercial Movements						
July 2013 (ONS)		98,802		104,901	107,119	
September 2015 (UNS)	70,133		93,820		107,120	108,250
Average Seats per Movement						
July 2013		86.7		86.5	89.3	
September 2015	78.2		87.5		88.5	89.6
Passengers (m)						
July 2013		4.87		5.51	5.87	
September 2015	3.65		5.08		5.87	5.99
Average Load Factor						
July 2013		56.9%		60.8%	61.4%	
September 2015	65.0%		61.8%		61.9%	61.8%
Average Passengers per Movement						
July 2013		49.3		52.5	54.8	
September 2015	52.0		54.1		54.8	55.4

[15] There is a natural variation in the pattern of demand over the hours of the day and the days of the week. The details of these variations are often route specific and airline revenue management systems study them intensively. Sophisticated mathematical and statistical algorithms are used to maximise the revenue that can be generated from each flight, the objective of these systems. A booking profile is built up for each flight based on historic experience, and as bookings are received, the price of remaining seats is increased. A 'no show' rate will be determined, and based on this, the nature of the route and commercial considerations, airlines will decide on the level of over-booking that they will accept: if the algorithms are correctly calibrated, each flight would depart full, with 'no-show' passengers exactly equalling the level of overbooking permitted.

4.41 It may be seen that the two sets of forecasts are very similar in 2023 despite the very different route compositions in the two base years, and the very considerable traffic growth at LCY over the last year. This should be an indication that the airport is constrained in relation to aircraft movements and stands. However, as a further increase in movements is forecast for 2025, this indicates that other services can be accommodated, probably outside the peak periods. Average load factor remains static for the second half of the forecasting period, at a level more than three percentage points lower than achieved in 2014. There is some growth in average seats per movement and in average passengers per movement, although as noted previously, this is little higher than is currently being seen at LCY. These factors suggest that the passenger forecasts are too low and higher volumes are likely to be seen earlier than predicted by York.

Forecasts Without Development

4.42 The passenger and movement forecasts to 2025 without the proposed CADP developments have been produced in the same fashion by York. As the forecasts are more constrained than for the 'With Development' scenario, aircraft movement forecasts are the primary driver of the passenger forecasts. The approach used is the same as in the ONS. The representative day schedule developed for 2023 in the ONS was discussed in more detail in the CSACL January 2015 report. The annual movement forecast is derived from the daily schedule, using the same approach as described above.

4.43 In the Without CADP case, York forecasts commercial aircraft movements to reach 86,050 in 2023 and to remain at that level in 2025. Business Aviation movements are forecast to be 9,000 in 2025. When combined, these forecasts are well within the 120,000 movements and Noise Factored movements which are already permitted. The commercial movements are lower than in the ONS.

4.44 York's forecasts for 2025 of 4.79 million passengers, imply a load factor of 64.3%. The passenger and movement forecasts lead to an average of 55.6 passengers per movement in 2025. These passenger forecasts are higher than in the ONS, despite the lower movement forecasts. This is as a consequence of higher seats per movement, and the higher load factors. The UNS appears to have been amended in the light of some of the CSACL criticisms made in the January report.

4.45 Table 4.4 summarises the key features of the ONS and UNS forecasts.

Table 4.4: Comparison of Without Development Forecasts between ONS and UNS

Without CADP	2014	2019	2020	2021	2023	2025
Commercial Movements						
July 2013 (ONS)		84,941		88,822	87,713	
September 2015 (UNS)	70,133		84,940		86,050	86,050
Average Seats per Movement						
July 2013		79.6		80.4	80.2	
September 2015	78.2		86.4		86.5	86.5
Passengers (m)						
July 2013		4.15		4.39	4.44	
September 2015	3.65		4.60		4.72	4.79
Average Load Factor						
July 2013		61.4%		61.5%	63.0%	
September 2015	65.0%		62.7%		63.4%	64.3%
Average Passengers per Movement						
July 2013		48.9		49.4	50.6	
September 2015	52.0		54.2		54.8	55.6

4.46 Although the UNS passenger forecasts are higher than those in the ONS, they are probably still too low. The ONS demonstrated that it would be possible to accommodate movements 3% higher than in the UNS (2021 ONS vs 2025 UNS), while I consider the load factors of the UNS are too low for a constrained airport in a constrained airport system.

Comparison of With and Without CADP Forecasts

4.47 For convenience, the major elements of the two base case forecasts are summarised in Table 4.5.

Table 4.5: Comparison of With and Without CADP Forecasts (UNS)

Comparison of With/Without	2014	2020	2023	2025
Commercial Movements				
With CADP	70,133	93,820	107,120	108,250
Without CADP		84,940	86,050	86,050
Average Seats per Movement				
With CADP	78.2	87.5	88.5	89.6
Without CADP		86.4	86.5	86.5
Passengers (m)				
With CADP	3.65	5.08	5.87	5.99
Without CADP		4.60	4.72	4.79
Average Load Factor				
With CADP	65.0%	61.8%	61.9%	61.8%
Without CADP		62.7%	63.4%	64.3%
Average Passengers per Movement				
With CADP	52.0	54.1	54.8	55.4
Without CADP		54.2	54.8	55.6

4.48 It may be seen that the load factors in the With CADP case are lower than in the Without CADP case, despite indications that even with the CADP developments LCY would be constrained in the second half of the assessment period: shortage of airport capacity tends to force load factors up. A related consequence of this is that the average passengers per movement are almost identical in both scenarios, despite larger aircraft being able to operate in the With CADP scenario.

Sensitivity Tests

4.49 The UNS describes three Sensitivity Tests:

- Without CADP Higher Jet Centre Growth: the basis of this test appears reasonable, as do the assumptions used to develop it;
- With CADP Faster Move to Jets: as the description suggests, more commercial jets are assumed in this sensitivity, with at some peak times two additional Code C aircraft at LCY than in

the Base Case. This increase takes the average seats per movement to 92.8 year round, although York considers that this development would have a 'negligible impact' on the passenger forecast. Consequently, load factor would fall to 60%. The number of Business Aviation movements would fall to 50 in the year in order to meet the Noise Factored Movement cap: at this level it would be probable that the Jet Centre would close; and

- With CADP Higher Passenger: in this test, the maximum load factor on individual business routes has been increased to 72% (leisure routes maintained at 78%) from the 65% figure of the Base Case (Paragraph 4.6). As a consequence, in 2025 the overall output load factor increases to 67% and the passenger forecast to 6.5 mppa. York considers that peak period load factors would not increase above a figure of 85%, with growth being mainly off-peak.

4.50 It is not obvious to me that if airlines introduced jets at a faster rate into LCY that they would be content to experience lower load factors of 60% or so. With higher load factors, passenger throughput would be higher: for example, if the 2014 load factor of 65% applied to the higher average seats per movement, passenger numbers in 2025 would be 6.5 mppa, while with the 67% load factor of the other sensitivity test, they would be 6.7 mppa. If BA's short haul load factor of 78% were achieved, LCY would be handling 7.6 mppa.

Conclusions on Traffic Forecasts

4.51 The approach to forecasting adopted by York would not normally be used to produce medium to long term projections. However, given the circumstances of LCY, I consider its application is appropriate. This does though mean that the forecasts are dependent on a very large number of judgements about the intentions of airlines over the next ten years.

4.52 The difference in 2025 outturn at a detailed level (based on 2014 schedules), from that predicted just two years earlier by York in the ONS for 2023 (and based on 2012 schedules) highlights the danger of such forecasting (Paragraph 4.11 *et seq.*). It also reduces the confidence that may be placed on York conclusions drawn on basis of such 'detailed modelling', particularly load factors and to a lesser extent aircraft size (which is influenced by stand sizes).

4.53 There is also some variation of forecasts for aircraft movements, for example in the Without CADP scenarios, forecasts vary from 88,822 movements with 80.4 seats on average in 2021 in the ONS, to 86,050 movements with 86.5 seats in 2025 in the UNS. The With CADP aircraft movement forecasts are though similar in both the ONS and the UNS. These variations in the aggregate outputs indicate the degree of forecasting uncertainty.

4.54 While the detailed assumptions are individually reasonable (although not uniquely so), collectively they lead to output passenger forecasts which are likely to be too low. In developing the forecasts, York appears to have been more heavily influenced by an implicit assumption of the continuation of the *status quo* (e.g. average year round load factor), rather than incorporation of an assessment of how such parameters might change given the likely shortage of airport capacity in the London area over the next ten years. It is quite plausible, and indeed I would say probable, that load factors at LCY will increase over the period, as passengers find available seats in the same way as water finds its own level.

4.55 One of the key controlling parameters in York's forecasts is the assumed maximum annual route load factor (65% on business routes) which is related to the peak load factor (indicated to be 85%). I consider these load factors are very likely to be exceeded in the future.

4.56 There is inconsistency between the passenger and aircraft movement forecasts in both the With and Without Development scenarios in 2025. On balance, it is likely that the passenger forecasts are low in comparison with the aircraft movement forecasts. Certainly, though, there is scope in the years beyond 2025 for passenger numbers to increase even if commercial movements remain at the levels forecast for 2025. There is also the probability that Business Aviation movements will be replaced by commercial movements.

4.57 Future passenger volumes are likely to reach 6.5 mppa at some time, and in the absence of an annual limit, would go beyond this figure through a combination of larger aircraft and higher load factors. For example, combination of the Faster Move to Jets and higher load factors of 65% or higher would see annual passenger volumes reaching the proposed cap. In my opinion, this is likely to be seen before 2025.

Need for an Annual Movement Limit

4.58 There are already limits on the number of aircraft movements that are permitted at LCY, and these need to remain in place. The physical capacity of the airside runway, taxiway and apron system creates a constraint that limits movements in peak hours, and this is true even if CADP is permitted. However, this physical constraint limits growth over a small period of time (a few hours) and does not prevent growth in off-peak periods. Peak spreading would allow the airport to grow although airlines would increasingly have to accept less desirable timings for their operations.

4.59 The theoretical capacity of LCY would be its hourly capacity multiplied by the number of hours in the year that it is open. With an hourly capacity of 45 movements in the With CADP case (discussed further at Paragraph 5.23 below), and some 4,800 annual opening hours the theoretical capacity is in excess of 215,000 aircraft movements per annum. While the realisable use of

LCY would never approach this figure, it nonetheless underlines the need to maintain the annual movement limit of 120,000 aircraft movements.

Need for an Annual Passenger Limit

4.60 My assessment in this chapter suggests that LCY has underestimated passenger demand, and that notwithstanding the annual aircraft movement limits and the physical restrictions on the size of aircraft that may use LCY, there is significant scope for annual passenger volumes to be much higher than LCY has forecast. LCY has acknowledged the possibility that passenger traffic could exceed 6.5 mppa, and has agreed with LBN that this should be the maximum throughput allowed at the airport and that this should be enshrined in a condition of planning approval.

4.61 Annual limitations on the number of passengers permitted to use the airport are relatively unusual. In the UK, a number have been proposed but to the best of my knowledge the limit has not been tested, either because the restrictions have been amended or because traffic has not yet approached the limit.

4.62 Ideally, an annual limit should be judged on a moving annual basis using passenger statistics supplied by the CAA (as an independent organisation). Rather than force the closure of the airport should the actual number of passengers exceed the limit, it would be better to allow a short period during which the airport and its airlines restricted bookings to enable the total passenger number to fall back below the limit, than to require the airport to close until the next annual period commenced.

4.63 Annual demand limitations based on movements are inherently much easier to control than passenger-based limits. Limits on movements may be done through the slot co-ordination system: the slot co-ordinator simply allocates slots up to the limit and no higher. However, passenger movement caps would be more challenging to control. One approach would require the slot co-ordinator to take early steps to protect the limit by incorporating into the slot not just the resources required for the aircraft operation, but also linking the slot to a certain number of passengers. Although the term 'slot' is generally taken to refer to an aircraft landing or take-off, the EU Regulation allows a slot to have associated with it the other airport infrastructure necessary for operation in addition to the airport runway, so the legal possibility exists.

4.64 A practical difficulty arises because all airlines using the airport will hold a number of slots and rightly would wish to have some flexibility as to how they used their passenger 'quota'. Solving this problem will be challenging, but is not obviously the task of this Inquiry so to do. However, unless some passenger element is included in the slot permission, a situation could arise in which the airlines have a lawful right to carry out aircraft operations with the slots previously held, but at the same time if they were operated LCY would as a result of increases in passengers per ATM be in breach of its annual passenger limit.

4.65 An involvement of the slot co-ordinator in the implementation of a limit would have several advantages:

- The co-ordinator is in frequent, if not almost continuous contact with airlines and is likely to have a good awareness of their commercial intentions and the state of the market;
- The co-ordinator has a statutory responsibility to ensure compliance with the slot allocation and co-ordination parameters at the airport; and
- The co-ordinator has powers to enforce penalties for breaches of the rules.

5 Capacity Assessment

Introduction

5.1 In this chapter, I review the capacity assessments made by York. I begin by giving a background to capacity assessments for airports, before considering the CADP submissions.

Background to Airport Capacity Measurement

5.2 When considering airport capacity, three important factors are (i) the hourly capacity of the **individual components** of infrastructure and operational processes; (ii) closely associated with which are the **service standards** adopted; and (iii) the **pattern of demand** assumed to convert the hourly capacities into a single annual capacity figure, often expressed in terms of the airport's passenger handling capacity.

5.3 The capacity of an airport is determined by its most constrained component, which is often the runway system or terminal building, but may be the number of aircraft parking stands or landside access system. The weakest component may of course change over time. The hourly capacity of any of these components is capable of determination/specification with reasonable accuracy, but may be 'flexed' to a limited extent by variation in service standards (e.g. delays, waiting time, over-crowding in terminals).

5.4 Hourly runway capacity is determined by several factors, including number and configuration of taxiways and turn-offs; aircraft separation standards and mix of aircraft types; and for some airports the ability of the surrounding airspace to handle aircraft arriving and departing from the airport.

5.5 Determination of aircraft parking capacity is more straightforward although it is generally not as simple as counting the number of stands: stands may be of different size (and able to accommodate different aircraft types), as is the case at LCY.

5.6 There are a number of elements within a terminal that can determine its capacity. There are both processing or 'flow' elements (such as check-in, passenger search and immigration) and dwell areas (e.g. lounges, retail and food & beverage areas). Average processing time per passenger and number of desks and security channels determine the capacity of the flow areas. Assessment of the capacity of the dwell areas requires the application of service standards for the number of seats offered and the areas reserved for standing passengers and circulation. Despite weaknesses, it is common to use guidelines produced by IATA, the global airline trade association, which has specified several levels depending on the degree of comfort that an airport operator wishes to provide.

Service Standards

5.7 Different approaches to defining service standards are applied in different components of the capacity chain.

5.8 For aircraft-related components of capacity, the service standard is normally the level of acceptable delay. In a perfect world, all flights arrive and depart on time, and so it would be possible to schedule flights to maximise runway and apron capacity. In practice of course flights may be delayed or less often arrive earlier than planned. Given this reality, maximum exploitation of capacity can only be achieved if there are 'magazines' of aircraft waiting to land or take-off on the runway at the precise moment this infrastructure element becomes available. Determination of an acceptable average waiting/delay time for flights sets the effective maximum capacity of a runway system. Another consideration is the degree of 'resilience' – or the ability to absorb or more likely recover from unplanned events such as bad weather - that should be included in the system. Such determinations are generally a matter of judgement and discussion with the aircraft operators who will have views on the capacity/delay balance.

5.9 The capacity of the aircraft parking system is similarly determined by judgements on the time that arriving aircraft have to wait for a stand to become available. Planned utilisation needs to assume a certain time gap between the departure of one aircraft and the arrival of the next. Increasing this planning gap decreases the likelihood of an incoming aircraft having to wait for a free stand but also decreases the effective capacity of the airport apron. A further complication which may impact capacity is that not all stands are the same size, thereby creating additional planning constraints when aircraft of different size use an airport.

5.10 Queuing times (or delays) are also a consideration in the passenger processing areas (e.g. security, immigration) of the passenger terminal. However, in dwell areas, the issues related to service standards are a little different. IATA's widely used set of standards provide airport operators with five different sets of standards (e.g. for the average space per passenger) to decide which level (A to E) they wish to meet. Many airport operators aim for Level C, although LCY might aspire to Level B given the nature of its primary customer base. While there are several weaknesses in the IATA standard approach, it nonetheless is widely applied.

5.11 While the IATA guidelines are generally used to set the capacity of individual areas, the variation in passenger numbers as a result of differences in aircraft load factors from day to day, variations in passenger behaviour and aircraft delays, is handled by the concept of a 'Busy Hour' (as distinct from the busiest or peak hour). There are several definitions of Busy Hour but the one most commonly used in the UK is the 30th Busy Hour, which is the 30th busiest hour of the year. The objective of terminal management should be that the passenger flow in the 30th Busy Hour is less than or equal to the IATA-derived hourly capacity. Achievement of this would mean that in no more than 30 hours in a year are service standards worse than the desired level.

5.12 In general, as the overall throughput of an airport increases, its profile of traffic becomes less 'peaky', and it is important in capacity assessments to recognise this trend.

York's Approach to Capacity Assessment

5.13 There are a number of possible approaches that may be taken to determine the capacity of an airport or the size of airport facilities required to handle a certain level of demand. York has based all its work on a single approach, namely using a busy day schedule to assess demands placed on facilities. York has indicated that this is its favoured approach when working on capacity issues.

5.14 York has developed detailed flight schedules for three assessment years (2020, 2023 and 2025). It was its intention that these days represented the day containing the 30th busiest hour. The flight schedules are immediately applicable to the assessment of runway and stand capacities. Assessment of terminal capacity elements requires the application of load factors to the seats on each flight to generate passenger flows in the building. As the interest in this exercise is peak flows, York has used a load factor of 85% as:

"…there is no evidence that such a load factor is regularly exceeded across all flights in each of the arrivals and departures peak hours, nor that the average peak load factor has been increasing over time. The use of an 85% load factor is consistent with the 30th highest load factor observed in each of the busy arrivals hour (08.00-09.00) and the busy departures hour (18.00-19.00) in 2014."[16]

5.15 These flows were then used in a terminal simulation model to define needs in the different areas of the passenger terminal.

5.16 Other approaches to assessing passenger capacity are to consider developments at analogous but larger airports; and to consider an

[16] Source: Terminal Capacity Assessment Briefing Note, York Aviation, 22 October 2015

airport's 'Busy Hour' and how passenger numbers in this hour might change as the airport's annual traffic increases: this second approach can be helpful in assessing the likely extent of peak spreading (i.e. more use of off-peak periods). As noted earlier, LCY is a very untypical airport so that the first alternative approach is not applicable. Use of a Busy Hour and trends in relationships with annual throughput is much more applicable to terminal capacity (rather than airside apron and runway capacity). York has responded to earlier criticism by CSACL by including in its work in the UNS a 'sense-check' based on an assessment of busy hour trends. Overall, the York approach based on analysis of a daily flight schedule is a reasonable one although there are weaknesses. Its results in the UNS have though been reinforced by consideration of busy hour trends.

5.17 It should also be noted that York has been working for LCY on forecasting and capacity issues for a number of different purposes for the last five years. To an extent, the demand and capacity assessments in the two Need Statements (viz. the ONS and the UNS) are both outputs of an iterative process over this period. For example, the movement forecasts for 2025 with the proposed development have been set at the maximum noise factored movements allowed at the airport of 120,000 Air Transport Movements, albeit with Business Aviation movements being used as the balancing element to reach this total.

Assumptions

5.18 The key assumptions in York's capacity work are the daily schedules constructed to assess the interaction of demand with capacity. The schedules are based on the first Tuesday in June 2014, which York considers to be reasonably representative. The development of the schedules is similar to that used in the ONS. These schedules were examined and analysed in some detail in the CSACL January report, but I have not repeated that exercise for the schedules of the UNS.

5.19 The number of daily flights in the Busy Day schedule is derived from, and indeed closely linked to, the bottom-up traffic forecasting exercise. Annual forecasts of commercial aircraft movements are developed from these daily schedules, as discussed in Chapter 4.

Analytical Approach: Runway and Apron System

5.20 A standard simulation modelling tool has been used by York to analyse the daily schedule for each scenario for its impact on the runway and on the apron, the two being interlinked.

5.21 Runway operations have only been assessed by York for the prevailing westerly pattern of operations (about two days out of three). York has indicated that this pattern, with landings coming from the east and take-offs towards the west, in fact allows LCY to handle more movements than an easterly pattern with the directions reversed. The simulation model includes the need for the largest assumed aircraft, the A318 and the Bombardier/Canadair C-Series, to back-track along the runway (to Link Taxiway D or Delta) after landing to reach the only stands that can accommodate them at the easterly end of the apron: the required clearances do not allow these aircraft to use the back of stand taxi-lane past the stands in the centre of the apron. The simulation model also recognises in the 'No Development' scenario the need for aircraft to use the runway to taxi to its easterly end in order to take-off, holding there as and when necessary.

5.22 [17]York has used the simulation to inform its judgement about the capacity of the runway system. In the 'No Development' scenario, this point is when the build up of aircraft waiting at the eastern end of the apron before being allowed to taxi to the eastern end of the runway for take-off interferes with arriving aircraft waiting to park. This is judged to be 36 movements per hour, slightly lower than the

[17] This paragraph is based on the investigations conducted on the ONS, although it is believed that the position remains unaltered in the UNS.

current scheduling limit of 38 movements an hour used by Airport Co-ordination Limited (ACL), LCY's slot co-ordinator.

5.23 [17]The same approach was applied to the 'With Development' busy day schedule. This schedule has a higher proportion of Bombardier C-100 Series aircraft in it (13% versus 10% in the 'No Development' Scenario), and these aircraft must backtrack along the runway to current Taxiway D when landing from the east. The simulation by York indicates that the maximum capacity of the runway with this mix of traffic is the 45 movements per hour of this schedule: at higher rates (or with a higher proportion of C-100 Series aircraft), delays increase and the circulation around the apron system begins to breakdown.

5.24 However, no explicit standard for acceptable delay is given for either assessment.

Non-CADP Taxiway Development

5.25 The UNS indicated (Paragraph 4.3) that a new taxiway link between current Taxiways Charlie and Delta is to be constructed under Permitted Development procedures (i.e. it does not form part of the CADP) to avoid the need for such backtracking. It states that this taxiway is "…to improve operational efficiency and increase resilience…this has no impact on overall runway capacity…". I do not agree with this assertion.

5.26 I indicate in Figure 5.1 my assumption of the approximate location and orientation of the planned taxiway. Taxiways are labelled alphabetically from the left (west) of the figure, so that the new taxiway would become Taxiway Delta and the existing Taxiway Delta would become Taxiway Echo.

Figure 5.1: Current Apron at LCY and Planned non-CADP Development

Source: Google Maps

5.27 I have two grounds for disagreement with the assertions of the UNS.

5.28 Firstly, runway resilience is very much about the degree to which the maximum theoretical runway capacity is planned to be used: the closer planned use is to maximum capacity, the lower is the resilience. Resilience could be increased to the same extent as the new Taxiway D would allow by reducing the number of movements scheduled without adding the taxiway. If the taxiway increases resilience, then *ceteris paribus*, it must also increase capacity. The airport community may initially choose to use this increase in capacity to improve resilience, but at some time in the future, could decide to reduce resilience in order to increase capacity.

5.29 Secondly, for the new taxiway not to increase capacity, it would require aircraft to be on the new taxiway and thereby too close to the runway to permit aircraft take-off or landing on it, for at least as long as aircraft backtracking to the existing Taxiway D would occupy the runway. This seems implausible given that backtracking requires an aircraft to make a 180^{o} turn in just the width of the runway (compared with a 135^{o} turn onto new Taxiway D), taxi back along the runway and turn onto the existing Taxiway D. This seems unlikely since once an aircraft is on the taxi-lane at back-of-stand, the runway is cleared for use.

5.30 However, the imposition of the planning condition to restrict the number of aircraft movements per hour would nullify any increase in capacity created by this proposed taxiway.

Stand Capacity

5.31 In conjunction with this runway simulation, the simulation model allocates arriving aircraft to specific apron stands that are sufficiently large to accommodate them. The total number of stands required is determined from this schedule, assuming a buffer of 15 minutes between planned occupations. The overall figure is then increased by about 10% to allow for some potential excess to cover stand maintenance, aircraft grounded by technical problems etc. I do not challenge these parameters.

Analytical Approach: Passenger Terminal

5.32 The daily schedule is then fed into a different simulation model to test its impact on terminal facilities, both arrivals and departures. An average seat load factor of 85% has been applied for the peak periods for both passenger flows. Analysis of departure facilities also requires the application of a reporting profile (viz. the time before departure when passengers first enter the airport). For LCY, reporting times are more concentrated and are closer to departure times for the morning departure peak, than for the evening peak, and two different reporting profiles were used by York. This aspect of the analysis is of course of far greater importance for the 'With CADP scenario. In the 'Without CADP' scenario, the daily schedule is constrained to match available terminal capacity, which could include minor increases permitted under GPDO legislation, including for example, a refurbishment of the West Pier of the building (as is already taking place). These capacity enhancements are included in the base capacity of the UNS.

5.33 Although York has used different reporting profiles for the morning and evening departure peaks, it has applied the same peak load factors to both the arrival and departing passenger flows in both time periods. There is in fact an asymmetry in these two flows, with arrivals being stronger in the morning, and departures being stronger in the evening. This is supported by data for three busy days in 2014 supplied by York (Table 5.1):

Table 5.1: Variation of Load Factors during Busy Periods

	Busiest Day of 2014 (to date) 27/10/2014	Early June Tuesday 03/06/2014	Late September Tuesday 29/09/2014	Busiest Day of 2014 (to date) 27/10/2014	Early June Tuesday 03/06/2014	Late September Tuesday 29/09/2014
Arrivals						
Morning	**Passengers**			**Load Factor**		
07:00	643	656	660	62%	59%	70%
08:00	1,003	1,048	997	78%	78%	86%
09:00	372	287	380	75%	77%	77%
3 hours	2,018	1,991	2,037	72%	70%	78%
Evening						
17:00	341	383	391	54%	57%	60%
18:00	962	892	917	69%	70%	66%
19:00	629	615	548	66%	63%	62%
3 hours	1,932	1,890	1,856	65%	65%	64%
Departures						
Morning	**Passengers**			**Load Factor**		
07:00	883	670	648	78%	50%	51%
08:00	840	470	458	74%	50%	52%
09:00	844	613	551	84%	56%	51%
3 hours	2,567	1,753	1,657	78%	52%	51%
Evening						
17:00	556	508	592	62%	68%	79%
18:00	760	642	670	63%	69%	68%
19:00	924	996	1,045	71%	72%	74%
3 hours	2,240	2,146	2,307	66%	70%	74%

Source: York Aviation, 3 hour averages derived by CSACL

5.34 It may be seen that arrival load factors are consistently higher in the three morning peak hours than in the three evening peak hours: across the three days the averages are 73% in the morning and 64% in the evening. For two of the three days, load factors for departures are higher in the evening than in the morning, although this is not the case for the busiest day of 2014 up to the point that this information was provided (3 November 2014). However, across the three days, departure load factors are ten percentage points higher at 70% in the evening than in the morning. A more robust statistical approach to this would be achieved with the use of Busy Hour data (with the term 'Busy Hour' clearly defined), although York has chosen not to apply this technique in conjunction with its application of a Busy Day schedule.

5.35 York argues that because it uses a high assumed load factor of 85% for both arrival and departures, this obviates the need to use asymmetric load factors. On balance and given that the purpose of this exercise is to demonstrate that an increase in terminal capacity is necessary, I consider this approach to be acceptable. It is though inconsistent with the precision implied by using different morning and evening reporting profiles, and in my opinion is not appropriate as a base for determining the size and scale of new terminal facilities to be provided.

5.36 The peak hour arrival and departure passengers given in the Need Statement are derived directly from the daily schedule by the application of the assumed 85% load factor. This is done on a rolling 15-minute hourly basis. The peak hour is forecast in the With CADP case to be 1,929 passengers for both arrivals and departures. This figure is reached in 2020 and remains constant over the next five years when annual demand is forecast to increase by nearly 20%. This implies that not only is all growth after 2020 in off-peak periods but also that the load factor in the peak period does not increase above 85%, despite LCY being constrained. While it is plausible that the number of seats in the peak period would not increase over the period, I do not accept that load factor would also not grow. York's counter to this may well be that the load factor is growing during this time, but is increasing towards an 85% figure. If this is the explanation of constant peak hour passengers after 2020, it means that these forecasts are artificial.

5.37 The artificial nature of the peak hour forecasts is highlighted by the fact that both arrival and departure figures are the same. In the real world, this phenomenon would be exceptional. It arises here because of the application of a standard load factor of 85% to the highest number of arrival or departure seats in each rolling hour during the reference day, which is not necessarily the same hour as the highest number of passengers. For example, in the representative schedule for 2023 of the ONS[18], the hour with the maximum number of departing seats was the 08:00 to 09:00 hour although the peak time for departing passengers is probably 19:00 to 20:00 (although no data are available to support this suggestion).

5.38 LCY and York Aviation commonly cite hourly capacity for LCY as currently 1,500 passengers in each direction. Hence, as the peak hour passengers even with an artificial load factor are some way above the capacity, forecast demand exceeds existing capacity, so justifying an expansion of the terminal building.

Conclusions on Capacity Assessment

5.39 The capacity analysis conducted for LCY has been very detailed, but has two weaknesses:

- It relies on a single approach, although this has now been supported by a cross-check on the trend for the ratio of peak hour to annual passengers to confirm the overall validity of the capacity assessments;
- Critical parameters and standards are not defined, but are reliant on the judgement of the assessor, creating the possibility of a change in opinion on the part of the assessor and of a different assessor reaching a different conclusion.

5.40 This last point is important in relation to both runway capacity and terminal size issues.

[18] I analysed the ONS in detail but have not conducted the same exercise for UNS data

5.41 Runway capacity is generally ultimately dependent on the level of delays which are considered acceptable. While the assessment of the level of future average delay inevitably requires many assumptions, once estimated there needs to be a clear measure against which to judge whether that delay level is acceptable. The benchmark set for the level of acceptability may of course be changed in the future, but current and future decision-makers should know what that standard is.

5.42 In relation to terminal capacity, the Need Statement and supporting documents refer to 'Peak' hours and rates, albeit on a relatively busy day (rather than the peak rate over the whole year). However, to the extent that 'peak period' is defined, it is implied to be 08:00 to 09:00 for arrivals and 18:00 to 19:00 for departures. Given that LCY is open for more than 300 of each of these hours each year, this is a great many 'peak periods', so that some sub-set of these periods is more likely to be the peak period.

5.43 It is unusual to invest in the provision of capacity sufficient to handle peak demand; rather, a slightly less busy hour is defined and capacity provided to meet that demand at the service standards selected by the provider, who implicitly accepts that a small proportion of annual passengers will experience standards below this preferred level. Having defined that hour, the load factors experienced during that hour in previous years may be determined and used to assess the passengers in that hour based on the planned schedule.

5.44 Consequently, it is not possible to determine if the capacity expansion proposed by LCY is matched to the forecast demand in all capacity elements, since capacity is dependent on the service standards to be applied. However, the provision of seven additional stands does appear justified, as is the extension of the parallel taxiway, probably to the full length of the runway rather than just a partial extension to a new runway entry point (Juliet). In my view an expansion of the terminal building has been justified, although I regard the use of a blanket 85% load factor and the analysis of peak hours as not being best practice. Consequently, it is not possible to conclude whether the quantum of the increase is adequate, inadequate or excessive. However, if excessive, the extent of the consequences of the excess can be controlled by an annual passenger limit.

5.45 The analysis has also indicated that it would be possible to handle additional commercial traffic at the airport, through either peak spreading and/or provision of the new Taxiway Delta (not applied for). However, business aviation movements would need to be reduced to comply with the current annual noise factored ATM limit.

5.46 The York capacity analysis has been very detailed, but suffers from the absence of definitions of both busy periods and quality of service standards. While capacity assessments must always feature a considerable degree of judgement and expert opinion, these should be made within some consistent framework, defining what is meant by 'peak' or 'busy' and clearly stating the service standards that are being applied to achieve LCY's stated objectives of being a 20-15[19] airport. Important service standards are the maximum acceptable average delay to flights, and the standards with which passengers are handled in the Terminal Building.

Need for an Hourly Movement Limit

5.47 As discussed above at Paragraph 5.25 *et seq.* the provision of an additional link taxiway between the current Taxiways Charlie and Delta, would in my opinion allow additional aircraft movements to be handled each hour, above the current estimated capacity of 45 per hour.

5.48 As noise disturbance is related to the hourly number of movements, it is important to restrict movements to the level that has been

[19] 20 minutes for departing passengers and 15 minutes for arriving passengers

evaluated and not to the maximum capacity of the runway system. Currently the evaluation level is also the maximum level, but a new taxiway could increase the maximum figure. Hence, there is a need to limit hourly aircraft movements to a maximum of 45 per hour.

5.49 Implementation of this condition could be best achieved through the slot co-ordination system. This has the same advantages as those set out in Paragraph 4.65. Additionally, the slot process deals with planned operations, so if on-the-day it is possible to reduce delays or avoid unnecessary fuel burn by actually flying more movements in any hour, to which I understand LBN does not object, this may then be lawfully achieved.

6 Conclusions

6.1 There is additional passenger demand for travel through LCY. Indeed, I believe that LCY's consultants have under-estimated demand and that it will certainly exceed the figure of 5.99 million passengers per annum forecast by York for 2025. I expect there to be pressure on a passenger cap of 6.5 mppa before the end of the forecast period (2025).

6.2 To achieve the currently permitted level of 120,000 aircraft movements per annum, additional facilities are required on the airside of the airport, specifically the provision of seven additional stands and a full-length parallel taxiway. While the analysis of peak hour passenger demand to support expansion of the passenger terminal has some considerable weaknesses, I consider that it does support the need for some expansion in this area.

6.3 In view of the probable under-estimation of demand (used to assess the impacts of expansion), it is necessary to continue the application of the existing aircraft movement limits, and to apply new hourly aircraft movement and annual passenger limits, so that the impacts of expansion are not greater than those assessed.

7 Witness Declaration

7.1 This proof of evidence includes all facts which I regard as being relevant to the opinions that have been expressed and the Inquiry's attention has been drawn to any matter which would affect the validity of that opinion. I believe that the facts that I have stated in this proof of evidence are true and the opinions expressed are correct; and I understand my duty to the Inquiry and to help it with matters within my expertise and I have complied with that duty.

Glossary of Terms

Organisations

ACL: Airport Co-ordination Limited, the schedule co-ordinator in the UK

CAA: UK Civil Aviation Authority

CSACL: Chris Smith Aviation Consultancy Limited

DfT: UK Department for Transport

DLR: Docklands Light Railway

IATA: International Air Transport Association, an airline global trade association

LBN: London Borough of Newham

LCY: London City Airport Limited

Air Transport Terminology

ATM: Air Transport Movement – a take-off or landing of an aircraft carrying commercial traffic (passengers, freight or mail). Normally these are revenue-generating flights conducted by airlines, but the CAA includes in the term operations by air taxis (flights (often one-off) commissioned by a single customer).

Business Aviation: Generally the operation of aircraft owned by an organisation ('Corporate' aircraft), high net-worth individuals ('Private' aircraft), or specialist companies that charter the aircraft as needed to private groups or businesses ('Air Taxi').

Busy Hour: Measure used to assess how busy an airport is relative to its hourly capacity. Often defined as being the 30th busiest hour of the year for passenger traffic, although there are a number of variants of this.

CADP: City Airport Development Programme.

Frequency: number of flights on a particular route in a specified time period.

(Passenger) Load Factor: The proportion of seats occupied by revenue-paying passengers, and may also be referred to as Seat Factor. For airlines, across a network an average load factor should be weighted by the distance of each flight, although for airport purposes this is not necessary.

MAT: Moving Annual Total – sum of last 12 months' traffic, a useful measure to track development of traffic while largely eliminating seasonal distortions.

mppa: million passengers per annum.

Noise Factor: Used at LCY to categorise aircraft by the level of noise made. For turboprops the value is 0.63, and jets 1.27. The number of movements by each type is multiplied by the Noise Factor to obtain the Noise Factored Movements and compared with the annual planning limit to assess compliance.

ONS: Original Need Statement.

(Flight) Schedule: A list of planned flights, identifying airline, route, departure or arrival time and aircraft type.

Schedule Co-ordinated: an airport where it is necessary for an aircraft operator to obtain a slot before using the airport.

(Scheduling) Season: Defined by IATA for scheduling purposes and normally aligned to the weekends when clocks change from Winter to Summer time (and vice versa) in Europe, so typically the last weekend in March to the last weekend in October.

(Airport) Slot: The permission granted under EC Regulation 2004/793 to plan to use all required infrastructure resources (physical and legal quota) to operate (arrive or depart) from an airport at a particular time.

(Aircraft) Stand: Parking position for aircraft on the apron.

Spill: Unsatisfied demand to travel on a particular flight.

UNS: Update to Need Statement.

Documents Referred To

CADP Need Statement, York Aviation, July 2013 (ONS)

CADP Update to the Need Statement, York Aviation, September 2015, (UNS)

CAA Airport and Airline Statistics and Surveys (http://www.caa.co.uk/data-and-analysis/)

- Passenger statistics: Airport Statistics, Table 9 monthly series
- Aircraft movement statistics: Airport Statistics, Table 3 monthly series
- Provisional Airport Statistics (for latest month)
- Airline load factors: Airline Statistics, Table 1.11.2

London City Airport: Needs Assessment for LBN, CSACL, January 2015 (included as part of Amec Foster Wheeler report)

Terminal Capacity Assessment Briefing Note, York Aviation, 22 October 2015

Appendix A: OOOH Construction Assessment

Introduction

A1 This chapter considers the issues associated with LCY's desire to undertake construction outside the current operational hours of the airport, that is, during the night. As LBN's decision in February 2015 on these aspects was based on a compromise between impact on residents on the one hand, and economic and commercial considerations on the other, the chapter continues to present the several alternatives OOOH Construction scenarios which were considered prior to the Council's original decision.

A2 Currently, LCY is considering only three scenarios, namely:

- Overnight piling for six nights a week (its preferred option which is carried forward from the earlier work);
- Closure for 32 weekends, which is based on the Proposed Planning Condition 95 and was developed originally by LBN Officers and CSACL; and
- Weekend piling for 48 weekends, a new LCY suggestion which avoids LCY closure and offers compensation to affected residents.

Background to Initial Scenarios

A3 Consultants for LCY, York Aviation, in conjunction with TPS Consulting Engineers, undertook an assessment of the commercial and economic consequences of temporary closures to the airport in order to reduce or eliminate Out of Operational Hours (OOOH) Construction.

A4 The report[20], including the appendix prepared by TPS, measured the impact of different airport temporary closure schemes in terms of the

[20] CESA, Volume I, Part A, Part 2

reduction of the length of the overall construction period, rather than reducing the period of night disturbance to residents.

A5 Previous to this, TPS had considered four different ‘radical approaches’ to construction, including temporarily draining the King George V Dock (Paragraphs 3.26 to 3.51, ESTA). The report concluded that the advantages of some approaches were outweighed by the disadvantages. Such alternatives are therefore not considered further here, subject to advice from the Council’s engineering advisors.

A6 In the absence of such alternatives, certain construction activity, notably the piling and assembly of the decking necessary for the new aircraft stands and parallel taxiway to the east of the current apron, cannot take place while aircraft are landing and taking off. It is possible that other construction activities might be undertaken alongside aircraft operations, although it may be more convenient for the contractor for them to be carried out when the travelling public is present neither inside the terminal nor on the landside of the airport.

A7 The York OOOH assessment considered different scenarios for the temporary closure of the airport in order to avoid overnight construction activity. A constraining assumption was that there was a minimum useful construction period of some seven to eight hours, the time required to construct a pile, which activity embraces positioning and removing the equipment, driving and pouring a pile and fixing it in place.

A8 The different scenarios initially considered by York in 2014 were:

- A single, though long, closure of the airport (with and without 24 hour working) (Scenarios 1 and 2 respectively);
- Closure every weekend until the works are complete (Scenario 3); and
- Restricting the hours of operation of the airport, and having shorter operating days (two variants of 07:00 to 20:00 and 08:00 to 18:30) and closing for 2 hours during the middle of the day

(Scenarios 4a, 4b and 4c), although in only one of the restricted hour scenarios (Scenario 4b), did the restriction yield a useful increase in the construction period, allowing a reduction in the period of OOOH construction.

A9 At the further request of LBN, York and TPS considered further closure scenarios:

- Closure during August and for two weeks over the Christmas period (Scenario 5);
- Weekend closure but with 24 hour construction activity (included in a widened Scenario 3), but for Piling work only; and
- Closure for seven hours during the working day (between 09:30 and 16:30 or 10:00 and 17:00) (added to Scenario 4), again for Piling work only.

A10 For each scenario, the assessment considered separately the effect on the construction period for the Interim Works and the Full Works, and for each period both the full range of construction activities and just Piling Works, the activity which is generally regarded as the most intrusive for residents. Piling during the Interim Works would need to be undertaken in two separate phases. The impact of the different closure scenarios was assessed in terms of the length of the necessary closure, and then compared with the duration of the construction periods without any closure (other than the current closure periods) and with OOOH construction. It is understood that the operation of two piling rigs whenever possible has been assumed in the assessments (close proximity of some piles may preclude this during specific parts of the construction programme). Of the 305 piles that may only be constructed when the airport is closed, some 210 piles can be made with a two rig operation.

A11 York then considered the impact on airlines of the different closure periods, and considered airlines to be either LCY based (viz. CityJet, BA Cityflyer and Flybe) or non-based, including Alitalia, Lufthansa and

SWISS. York considered the potential behaviours of these groups and indeed sometimes individual airlines in detail. In general, York sought to re-schedule the aircraft from LCY to other London airports, correctly identifying the challenges such re-allocation would face given the shortages of capacity in peak hours at most other alternative airports. In practice, it is likely, particularly for many non-based airlines, that they would re-deploy the aircraft away from London entirely, encouraging LCY business passengers to displace lower yield passengers from the airlines' other services to London. For the displaced LCY passengers, this would clearly be inconvenient/irritating but certainly not life changing: it is likely that some erstwhile LCY passengers are already experiencing similar irritations when they are unable to use peak hour LCY flights that are already fully booked.

A12 York argues that the Weekend and Restricted Hour closures (Scenarios 3 and 4) could lead to financial implications for the airlines that are just as severe as a full (temporary) closure of the airport. York's original report though showed no indication of recognising that even business passengers can often (re-)organise their meetings to fit flight schedules (e.g. with weekend closures, meet on Thursday rather than Friday), and that off-peak passengers are lower yielding than peak period passengers.

A13 York also painted a fairly bleak picture of long term consequences after the closure period(s) is/are completed, stating that "...airlines that have relocated to alternative markets...are highly unlikely to return..."[21]. While a full closure (Scenarios 1 and 2) could indeed have a severe impact on individual airlines (including the possible closure of any highly dependent on LCY), the market served by LCY is likely to remain very attractive. Indeed, the core passenger base of the airport may well include individuals of sufficient wealth and wherewithal to see an opportunity to risk launching a new airline to serve LCY, if no existing airline did so. If LCY is currently sufficiently attractive to an airline, the

[21] Paragraph 6.30, *op cit*

probability is that it would resume operations after the disruptive construction period.

A14 York gave two examples of closures elsewhere: Venice Treviso and Modlin Airport near Warsaw which it argued could to an extent mirror the position at LCY. This is questionable, as Modlin is much further from the centre of Warsaw than the longer established Chopin Airport, and by staying at Chopin, Wizz would also be avoiding head-to-head competition with Ryanair.

A15 During 2014, Dubai International Airport closed one of its runways for about 80 days. This led to a reduction of more than 25% in the number of flights operated during this period, but passenger traffic was much less affected with numbers down by less than 10%. Traffic growth has since resumed. While disruption to service at this major global hub will have been inconvenient for many passengers and airlines, airlines were able to cope with a reduction in operations.

A16 Another airport that experienced serious disruption to operations during runway work was Stuttgart in Germany, albeit longer ago in 1995. Major disruption for 66 days saw annual passenger traffic decline by 7% in 1995 (against an average 9% growth at other German airports), although in 1996, Stuttgart's traffic grew by 25% against a background growth of just 3% (i.e. a bounce back in one year).

A17 The York assessment estimated the socio-economic impacts of restrictions on operations. It considered both the direct impacts on employment at the airport (and the knock-on effects on local GVA), and the impact on the wider economy, although this was not generally quantified, save for impact on passenger journey times. Many of the statements made would certainly be valid if LCY were to be permanently closed, but the temporary nature of the restrictions being considered is likely to dilute significantly the impacts.

A18 Shorter closures might not be quite so damaging to the existing base airlines, and for this reason, the consequences of closing the airport during quieter months (such as August) and over the Christmas period were examined. However, LCY's engineering consultants advised that closures at these times would not fit the overall construction phasing and hence these possibilities would not be feasible.

A19 It is feasible that airlines might incur relatively small overall losses if these services were to be cancelled for a short period as a result of, for example, LCY closing for seven or eight hours during the day (e.g. between 09:30 and 16:30), because of the probable variation in load factors and average yields during the day. Many off-peak services (especially to leisure destinations) may well be operating at low levels of profitability, potentially only covering the direct costs of flying that specific service (e.g. fuel, airport and air traffic control charges) and making limited contributions to other costs such aircraft costs and overheads.

A20 The assessment also considered the financial revenue loss to the airport company of periods of temporary closure. These estimates are likely to be very accurate, given that the number of movements and passengers in the affected periods is known, as is the average revenue per passenger received by the airport. It is possible that there are differences in commercial expenditure between peak and off-peak passengers which could change the estimates slightly although this is not likely to be material. The financial impacts of closures of shorter duration may be over-estimated as a proportion of passengers would be likely to re-schedule their trips to fit into the available flight schedules. York correctly notes that the scope for LCY to reduce its operating costs would be limited. The 2013 average revenue per passenger of £23.86 was used by York in the original assessments. This fell slightly to £23.64 in 2014[22].

LCY's Initial Analysis (Original Need Statement)

A21 Overall, the York assessment indicated much more severe economic impacts of a full (temporary) closure of LCY (Scenarios 1 and 2) than for the other scenarios considered. To avoid all night-time construction

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activities (Scenario 1), LCY would need to close for three periods for a total of 28 months. If closure were used to avoid just night-time piling works though, it would need to last for 26 weeks, again spread over three different periods between September 2015 and June 2018 (as then planned).

A22 Scenario 2, which allows for complete airport closure but with 24 hour construction, would result in a closure for a total of 23 months, or 13 weeks just for piling activity. The shorter total duration of closures would result in slightly lower economic impacts, but they would still be severe.

A23 Weekend closures (Scenario 3a) would need to last for 36 months in total assuming there was no 24 hour working at weekends but with overnight working continuing for five weekday nights. This is very little different from the base line construction estimate of 37 months. Duration of night-time piling work and weekend closures would be for a total of 28 weeks. This would reduce to 22 weeks if 24 hour weekend working (and with weekend closures) was also permitted (Scenario 3b). These scenarios were determined to produce the smallest impact on passenger traffic and hence lowest economic impact.

A24 Both of the weekend closure scenarios assume that overnight piling continues on the five weekday nights (Monday to Friday inclusive). A further weekend closure scenario (Scenario 3c) has been developed by LBN Officers and CSACL, based on no weekday overnight working, but with overnight piling working for three nights (Friday to Sunday) during each weekend closure. The estimate of the number of weekends for which the airport would need to close to undertake the piling is intended to be based on the same parameters as used by LCY and its advisors. Thus, during such a weekend period, each piling rig would be able to construct some seven piles. Based on information from LCY, it is understood that some 210 of the 305 required piles could be constructed with two piling rigs in operation, although the position of the remaining piles is such that only one rig could be used. Weekend closures during two rig operation would therefore be for 210/14 or 15 week(end)s, with single rig operation for 95/7 or 14 weeks, to give a total of 29 weeks. TPS has normally allowed a contingency for unforeseen problems of 10% which would take the total to 32 weeks.

A25 Two of the original three variants of restricted hours (Scenario 4) yielded no meaningful reduction in the duration of the OOOH construction period. The third one and the new variant of middle of the day closure reduced the duration of over-night piling from 32 weeks to 24 or 25 weeks.

A26 Scenario 5 although deemed not feasible by TPS would see a full closure for piling works of 13 weeks over Christmas and August. A variant on this would require closure for two Augusts and six subsequent weekends.

A27 Table A.1 summarises the impacts. For simplicity, it considers only the impacts for the piling works, and aggregates the periods when closures would be required. Economic impact is only presented in terms of 'lost' passengers. The impact on the air transport community would also be felt in terms of direct financial loss, employment and contribution to the economy, but these are not shown in this summary table. With the exception of the estimate of the number of nights when piling would take place and Scenario 3c, all figures are taken from the York report.

Table A.1: Summary of Impact of Closure Scenarios on OOOH Construction

Scenario	Duration of Piling	Nights per week Piling	Number of Nights Piling	'Lost' Passengers
Base Line	32 weeks	6	192 nights	0
Scenario 1: Full Closure	26 weeks	0	0	2,233,100
Scenario 2: Full Closure 24 hour working	13 weeks	6	78 nights	1,116,500
Scenario 3: Weekend Closure				
a. No 24 hour working at weekend	28 weeks	5	140 nights	194,100*
b. 24 hour working all week	22 weeks	7	154 nights	148,500*
c. 24 hour working only at weekend	32 weeks	3	96 nights	222,000
Scenario 4: Restricted Hours				
a. 07:00 to 20:00	32 weeks	6	192 nights	171,300
b. 08:00 to 18:30	25 weeks	6	150 nights	647,900
c. As a + 2 hours	32 weeks	6	192 nights	481,700
d. 7 hours middle day	24 weeks	6	144 nights	855,600
Scenario 5: Quiet Period Closures				
a. Christmas + August	13 weeks	-	Not feasible	955,000
b. August + weekends	9 weeks + 6 weekends	-	80 nights	784,000

* Original York estimate now discovered to have been too low

Source: Tables 4.1 and 5.1, CESA Volume 1, Part A, Part 2, with some CSACL analysis and assessment of number of nights piling operations would take place. Scenario 3c estimates by CSACL and LBN

A28 The passengers lost to LCY would lead to a direct loss in revenue for the airport. LCY has used a figure of £23.86 per passenger based on 2013 revenues, indicating overall direct loss of revenue by the airport of £5m, £4m and £5m for Scenarios 3a, 3b and 3c respectively. However, as noted above the loss of passengers is likely to be less than that estimated by LCY if itineraries were re-arranged to reflect the weekend closures.

A29 On the basis of this assessment, LBN concluded on 3 February 2015 that a condition of granting planning permission should be that overnight piling should only be permitted for up to 96 nights, which would be consistent with LCY closing for 32 weekends. Of the options considered, this Scenario 3c would result in one of the lowest number of nights of piling and one of the lower impacts on passengers.

Current OOOH Scenarios

A30 As part of the current process, LCY has considered three different scenarios for OOOH Construction, as noted at the beginning of this note. Its Base Line remains weeknight piling; it has undertaken its own assessment of closure for 32 weekends; and it has added a new scenario of piling only weekend nights only.

A31 The basic parameters for these scenarios are summarised in Table A.2.

Table A.2: Current OOOH Construction Scenarios

Scenario	Duration of Piling	Nights per week Piling	Number of Nights Piling	'Lost' Passengers
Base Line	32 weeks	6	192 nights	0
Weekend Closure, 24 hour working	32 weeks	3	96 nights	350,000 (Current York Estimate) 222,000 (Original estimate)
Weekend Piling only	48 weeks	3	144 nights	0

A32 York has provided a short paper outlining how it has reached an assessment of the impact of the LBN Case of a 32 weekend closure. This is based on Appendix 6.7 of Chapter 6 of the UES. The overall impact has been assessed as a loss of passengers of 350,000 from LCY during two periods of closure of 19 weeks in 2017 and 13 weeks in 2019. This loss figure is higher than the previous CSACL estimate (based on York's 2014 work in this area) of 222,000 passengers.

A33 Comparison of the current York analysis and its previous work indicates that its current assessment assumes substantially more flights are now expected at weekends than were previously assumed. The proportion of weekend flights is based on the current pattern of operations, whereas the previous 2014 evaluation contained an error, and is therefore not a valid comparator.

A34 It was argued in the CSACL January 2015 report (repeated above) that the original York assessment over-estimated the number of passengers that would be lost, especially for short periods of closure. York's analysis is a static assessment essentially counting the number of passengers on flights that would not be able to operate. It argues that it is 'speculation' that passengers might change their behaviour when faced with an inability to travel at the weekend or be uncertain about being able to return home on a Friday evening, for example. The probability is that a proportion of business travellers would indeed adjust their meeting schedules to work around these temporary handicaps and travel via LCY on other days of the week. For some journeys and meetings this will of course not be possible, and the custom of these travellers would be lost to LCY.

A35 There is some evidence to suggest that there would be a change in passenger behaviour in response to a change in service provision. For example, airports have seen a reduction in service frequency on certain low frequency domestic routes of, say, 20% only resulting in a loss of market volume of 10%.

A36 York has accepted the principle of such modification of passenger behaviour, but doubts the extent to which this would be possible. It has indicated that some of the highest arrival load factors are on Monday morning and Sunday evening suggesting that a proportion of passengers fly into LCY to spend the working week in London. It has been agreed that modification of behaviour might result in the number of passengers affected by weekend closures being perhaps 10% to 25% less than that forecast by York.

A37 York has also noted, not unreasonably, that CSACL has suggested that York's passenger forecasts, load factors and passengers per ATM are too low. If this were the case, the 'lost passenger' estimates would be higher than it has suggested.

A38 The impact of closing LCY for 32 weekends has also been assessed in economic and financial terms:

- additional time costs for displaced passengers of £9 million;
- scheduling impacts and up to £38 million lost airline revenue;
- up to £8.3 million lost airport revenue; and
- reduction of up to 120 jobs and £5.5 million GVA.

A39 York's approach to estimating these impacts is described in Appendix 6.7 of Chapter 6 of the UES. It is in line with that previously used. The airline revenue loss is a gross-loss, and airlines would save some costs from not operating these weekend flights. Direct Operating Costs (DOCs) (i.e. those costs only incurred if a flight operates) in 2013/14 for BA Citiflyer and Flybe were approximately 75% and 40% of total operating costs respectively based on a CSACL assessment of Civil Aviation Authority Airline Financial Statistics. During this period, oil prices were very high, and if adjustments are made to reflect current prices, then the DOCs of the two airlines might be closer to 70% and 35% respectively. Hence, net airline loss could be materially lower than the estimates presented by York, perhaps of the order of £20 million to £25 million.

A40 It would also be erroneous to add the individual impacts above (Paragraph A38) together, for a number of reasons, including the fact that a part of LCY's revenue loss would represent cost savings to the airlines.

Relative Scale of Economic Impacts

A41 It is useful to give some scale to these economic impacts.

A42 In order to avoid these impacts, LCY has developed a new scenario based around overnight piling for 48 weekends (but no week night piling), which would not require the airport to be closed other than for its existing closure periods. In conjunction with this scenario, LCY is offering additional mitigation measures based on secondary or double glazing, with an option for affected residents to take instead cash compensation. If all residents opted for cash compensation, the total cost to LCY would be £454,000. This compensation would be equivalent to £7 per night per Tier 1 household and £21 per night per Tier 2 household for each night of piling.

A43 In relation to the impact on passengers and airline finances, it should be noted that LCY is currently being offered for sale at a mooted price of £2 billion. When the airport was bought in 2006, the price paid was reported to have been some £760 million. A stake in LCY has changed hands since then so that the capital invested in the airport company in the form of equity, and debt (including bonds) may well be higher. However, the forthcoming transaction could see the capital invested in the company increase by of the order of £1 billion if something close to the touted price is achieved in a competitive sale.

A44 This increase in capital has to be paid for: dividends on equity invested, interest payments on debt, and yield payments on bonds. In regulating Heathrow Airport, the UK Civil Aviation Authority has typically set a WACC (Weighted Average Cost of Capital) of around 7.5% as being a fair level to generate funds to pay dividends, interest etc.. If this figure were to be applied to the likely capital increase at LCY, additional revenue of £75 million per annum would be required. Over the ten year period covered by the CADP this would amount to £750 million, a figure significantly higher than the assessed impacts of weekend closure.

Conclusions

A45 The York assessment of a temporary closure of the airport has a tendency to over-state the impact on passengers and airlines, and to paint a picture of permanent damage. It is true that passengers and airlines would be adversely impacted by a closure, and that the longer the closure, the greater the impact. However, passengers would cope with the inconvenience, and experience has shown that they would be likely to quickly resume their use of an improved LCY.

A46 Airlines would suffer some financial penalties, which again would be greater the longer the closure. At one extreme, the complete closure of LCY for between 23 and 28 months (as envisioned in the original Scenarios 2 and 1 respectively) could easily see one, two or even all the base airlines ceasing to trade (although upon the re-opening of LCY the services they had operated would probably be taken up by other airlines in due course). At the other end of the spectrum, it is much more probable that the airlines would be able to withstand the restrictions on their operations for a limited number of weekends.

A47 LCY itself would suffer financial penalties from closure, again with the size of the loss increasing in line with the duration of the closure. With shorter but more frequent closure periods, there would be likely to be a less than proportionate revenue loss as passengers adjusted the timing of their trips to fit the airport's opening hours.

A48 The LBN preliminary decision to grant permission subject to a condition leading to the closure of LCY for 32 weekends represented a compromise between disturbance to residents and economic impact on airlines, airport and passengers. While the original assessment of number of passengers lost was based on an incorrect (and low) estimation by York, even had there been a correct basis for the calculation resulting in a higher impact it is unlikely that a different recommendation would have been made. Specifically, had York's current estimate of the number of passengers lost of 350,000 been included in Table 5.1 of this report, this is still likely to have been the condition imposed on OOOH construction.

A49 The adverse impacts of closure as estimated by York tend to over-estimate the consequences for the air transport industry. Certainly, airline revenue loss should be reduced by the savings in costs of not operating: in the 32 weekend closure scenario a £38 million airline revenue loss would probably be accompanied by cost savings of some

£15m. The one-off costs of closure are certainly significantly lower than the costs of £75 million per annum than passengers and the airline community of LCY could easily experience as a consequence of the current sale process of LCY.

Appendix B: Route Comparison, ONS and UNS

Route	ONS (2023)		UNS (2025)	
	Weekday Departures	Forecast Passengers	Weekday Departures	Forecast Passengers
Aberdeen	3	81,161	4	100,400
Amsterdam	15	537,731	16	563,700
Antwerp	4	92,907	3	70,300
Barcelona	3	106,791	2	70,500
Basel	3	105,348	2	36,000
Belfast BHD)	3	106,791	5	169,000
Berlin	3	81,601	3	79,800
Billund	2	24,140	2	26,600
Cologne/Bonn	3	79,025	3	84,100
Copenhagen	5	159,474	3	105,700
Cork	-	-	3	84,100
Dublin	7	222,849	14	493,200
Dundee	2	36,440	-	-
Dusseldorf	5	150,219	5	135,200
Edinburgh	12	438,004	18	591,000
Eindhoven	2	52,683	-	-
Florence	1	35,597	2	70,500
Frankfurt	10	330,340	9	314,900
Geneva	6	234,940	8	252,100
Glasgow	11	353,736	12	394,000
Guernsey	1	17,798	2	25,300
Hamburg	2	46,915	2	36,000
Hanover	3	50,359	3	64,300
Helsinki	2	32,895	2	62,100
Isle of Man	3	61,416	4	71,900
Jersey	3	53,395	3	53,900
Luxembourg	7	193,647	8	212,800
Lyon	-	-	3	96,700
Madrid	3	106,791	3	105,700
Milan (LIN)	3	106,791	4	140,900
Milan (MXP)	3	106,791	-	-
Munich	6	195,071	5	150,300
Nantes	2	34,810	-	-
New York (JFK)	2	22,782	2	23,000
Nice	1	33,929	2	70,500

Oslo	3	97,536	-	-
Paris (ORY)	5	122,505	4	121,300
Prague	2	48,875	-	-
Rome (FCO)	2	71,194	2	70,500
Rotterdam	7	146,148	9	213,200
Shannon	-	-	2	39,200
Stockholm (ARN)	3	106,791	3	105,700
Stuttgart	3	79,025	-	-
Venice	1	35,597	-	-
Vienna	2	49,637	-	-
Warsaw	3	81,161	2	70,500
Zurich	13	494,798	12	453,000
Leisure	2	61,939	4	169,500
Others	6	185,816	-	-