Working paper summarising Affordability and Financeability modelling for capacity expansion at Heathrow airport

Response from Richmond Heathrow Campaign
13 August 2019

INTRODUCTION

1. This is a written response of the Richmond Heathrow Campaign (RHC) to the CAA's consultation titled *'Working paper summarising affordability and financeability modelling for capacity expansion at Heathrow airport, CAP 1812, June 2019.'*

2. This working paper sets out the CAA's updated assessment of the affordability and financeability of the development of new runway capacity at Heathrow. It follows on from the initial assessment of affordability and financeability included within the CAA's consultation in April 2018, updating that assessment to take account of developments in HAL's master planning process for the expansion of Heathrow airport.

3. RHC represents three amenity groups in the London Borough of Richmond upon Thames: The Richmond Society, The Friends of Richmond Green, and the Kew Society, which together have over 2000 members. The members of our amenity groups are adversely affected by noise from Heathrow Airport's flight paths, poor air quality and road and rail congestion in west London. We acknowledge Heathrow's contribution to the UK economy and seek constructive engagement in pursuit of a better Heathrow. We are an active participant in the Heathrow Community Noise Forum

4. Our premise is that it would be preferable to aim for a better Heathrow rather than bigger Heathrow and to capitalise on the world beating advantage of London's five airports, in particular by improving surface accessibility to all five airports, which would be a major benefit to users. Our approach is to continue supporting the case for no new runways in the UK and we believe this is well supported by the evidence produced by the Airports Commission and the DfT in relation to the Airports National Policy Statement.

5. Over recent years we have undertaken extensive research on Heathrow and submitted a large number of papers to the Airports Commission, the DfT, CAA and others - all of which can be found at www.richmondheathrowcampaign.org

6. RHC has responded to seven CAA consultations on economic regulation - CAPs 1510, 1541 in 2017, CAPs 1610 and 1658 in 2018 and CAPs 1722, 1769 and 1782 in 2019. The responses and other material are on the RHC website.

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RICHMOND HEATHROW CAMPAIGN RESPONSE TO CAP 1812

1. RHC's strongly believes that the evidence produced by the Airports Commission and the DfT in support of the Aviation National Policy Statement (APNS) demonstrates that a third runway at Heathrow will harm the UK aviation market and UK economy. The CAA continues to assume the Northwest runway expansion (NWR) is beneficial in both respects. In our view the CAA's over optimistic assumption will lead to unsatisfactory regulation of the Heathrow monopoly. Annex 1 replicates our response to the CAA's consultation CAP 1782 in April 2018 on this matter. In brief the consequences are:

    a. **Non-Heathrow customers**. The CAA's duties (CAA 12) include protecting the interests of aviation customers (passengers and freight owners). Annex 1 reports how the NWR expansion cannibalises 17 mppa of growth from other airports (i.e. 40% of new capacity) (DfT 2017 estimates). The Airports Commission in its Final Report 2015 estimates 58 mppa of growth being cannibalised from other airports (AON carbon capped central case). The carbon pricing is a major factor making regional airports relatively expensive for passengers. Why does the CAA focus on protecting Heathrow's monopoly and customers while ignoring customers across the UK. Is this not a failure of the CAA's statutory duties?

    b. **International-to-International (I-I) transfer passengers**. The evidence in Annex 1 demonstrates that a substantial proportion of Heathrow's additional capacity will be used by I-I transfer passengers (37%) compared to the Do-minimum. These are of no value to the UK; they do not support to any significant degree otherwise unviable thin routes as we demonstrate using data for 2011 and 2016 provided to us by the CAA. We question economic regulation that seeks to benefit the I-I transfer segment of the market, especially as it already is exempt from Air Passenger Duty, rather than UK terminating passengers. Again, we ask is this not a failure of the CAA's statutory duties?

    c. **Business Passengers**. Annex 1 shows how the NWR expansion results in no increase in UK business passengers by 2050 compared to the Do-minimum. Is it not a failure of the CAA's statutory duties to support such an outcome?

    d. **Connectivity.** Annex 1 shows that the NWR expansion does not add a single destination from the UK as a whole by 2050 and the increase in frequency of flights per destination at Heathrow is more than offset by a reduction in frequency at other UK airports. Is it not a failure of the CAA's statutory duties to support such an outcome?

    e. **Capex**. CAP 1819, currently being consulted on, shows that category B (planning) costs have risen from £265 million to £500 million and early category C costs have risen from £650 million to £2.4 billion (all 2014 prices). These costs arise between 2016 and the DCO planning decision, say between 2020 and 2021. Annex 2 col. b records CAP 1812 Appendix B Figure 5 Master Plan capex from 2016 to 2020 as £5.5 bn and to 2021 as £8.75 bn. These are far in excess of the £2.9 bn Category B costs and early category C costs, which needs explanation. The Airports Commission capex estimates are also shown in Annex 2 and the scheme costs, excluding core and replacement costs, (col. c) at £1.2 bn and £2.8bn, respectively for 2020 and 2021 are nearer the £2.9 bn.

Para 7 page 8 of CAP 1812 says HAL's current estimates suggest that its total capital costs to facilitate the opening of a new runway in 2026 will be in the region of £14 billion (in 2014 prices). But Annex 2 col. b shows the Master Plan estimate from 2016 to the end of 2026 as £24.7 bn. Again this seems excessive. But the Airports Commission (col c of Annex 2) estimates the scheme costs excluding core and replacement costs as £16.4 bn for this period, which is nearer the £14 bn.

Para 7 page 8 of CAP 1812 also says HAL's current estimates for total expansion capital costs are around £32.5 billion (in 2014 prices) in the period to 2050 (to provide the capacity to accommodate 142 million passengers per annum). Annex 2 shows the Master Plan estimate from 2016 to 2050 as £56.3 bn, whereas the Airports Commission estimate is £46.3 bn (all in 2014 prices). Chart 2 below shows that the difference between the Master Plan and Airports Commission estimates arises after 2040, and so the difference is probably not a difference in scheme costs. But the difference with the £32.5 bn needs explaining.

Generally, RHC has not had access to capex estimates since those that were published in the Airports Commission's Final report in mid 2015. This makes it difficult to respond to the current CAP 1812 consultation, as can be seen from the discrepencies and uncertainties highlighted above. It is important the scheme costs are separated from the core, and replacement costs not only so as to assess the incremental viability of the NWR expansion but also the regulatory control. The matter is critical to the issue of affordability and financeability and CAP 1812 is not clear how scheme, core and replacement costs are separately treated by the regulatory model and indeed how they might be distinguished by HAL.

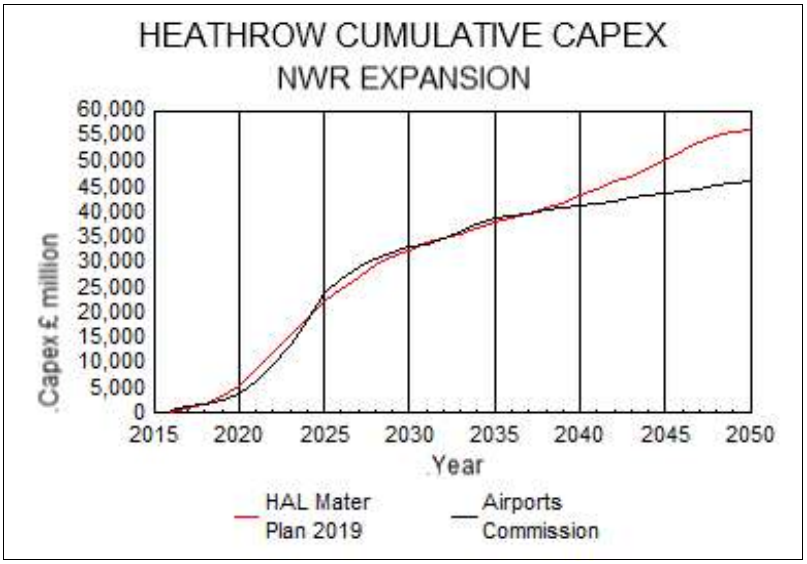

Chart 1 prepared by RHC

The Airports Commission estimated the scheme capex in 2014 prices as £17.6 bn. For reference purposes Annex 3 shows the phasing and breakdown of the different capex costs. Hopefully, we will have the opportunity in the near future of comparing this with Heathrow's latest estimates, when published.

f. **Phasing of Heathrow expansion**. Heathrow's recent Master Plan (now being consulted on) estimates a much slower passenger growth rate than predicted by the

DfT in its support of the APNS in June 2018 but a faster rate than predicted by the Airports Commission in 2015. Passenger growth is shown in Chart 2 below. The phased growth is presumably accompanied by phased capex but we still await confirmation of the capex in Chart 1.

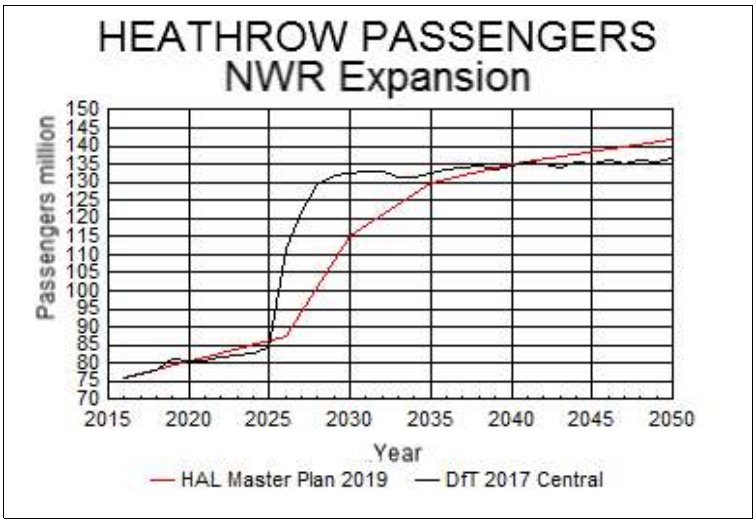

Chart 2 prepared by RHC

g. **Congestion premium**. We support the airlines' arguments reported in CAP 1722 and elsewhere that the congestion premium, sometimes referred to as scarcity rent, currently born by passengers due to lack of Heathrow capacity, and on which the CAA places so much value, does not exist. There is neither the need nor urgency to add capacity at Heathrow or any other UK airport. We have argued the case in previous responses to the CAA.

But even if there is a congestion premium or scarcity rent, as it is sometimes called, then Heathrow's Master Plan changes the demand profile considerably from that produced by the DfT in support of the APNS. We suggest there are two important consequences for the CAA's regulation of Heathrow.

i. The phased passenger growth of the Master Plan over 10 years (2026 to 2035) instead of two years means that the congestion charge, that the CAA believes it is so important to reduce through additional capacity, could reduce much more slowly than predicted by the DfT in its estimates for the APNS. The 20% or so ticket price premium could take 10 years to reduce. The actual dynamics will depend on the level and changes in suppressed demand (if it exists) and ultimately if and when capacity is reached again. Should not the change in ticket prices, now updated by the phasing of the Heathrow's Master Plan, mean that a re-appraisal of the impact of congestion premium on affordability is required?

ii. A phased reduction in congestion premium (if it exists) surely means the economic value attributed to the reduction in premium is substantially reduced due to the delay (i.e. discounted value). The DfT's APNS webTAG estimate of the passenger benefit from expansion was £67.6 bn (present value 60 yrs, 2014 money). The net UK economic net benefit ranged between minus £3.2bn and plus £3.3bn. Should not the passenger benefit and

economic net benefit be re-appraised on account of a changed reduction in congestion premium?

h. **Surface Access**. Heathrow' surface access remains a major risk to affordability and financeability.

i. The background demand in surrounding rounds, including motorways, already experiences substantial congestion.

ii. The size of the needed modal shift for passengers and staff to public transport, if pollution is to be kept under control, is highly challenging.

iii. The additional public transport being considered by Heathrow is only sufficient to provide for background demand and growth in traffic from the existing two runway airport. This includes Crossrail, additional Piccadilly line capacity and Western rail access and Souther rail access projects. In consequence, the NWR expansion and modal shift will result in overcrowding.

iv. The net result is that the road congestion, public transport overcrowding and air pollution will result in an economic cost to the UK of an estimated £25 bn (60 year discounted value 2018 prices).

v. The investment needed to mitigate this cost is likely to be at least £10 bn to £15 bn. The cost should ultimately be born by the customer. For passengers this might mean an addition to ticket prices or a direct cost if travelling by road such as fixed access cost or ULEZ charge. If HAL initially bears the cost then it could pass it through to the airlines via the aero charge and they then pass it on to the passengers in the ticket price.

vi. The extra cost to the passenger (and freight owner) impacts affordability.

vii. If Heathrow bears the cost initially then it could impact financeability.

viii. It is essential the tax payer does not end up paying for the surface access, either by subsidy, guarantee or otherwise.

ix. It is not clear that the surface access cost has been adequately taken account of in the regulatory model and this results currently in a substantial risk to affordability and financeability.

2. Regulatory Model

We have not seen a detailed regulatory model and current estimates of revenue, opex, capex etc. For reference purposes Annex B2 of RHC's response to CAP 1541 in September 2017 is attached. This is a cash flow prepared by RHC from the Airports Commission cashflow for the NWR expansion and Do-minimum in 2016 prices.

We said the following in our response to CAP 1541 based on the cashflow modelling we had done and illustrated in Annex B2. *"We examine the financial impact of Heathrow's Northwest Runway (NWR) expansion. We find that if there is to be no increase in the aero charge compared to the Do-minimum option then Heathrow's shareholders are likely to experience a drop in value of at least £12bn, which approximates most of the debt and equity of Heathrow and clearly is untenable. To breakeven on the expansion requires the aero charge to be*

increased by 38% from first flight in 2026 compared to the Do-minimum aero charge. We believe a charge of £37.67 per passenger (real 2016 prices) would be unacceptable to airlines and passengers. The only solution we can see at the moment is a substantial reduction in capital expenditure but it is difficult to see how this can be achieved without a material reduction in service and inefficient allocation of resources. Under the circumstances, we urge the Government to confirm without delay that it will not provide any financial support for Heathrow expansion, including, subsidies, guarantees, contingent liabilities or favourable tax treatment.

The model did include £6 bn of surface access costs and we realise that Heathrow believes this is far too high but as discussed above we believe it could range between £10 bn and £15 bn. The cost of capital used was 5%.

On the basis of Annex B2, we do not believe aero charges can be kept at roughly today's level, as required by the APNS, if the NWR expansion is to be financeable. While raising the aero charge to around £38 per passenger (2016 prices) may make the project financeable it would no longer be affordable. We await updated estimates from Heathrow so we can re-assess our financial model and comment further on affordability and financeablity.

Annex 1	Extract from RHC response to CAP 1782
Annex 2	Heathrow Capital Expenditure Forecasts - HAL and Airports Commission
Annex 3	Heathrow Capex Breakdown - Airports Commission
Annex 4	Heathrow Financial Model cashflows

ANNEX 1

RHC Response to CAA Consultation 1782 April 2018

Paragraph 1 of the Consultation [CAP 1782] says *'The CAA has consistently stated that additional runway capacity in the southeast of England will benefit air passengers and cargo owners. The timely delivery of more aviation capacity is required to prevent future consumers experiencing higher airfares, reduced choice and lower service quality.'* The following DfT and CAA evidence does not support this hypothesis. There is absence of need for a 3rd runway and a 3rd runway harms the aviation market and in turn UK air passengers.

a. Even without a 3rd runway, the number of passengers terminating their journey at Heathrow will grow by 60% by 2050 from increased aircraft loads and reduced international-to-international transfers. **Heathrow is not full**.

b. The unsatisfied terminating passenger demand of 37 million passengers per annum (mppa) by 2050 is almost all short-haul leisure, capable of being served many times over by UK spare capacity equivalent to 6 runways in 2050. Unused spare runway capacity in 2050 comprises (mppa):
   i. London airports (Stansted 8, Luton 7),
   ii. Larger regional/national airports (Manchester 31, Newcastle 22, Liverpool 24, Bristol 19, Glasgow 18 and Edinburgh 10),
   iii. Other regional/nation airports (95 mppa).

   A two-runway Heathrow and other capacity is well able to satisfy UK demand to 2050.

c. A 3rd runway results at the UK level in not a single additional long-haul or domestic business passenger. The major economic benefit from additional business travel claimed by Heathrow, the Airports Commission and the Government is absent.

d. The 43 million passengers per annum (mppa) served by a 3rd runway is comprised of:
   iv. 17 mppa cannibalised growth from other UK airports. Manchester loses 5 mppa, Birmingham 2 mppa and smaller airports lose 10mppa by 2050.
   v. 16 mppa international-to-international transfers of no economic value to the UK (see g below),
   vi. Just 10 mppa additional mostly short-haul terminating passengers. These represent only 2.3% of UK passengers by 2050 and can be served by other UK airports.

   A 3rd runway harms the regional balance and is used inefficiently.

e. Heathrow's 3rd runway expansion results in not a single additional destination from the UK. Heathrow's increased frequency of flights to already popular destinations is offset by loss of frequency at other UK airports. **UK connectivity is impaired**.

f. There is a turnover in destinations at Heathrow of around 10 (5%) a year. Opportunities for new beneficial routes are available if needed.

g. 37% of Heathrow's additional 3rd runway passengers are international-to-international (I-I) transfer passengers but only 300,000 out of 24 million I-I transfers are on less viable or thin routes. I-I transfers do not support otherwise unviable thin routes. They represent 94% of additional passengers on UK long-haul routes, which is highly inefficient use of runway capacity. I-I transfers do provide income for the airlines but the income would be preserved or increased by replacement with terminating passengers, for example in the in the two runway case. **Heathrow's hub value is a myth**.

h. The Commission on Climate Change estimate the need for a cap of 389 mppa at the UK level by 2050, compared to the estimated 435 mppa served assuming a 3rd runway. If the speculative carbon abatement and carbon trading fail to bridge the gap, the necessary demand management will have a substantial negative impact on the regional airports in the case of a 3rd runway, as was demonstrated by the Airports Commission. The carbon risks are considerable.

In our view it is important that economic regulation of Heathrow takes account of the economic scenario described above, all of which is evidence provided by the DfT and CAA, and not an unrealistic scenario promoted by Heathrow and its lobby of supporters.

Point (d) above is expanded in the following Table 1 provided by the DfT in support of the Airports National Policy Statement June 2018.

Table 1 **Source: DfT 2017 Demand forecasts**	**DfT 2017 Passenger Demand Forecasts with and without Heathrow's northwest runway (NWR)**			
Million Passengers per annum	**Base 2016**	**Base 2050**	**NWR 2050**	**NWR-Base 2050**
Heathrow	76	93	136	43
London ex Heathrow	86	112	112	0
Larger Regional airports	81	151	143	-7
Other Regional Airports	23	53	44	-10
Total UK	267	410	435	26
I-I Transfers	24	5	21	16
UK Terminating	243	405	414	10

Point (d) above is further expanded in the following Table 2 provided by the Airports Commission in support of its Final Report 2016.

Table 2 **Source: Airports Commission - AON carbon capped scenario (its central case)**	**Airports Commission Passenger Demand Forecasts 2015 with and without Heathrow's northwest runway (NWR)**			
Million Passengers per annum	**Base 2016**	**Base 2050**	**NWR 2050**	**NWR-Base 2050**
Heathrow	76	94	135	41
London ex Heathrow	86	107	93	-14
Larger Regional airports	81	133	105	-28
Other Regional Airports	23	52	36	-16
Total UK	267	386	369	-17
I-I Transfers	24	8	30	22
UK Terminating	243	378	339	-39

Point (g) is further expanded in the following Table 3.

Table 3 Source: CAA data via DfT	**Heathrow International Destinations in 2016 I-I Transfer passengers ('000)**		
Source CAA	**Long-haul**	**Short-haul**	**Total**
Thin destinations	317	0	317
Thick destinations	13,091	10,560	23,651
Total	13,408	10,560	23,968
Thin destinations: under 2 movements per day (arrival & departure); Long-haul: 3,500km and over			

ANNEX 2

Heathrow Capital Expenditure Forecasts NWR Expansion

	HAL Master Plan 2019 (2014 prices)		Airports Commission 2015 (2014 prices)					
	Total	Cumulative	Scheme	Core	Replacement	Surface Access	Total	Cumulative
	a	b	c	d	e	f	g	h
year	£mill	£mill	£mill	£mill	£mill	£mill	£mill	£mill
2016	100	100	0	9	667	0	677	677
2017	750	850	0	21	535	0	556	1,232
2018	800	1650	0	26	534	0	560	1,793
2019	1800	3450	399	95	290	0	785	2,577
2020	2100	5550	797	225	294	0	1,317	3,895
2021	3200	8750	1,595	461	295	0	2,350	6,245
2022	3200	11950	2,229	589	295	0	3,112	9,357
2023	3500	15450	3,179	737	302	0	4,217	13,574
2024	3250	18700	3,560	1,163	305	0	5,028	18,602
2025	3600	22300	3,299	1,386	308	0	4,993	23,595
2026	2400	24700	1,349	1,347	346	0	3,043	26,638
2027	2500	27200	937	1,306	376	0	2,619	29,257
2028	2100	29300	83	1,141	390	0	1,614	30,871
2029	1600	30900	56	751	401	0	1,208	32,079
2030	1400	32300	42	487	412	0	941	33,020
2031	1500	33800	6	118	418	0	542	33,562
2032	900	34700	18	590	426	0	1,034	34,596
2033	900	35600	36	972	429	0	1,437	36,033
2034	1100	36700	36	986	439	0	1,460	37,493
2035	1250	37950	24	709	446	0	1,178	38,672
2036	1000	38950	0	274	453	0	727	39,399
2037	700	39650	0	0	459	0	459	39,857
2038	1100	40750	0	0	467	0	467	40,325
2039	1100	41850	0	0	475	0	475	40,799
2040	1300	43150	0	0	482	0	482	41,282
2041	1600	44750	0	0	485	0	485	41,767
2042	1250	46000	0	0	490	0	490	42,257
2043	1100	47100	0	0	496	0	496	42,752
2044	1400	48500	0	0	499	0	499	43,251
2045	1800	50300	0	0	496	0	496	43,747
2046	2000	52300	0	0	503	0	503	44,250
2047	1500	53800	0	0	500	0	500	44,750
2048	1500	55300	0	0	505	0	505	45,255
2049	500	55800	0	0	504	0	504	45,758
2050	500	56300	0	0	509	0	509	46,268
Total	56300		17,644	13,393	15,231	0	46,268	

prepared by RHC 13 August 2019

TABLE 2 **Heathrow Capex Source Jacobs 2014 real prices £ million including mitigated optimism bias**

	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Terminal Buildings	3482									266	665	972	962	370	247								
Plant	729						17	34	69	98	143	159	141	41	27								
Tunnels and Bridges	0																						
Transit Systems	1232						6	13	25	112	241	334	320	109	72								
Runways	180						9	18	36	36	36	27	18										
Taxiways and Aprons	642						20	41	82	82	82	73	87	105	70								
Equipment	1143									59	147	233	287	250	167								
Land	2880						144	288	576	576	576	432	288										
Airfield Ancilary	758						34	68	136	140	146	117	87	18	12								
Car Parks	577									14	36	58	83	86	84	60	40	30	4	13	26	26	17
Thrid Party Land Use	91						5	9	18	18	18	14	9										
Environment	669						33	67	134	134	134	100	67										
Community	400						20	40	80	80	80	60	40										
Optimimum Bias	2302						52	104	208	291	415	464	430	176	122	11	7	5	1	3	5	5	3
Risk	2558						58	116	231	323	461	516	478	196	136	12	8	6	1	3	5	5	3
TOTAL	17643						398	798	1595	2229	3180	3559	3297	1351	937	83	55	41	6	19	36	36	23
Nominal +3.5%pa		1	1.035	1.07	1.11	1.15	1.19	1.23	1.27	1.32	1.36	1.41	1.46	1.51	1.56	1.62	1.68	1.73	1.79	1.86	1.92	1.99	2.06
Nominal +3.5%pa	24,625						473	981	2029	2935	4334	5020	4814	2041	1465	134	92	71	11	35	69	72	47

File: Heathrow/AC Final/Viability/P Analysis

17-Sep-17

Prepared by P Willan RHC

BASE CASE: NWR aero charge equals Do Minimum areo charge

£ million

Real Terms (2016 money)

Do Minimum Option

ANNEX B 2

	cost of cap																																			
	5.0%		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*
Year	NPV	2016-2050	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Passengers million		2,986	75.7	76.1	76.6	77.2	77.7	78.3	78.8	79.4	79.9	80.5	81.0	81.6	82.2	82.7	83.3	83.9	84.5	85.1	85.7	86.3	86.9	87.5	88.1	88.7	89.3	90.0	90.6	91.2	91.9	92.5	93.2	93.8	94.5	95.1	95.8
Aero charge nominal money	3.0%																																				
Aero charge 2016 money			22.35	22.80	22.38	21.86	22.07	22.79	24.56	24.56	24.56	24.56	24.56	25.83	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30
Revenue:																																					
Aeronautical revenue 3.0%pa esc	3.0%	34,192	78,025	1,699	1,736	1,715	1,687	1,715	1,783	1,935	1,949	1,962	1,976	1,990	2,108	2,243	2,259	2,275	2,291	2,307	2,323	2,339	2,356	2,372	2,389	2,405	2,422	2,439	2,456	2,473	2,491	2,508	2,526	2,543	2,561	2,579	2,597	2,615
Non-aero revenue 2.1%pa esc	2.1%	17,685	38,190	1,087	1,035	1,041	1,041	1,049	1,055	1,058	1,062	1,071	1,079	1,080	1,077	1,079	1,085	1,101	1,100	1,096	1,097	1,104	1,107	1,104	1,106	1,113	1,118	1,115	1,110	1,109	1,113	1,118	1,119	1,119	1,120	1,114	1,106	1,103
Revenue total		51,878	116,215	2,786	2,771	2,756	2,728	2,764	2,839	2,993	3,010	3,033	3,055	3,070	3,185	3,322	3,344	3,375	3,391	3,403	3,420	3,443	3,462	3,476	3,494	3,519	3,540	3,554	3,567	3,582	3,604	3,626	3,645	3,662	3,681	3,693	3,703	3,719
Operating costs:																																						
Operating Expenses 3.0%pa esc	3.0%	18,584	40,445	1,138	1,106	1,093	1,092	1,095	1,093	1,091	1,091	1,105	1,107	1,105	1,102	1,103	1,105	1,165	1,158	1,164	1,164	1,167	1,168	1,170	1,176	1,184	1,188	1,190	1,191	1,196	1,204	1,211	1,215	1,218	1,224	1,220	1,221	1,225
Environment costs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating costs total		18,584	40,445	1,138	1,106	1,093	1,092	1,095	1,093	1,091	1,091	1,105	1,107	1,105	1,102	1,103	1,105	1,165	1,158	1,164	1,164	1,167	1,168	1,170	1,176	1,184	1,188	1,190	1,191	1,196	1,204	1,211	1,215	1,218	1,224	1,220	1,221	1,225
Operating Surplus		33,293	75,769	1,648	1,665	1,663	1,636	1,670	1,745	1,902	1,919	1,928	1,947	1,965	2,083	2,220	2,239	2,211	2,233	2,239	2,256	2,276	2,294	2,306	2,318	2,334	2,352	2,364	2,375	2,386	2,399	2,415	2,430	2,444	2,457	2,473	2,482	2,494
Operating margin		65.2%	59.2%	60.1%	60.4%	60.0%	60.4%	61.5%	63.5%	63.8%	63.6%	63.7%	64.0%	65.4%	66.8%	67.0%	65.5%	65.8%	65.8%	66.0%	66.1%	66.3%	66.3%	66.3%	66.3%	66.4%	66.5%	66.6%	66.6%	66.6%	66.6%	66.6%	66.7%	66.7%	66.8%	67.0%	67.0%	67.1%
Capital Expenditure:																																						
NWR capex 3.5%pa esc	3.5%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Core capex 3.5%pa esc	3.5%	9,355	14,348	10	22	28	102	1,006	1,880	2,447	2,334	1,531	658	651	1,086	1,201	1,033	343	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asset replacement 3.5%pa esc	3.5%	6,332	13,017	713	572	572	308	314	317	318	322	327	332	331	331	335	340	346	342	342	345	352	351	350	354	360	361	361	361	363	369	373	375	376	380	374	373	374
Surface Access		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capital expenditure total		15,687	27,365	723	594	600	410	1,320	2,197	2,766	2,657	1,858	990	982	1,417	1,535	1,372	689	358	342	345	352	351	350	354	360	361	361	361	363	369	373	375	376	380	374	373	374
Cash Flow before interest and tax		17,607	48,404	925	1,071	1,063	1,226	349	-452	-864	-738	70	957	982	666	684	867	1,522	1,874	1,897	1,911	1,925	1,943	1,956	1,964	1,974	1,990	2,003	2,015	2,023	2,030	2,042	2,055	2,068	2,078	2,099	2,109	2,120

£ million

Real Terms (2016 money)

NWR Option

	cost of cap																																			
	5.0%		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*
Year	NPV	2016-2050	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Passengers million		3,802	75.7	76.1	76.6	77.2	77.7	78.3	78.8	79.4	79.9	80.5	91.7	99.6	103.2	106.2	109.3	110.7	112.9	113.7	116.2	118.1	120.2	121.6	123.8	125.8	127.9	128.5	129.8	131.4	132.2	131.5	133.2	132.6	133.7	133.5	134.9
Aero charge nominal money	3.00%																																				
Aero charge 2016 money			22.35	22.80	22.38	21.86	22.07	22.79	24.56	24.56	24.56	24.56	24.56	25.83	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30	27.30
Revenue:																																					
Aeronautical revenue 3.0%pa esc	3.00%	41,260	100,266	1,699	1,736	1,715	1,687	1,715	1,783	1,935	1,949	1,962	1,976	2,252	2,573	2,818	2,898	2,983	3,023	3,082	3,103	3,174	3,224	3,280	3,318	3,379	3,434	3,491	3,508	3,544	3,588	3,608	3,590	3,637	3,620	3,650	3,645	3,684
Non-aero revenue 2.1%pa esc	2.10%	19,383	43,527	1,087	1,035	1,041	1,041	1,049	1,055	1,058	1,062	1,071	1,079	1,130	1,189	1,230	1,248	1,263	1,275	1,286	1,292	1,301	1,313	1,327	1,335	1,345	1,356	1,363	1,367	1,369	1,374	1,378	1,372	1,372	1,370	1,367	1,364	1,365
Revenue total		60,644	143,792	2,786	2,771	2,756	2,728	2,764	2,839	2,993	3,010	3,033	3,055	3,382	3,762	4,049	4,146	4,245	4,299	4,367	4,395	4,474	4,537	4,607	4,654	4,724	4,790	4,855	4,875	4,913	4,962	4,986	4,962	5,009	4,989	5,017	5,010	5,049
Operating costs:																																						
Operating Expenses 3.0%pa esc	3.00%	21,889	50,646	1,138	1,106	1,093	1,092	1,095	1,093	1,091	1,091	1,105	1,107	1,290	1,325	1,454	1,465	1,489	1,510	1,516	1,518	1,526	1,536	1,600	1,609	1,630	1,641	1,654	1,659	1,667	1,677	1,683	1,683	1,693	1,693	1,701	1,703	1,712
Environment costs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating costs total		21,889	50,646	1,138	1,106	1,093	1,092	1,095	1,093	1,091	1,091	1,105	1,107	1,290	1,325	1,454	1,465	1,489	1,510	1,516	1,518	1,526	1,536	1,600	1,609	1,630	1,641	1,654	1,659	1,667	1,677	1,683	1,683	1,693	1,693	1,701	1,703	1,712
Operating Surplus		38,754	93,147	1,648	1,665	1,663	1,636	1,670	1,745	1,902	1,919	1,928	1,947	2,092	2,437	2,595	2,681	2,757	2,788	2,851	2,877	2,948	3,001	3,007	3,044	3,094	3,148	3,201	3,216	3,245	3,285	3,303	3,280	3,316	3,297	3,316	3,307	3,336
Operating margin		64.8%	59.2%	60.1%	60.4%	60.0%	60.4%	61.5%	63.5%	63.8%	63.6%	63.7%	61.8%	64.8%	64.1%	64.7%	64.9%	64.9%	65.3%	65.5%	65.9%	66.1%	65.3%	65.4%	65.5%	65.7%	65.9%	66.0%	66.1%	66.2%	66.2%	66.1%	66.2%	66.1%	66.1%	66.0%	66.1%
Capital Expenditure:																																						
NWR capex 3.5%pa esc	3.50%	12,480	18,901	0	0	0	428	854	1,708	2,388	3,405	3,814	3,534	1,445	1,003	89	59	44	7	19	38	38	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Core capex 3.5%pa esc	3.50%	7,896	14,347	10	22	28	102	241	493	630	789	1,245	1,484	1,443	1,399	1,222	805	522	127	632	1,041	1,056	759	293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asset replacement 3.5%pa esc	3.50%	7,372	16,313	713	572	572	311	315	316	316	324	327	330	371	403	418	429	442	448	456	460	470	478	485	491	501	509	517	520	525	531	534	532	538	536	540	540	546
Surface Access	3.50%	4,230	6,027	0	0	0	0	871	1,263	1,220	1,179	759	734	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capital expenditure total		31,978	55,587	723	594	600	841	2,282	3,780	4,554	5,697	6,145	6,083	3,260	2,806	1,729	1,294	1,008	581	1,107	1,540	1,564	1,262	778	491	501	509	517	520	525	531	534	532	538	536	540	540	546
Cash Flow before interest and tax		6,776	37,560	925	1,071	1,063	795	-613	-2,035	-2,652	-3,778	-4,217	-4,135	-1,168	-369	866	1,388	1,748	2,208	1,744	1,337	1,384	1,738	2,229	2,553	2,594	2,640	2,684	2,696	2,721	2,754	2,769	2,748	2,778	2,761	2,776	2,767	2,791

£ million

Real Terms (2016 money)

INCREMENT - NWR Option minus Do Minimum Option

	cost of cap																																			
	5.0%		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*
Year	NPV	2016-2050	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Passengers million		817	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7	18.0	21.1	23.4	25.9	26.8	28.4	28.6	30.6	31.8	33.3	34.1	35.7	37.1	38.5	38.5	39.2	40.2	40.3	39.0	40.1	38.8	39.2	38.4	39.2
Aero charge nominal money																																					
Aero charge 2016 money			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Revenue:																																					
Aeronautical revenue 3.0%pa esc		7,068	22,241	0	0	0	0	0	0	0	0	0	0	262	465	575	639	708	733	775	780	835	869	908	930	974	1,011	1,052	1,052	1,070	1,097	1,100	1,065	1,094	1,058	1,071	1,048	1,069
Non-aero revenue 2.1%pa esc		1,698	5,337	0	0	0	0	0	0	0	0	0	0	50	111	151	163	162	175	190	195	197	206	224	230	232	238	248	256	260	261	259	253	253	250	253	259	261
Revenue total		8,766	27,578	0	0	0	0	0	0	0	0	0	0	312	576	727	802	870	908	965	975	1,031	1,075	1,132	1,160	1,206	1,250	1,301	1,309	1,331	1,359	1,359	1,317	1,347	1,308	1,324	1,307	1,330
Operating costs:																																						
Operating Expenses 3.0%pa esc		3,305	10,201	0	0	0	0	0	0	0	0	0	0	185	223	351	360	324	352	352	354	359	368	430	433	446	453	464	468	472	473	472	468	475	469	480	482	488
Environment costs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating costs total		3,305	10,201	0	0	0	0	0	0	0	0	0	0	185	223	351	360	324	352	352	354	359	368	430	433	446	453	464	468	472	473	472	468	475	469	480	482	488
Operating Surplus		5,461	17,377	0	0	0	0	0	0	0	0	0	0	127	354	375	442	546	556	612	620	672	707	702	726	760	796	837	841	859	886	887	850	872	839	843	825	842
Operating margin																																						
Capital Expenditure:																																						
NWR capex 3.5%pa esc		12,480	18,901	0	0	0	428	854	1,708	2,388	3,405	3,814	3,534	1,445	1,003	89	59	44	7	19	38	38	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Core capex 3.5%pa esc		-1,459	-1	-0	0	0	-0	-765	-1,387	-1,817	-1,545	-285	827	792	314	22	-228	179	111	632	1,041	1,056	759	293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asset replacement 3.5%pa esc		1,040	3,296	0	0	0	3	1	-1	-3	1	-1	-2	39	71	83	89	96	105	114	115	118	127	135	137	141	147	156	159	161	162	161	157	162	156	166	167	171
Surface Access		4,230	6,027	0	0	0	0	871	1,263	1,220	1,179	759	734	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capital expenditure total		16,291	28,222	-0	0	0	430	962	1,583	1,788	3,040	4,287	5,093	2,277	1,388	194	-79	319	222	765	1,194	1,213	912	428	137	141	147	156	159	161	162	161	157	162	156	166	167	171
Cash Flow before interest and tax		-10,831	-10,845	0	0	-0	-430	-962	-1,583	-1,788	-3,040	-4,287	-5,093	-2,150	-1,035	181	521	226	333	-153	-574	-541	-205	273	589	619	649	681	682	698	724	727	693	710	683	677	658	671