

CAA CAP 1616 Options Appraisal Assessment (Phase II Full)

Title of Airspace Change Proposal:	Heathrow Slightly Steeper Approaches		
Change Sponsor:	Heathrow Airport		
ACP Project Ref Number:	ACP-2017-49		
Case study commencement date:	11/02/2021	Case study report as at:	26/02/2021

Account Manager: [REDACTED]	[GREY]	Airspace Regulator (Engagement & Consultation): [REDACTED]	[YELLOW]	IFP: [REDACTED]	[YELLOW]	OGC: [REDACTED]	[NAVY]
Airspace Regulator (Technical): [REDACTED]	[GREEN]	Airspace Regulator (Environmental): [REDACTED]	[PURPLE]	Airspace Regulator (Economist): [REDACTED]	[LIGHT BLUE]	ATM (Inspector ATS Ops): [REDACTED]	[RED]

Instructions

To aid the SARG project leader's efficient project management, please highlight the "status" cell for each question using one of the four colours to illustrate if it is:

Resolved - GREEN

Not Resolved – AMBER

Not Compliant – RED

Not Applicable - GREY

Guidance

The broad principle of economic impact analysis is **proportionality**; is the level of analysis involved proportionate to the likely impact from that ACP? There are three broad levels of economic analysis; qualitative discussion, quantified through metrics, and monetised in £ terms. The more significant the impact, the greater should be the effort by sponsors to quantify and monetise the impact.

1. Background – Identifying the impact of the shortlist of options (including Do Nothing (DN) / Do Minimum (DM))			Status
1.1	Are the outcomes of DN/DM and DS scenarios clearly outlined in the proposal?		<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
1.1.1	Has the change sponsor produced an Options Appraisal (Phase II - Full) which sets out how Initial appraisal is developed into a more detailed quantitative assessment, moving from qualitatively defined shortlist options to the selected preferred option? [E23]	Yes. The sponsor provides the Full Options Appraisal, setting out a more detailed qualitative and quantitative assessment. However, the Initial Options Appraisal includes only one option – Option B2: 3.2° RNAV SSA.	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
1.1.2	Does each shortlist option include the impacts in comparison to the 'do nothing / do minimum' option, in particular: -all reasonable costs and benefits quantified -all other costs and benefits described qualitatively -reasons why costs and benefits have not been quantified	Yes. The preferred option – Option B2: 3.2° RNAV SSA - is assessed against the Do-Nothing (Option B1: 3.0° RNAV and ILS approaches). This ACP aims to introduce only vertical changes, leaving the lateral flight paths unchanged, therefore only marginal benefits are envisaged, i.e. fuel burn, CO ₂ emissions and air quality. The sponsor estimates noise impact using WebTAG workbooks and provides a qualitative assessment for the other impacts as per Tab E2 of CAP1616.	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
1.1.3	Where options have been discounted, does the change sponsor clearly set out why?	The sponsor presents only one option – Option B2, as the only viable option already discussed and taken forward during the IOA.	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
1.1.4	Has the change sponsor indicated their preferred option in the Options Appraisal (Phase II - Full)? [E23]	Yes, the sponsor states that the only viable option is the preferred one - Option B2 (Maintain RNAV VPA to 3.2°, maintain ILS VPA at 3.0°).	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
1.1.5	Does the Full Options Appraisal (Phase II - Full) detail what evidence the change sponsor will collect, and how, to fill in any evidence gaps and how this will be used to develop the Options Appraisal (Phase III - Final)? Does the plan for evidence gathering cover all reasonable impacts of the change?	No. The sponsor is not planning to gather further evidences because the proposed airspace change is going to have a negligible impact. The qualitative justification provided is sufficient since there will be no variation in the effective capacity and access to the airspace.	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

2. Direct impact on air traffic control					Status
2.1	Are there direct cost impacts on air traffic control / management systems? If so, please provide below details of the factors considered and the level in which this has been analysed.				<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2.1.1	Examples of costs considered (please add costs that have been discussed, and any reasonable costs that the Airspace Regulator (Technical) feels have NOT been addressed)				
		Not applicable	Qualitative	Quantified	Monetised
2.1.2	Infrastructure changes		x	N/A	N/A
2.1.3	Deployment		x	N/A	N/A
2.1.4	Training		x	N/A	N/A
2.1.5	Day-to-day operational costs / workload / risks		x	x	x
2.1.6	Other (provide details)	x			
2.1.7	Comments: The sponsor provides a qualitative assessment of the infrastructure change, deployment and training costs that are not going to be affected by the proposed airspace change. The RNAV approaches do not rely on ground-based equipment to determine the final approach vertical and lateral path, hence it is not required a change in the infrastructure for the implementation of Option B2 and both Heathrow Airport and NATS as the ANSP will not incur any additional costs. There will not be deployment and training costs because IFP design, validation, AIP promulgation and ATC operational instructions were completed during the flight trials completed in 2015 and 2017. The sponsor states that if it was decided to remove the 3.2 SSA and revert to all aircraft operating 3.0° approaches, this will require the review of the procedure by a UK Approved Procedure Design Organisation (APDO), which would cost £8,0000.				
2.2	Are there direct beneficial impacts on air traffic control / management systems? If so, please provide details and how they have been addressed:				<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
2.2.1	Examples of benefits considered	Not applicable	Qualitative	Quantified	Monetised
2.2.2	Reduced work-load	x			
2.2.3	Reduced complexity / risk	x			
2.2.4	Other (provide details)	x			

2.2.5	Comments: N/A	
2.3	Where monetised, what is the net monetised impact on air traffic control (in net present value) over the project period? N/A	
2.4	Are the direct impacts on air traffic management analysed accurately and proportionately? Yes. The sponsor provides an accurate and proportionate analysis of the direct impacts of the proposed airspace change suggesting that there will not be a critical difference between the baseline option and the preferred one for most of the impacts. This is due to the nature of the proposed airspace change that will only affect vertical flight paths leaving lateral ones unchanged.	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

3. Changes in air traffic movements / projections					Status
3.1	What is the impact of the ACP on the following and has it been addressed in the ACP proposal?				<div><div><input checked="" type="checkbox"/></div><div><input type="checkbox"/></div><div><input type="checkbox"/></div><div><input type="checkbox"/></div></div>
		Not applicable	Qualitative	Quantified	Monetised
3.1.1	Number of aircraft movements	x			
3.1.2	Type of aircraft movement		x	N/A	N/A
3.1.3	Distance travelled	x			
3.1.4	Area flown over / affected		x	N/A	N/A
3.1.5	Other impacts	x			
3.1.6	Comments: The sponsor states that this airspace change will not bring any change in traffic movements, hence the present traffic cap of 480,000 movements per annum will remain the same. The ANOMS data (Heathrow's Noise Track Keeping Database) shows that 0.6% of arrivals have used SSA 3.2° in 2019.				
3.2	Has the forecasting of traffic done reasonably using best available guidance (e.g. DfT WebTAG, the Green Book, Academic sources...etc?) <div><div></div><div>No change to expected traffic forecast associated with this ACP, traffic predictions out 2031 have been considered as part of this ACP, however these predictions indicate that traffic will remain at 2019 levels, with capacity being quoted as constraint and COVID 19 -statistics given in FOA on the split between RNAV approaches and ILS ANOMS data, also</div></div>				<div><div><input type="checkbox"/></div><div><input checked="" type="checkbox"/></div><div><input type="checkbox"/></div><div><input type="checkbox"/></div></div>





	<p>the same splits of runway etc used as recorded by ANOMS in 2019, however forecast schedule also reflected, used to inform traffic statistics. Single option compared against a Do nothing</p> <p>████ The sponsor does not use DfT WebTAG nor the Green Book to develop the traffic forecast, instead suggests that the proposed airspace change is not going to increase the airspace capacity nor the access to it, highlighting that the traffic forecast for 2031 will be the same as in 2019 and that the only difference will be in the aircraft fleet operating then. This is the consequence of Heathrow already operating at the maximum capped movements per annum (i.e. 480,000). For the purpose of the FOA the sponsor uses the ANOMS data (Heathrow's Noise Track Keeping Database) to report the number of 3.2° RNAV approaches in 2019.</p> <p>The sponsor provides a justification for the qualitative assessment of the overflown areas, highlighting that the nationally protected landscapes of National Parks and AONBs will not be affected by the proposed airspace change because there will not be a change to existing lateral flight paths and no increase in the number of air traffic movements is forecast. The FOA briefly refers to the Airbus A320, as the most common aircraft variant in operation at Heathrow Airport, when attempting to simulate the future traffic at the airport. However, since the proposed airspace change does not aim to increase the airspace capacity nor the access to it, the assessment here is merely qualitative and no further information on the future of aircraft and number of aircraft movement is provided.</p>				
3.3	What is the impact of the above changes (3.1) on the following factors?				
		Not applicable	Qualitative	Quantified	Monetised
3.3.1	Noise			x	x
3.3.2	Fuel Burn			x	N/A
3.3.3	CO2 Emissions			x	N/A
3.3.4	Operational complexities for users of airspace	x			
3.3.5	Number of air passengers / cargo	x			
3.3.6	Flight time savings / Delays	x			
3.3.7	Air Quality			x	N/A
3.3.8	Tranquillity			x	N/A
3.4	Are the traffic forecast and the associate impact analysed proportionately and accurately according to available guidelines (e.g. WebTAG or the Green Book?)				<div><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></div>

	<p>████ No, the sponsor does not provide a ten-year traffic-forecast. Based on the assumption that Heathrow is already operating at its maximum capped movement per annum, the 2031 the traffic movement will be the same as in 2019 with the only difference in the aircraft fleet (i.e. fleet turnover and retirements and future aircraft types). The FOA quantifies and monetises the noise impact and estimates the fuel burn and CO₂ emissions. To undertake the noise impact the sponsor uses both the Aviation Environmental Design Tool (AEDT) and the WebTAG noise model.</p> <p>The sponsor undertakes a simulation of Airbus A320 (the most common aircraft variant in operation at Heathrow Airport) to predict the reduction in fuel burn when aircraft uses a 3.2° vertical path angle (VPA) compared to a 3.0° VPA. The result is a 3% fuel burn reduction but, given the usage of the 3.2° VPA (0.6% of all arrivals in 2019) compared to the 3.0° VPA (99.4% arrivals in 2019) the influence of the approach on fuel burn is overall negligible and not monetised.</p> <p>Using the Airbus A320 simulation model the sponsor estimates two minor air quality benefits: i. lower overall emissions of NO_x, PM and hydrocarbons; and ii. lower emissions to ground level air quality. However, these two benefits are overall marginal because of the small percentage of aircrafts operating a 3.2° VPA (0.6% in 2019).</p> <p>████ Actual 2019 ANOMS Traffic data used. No change to expected traffic forecast associated with this ACP, traffic predictions out 2031 have been considered as part of this ACP, however these predictions indicate that traffic will remain at 2019 levels, with capacity being quoted as constraint and COVID 19 -statistics given in FOA on the split between RNAV approaches and ILS ANOMS data, also the same splits of runway etc used as recorded by ANOMS in 2019, however forecast schedule also reflected, used to inform traffic statistics.</p> <p>Single option compared against a Do-nothing. Noise contours produced from 51dB(A) based on ANOMs forecast traffic data up to 2019 levels for both scenarios also N65 plots provided.</p>	
3.5	<p>What is the total monetised impact of 3.3? (Provide comments)</p> <p>Implementing Option B2: 3.2° RNAV SSA leads to a net benefit of £27,632,143 (with a sensitivity test outcome of £10,544,020). The noise WebTAG assessment of adopting 3.2° RNAV SSA against the baseline is summarised in the table below:</p>	

	WebTAG assessment	Sensitivity test excluding impacts below 51 dB (for aviation proposals only)
Net present value of change in noise (£, 2010 prices):	£27,632,143	£10,544,020
	*positive value reflects a net benefit (i.e. a reduction in noise)	
Net present value of impact on sleep disturbance (£, 2010 prices):	£10,122,037	£1,825,547
Net present value of impact on amenity (£, 2010 prices):	£14,917,345	£6,125,713
Net present value of impact on AMI (£, 2010 prices):	£51,097	£51,097
Net present value of impact on stroke (£, 2010 prices):	£1,013,021	£1,013,021
Net present value of impact on dementia (£, 2010 prices):	£1,528,642	£1,528,642
<u>Quantitative results</u>		
households experiencing increased daytime noise in forecast year:	12408	
households experiencing reduced daytime noise in forecast year:	41825	
households experiencing increased night time noise in forecast year:	1008	
households experiencing reduced night time noise in forecast year:	12170	

4. Benefits of ACP					Status
4.1	Does the ACP impact refer to the following groups and how they are impacted by the ACP?				
		Not applicable	Qualitative	Quantified	Monetised
4.1.1	Air Passengers	x			
4.1.2	Air Cargo Users	x			
4.1.3	General aviation users		x	N/A	N/A
4.1.4	Airlines	x			
4.1.5	Airports	x			
4.1.6	Local communities			x	N/A
4.1.7	Wider Public / Economy		x	N/A	N/A




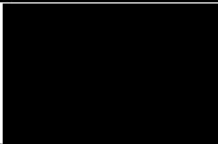
4.1.8	<p>Comments:</p> <p>████ The FOA states that the proposed airspace change is not going to have an impact on the existing controlled airspace boundaries, or airspace classifications or on traffic numbers with the introduction of 3.2° RNAV SSA. Hence, Option B2 will not change the current impact on general aviation (GA) access. The proposed airspace change will not increase traffic movements and the current traffic cap of 480,000 movements per annum will remain, as reinforced by the results of the flight trials in 2017 and 2019.</p> <p>████ Local community Population data used based on noise analysis Census 2019 data used to forecast up to 2031, Noise contours (Leq16Hr and Leq8hr) provided for 2019 and 2031 scenarios from 51dB(A). Also N65 Day and N60 Night plots provided since this ACP will impact on Night-time Operations for current day (2019) and Forecast (2031) traffic scenarios. Population counts based on Dwellings, and statistics showing Educational Premises, Healthcare Premises, & Places of worship, also provided for both Leq(16hr) and Night-time Leq (8hr), and Number Over assessments for both Modal split and 100% Easterly operations assessments</p>	
4.2	How are the above groups impacted by the ACP, especially (but not exclusively) looking at the following factors below:	
4.2.1	Improved journey time for customers of air travel	N/A
4.2.2	Increase choice of frequency and destinations from airport	N/A
4.2.3	Reduced price due to additional competition because of new capacity	N/A
4.2.4	Wider economic benefits	N/A
4.2.5	Other impacts	N/A
4.2.6	<p>Comments:</p> <p>The sponsor predicts a positive impact on society such as the reduction in the noise level, better air quality and tranquillity compared to the Do-Nothing option.</p>	
4.3	<p>What is the overall monetised impacts associated with 4.1 and 4.2 the above?</p> <p>There are no monetised impacts associated to groups in 4.1 and 4.2.</p>	
4.4	<p>What are the non-monetised but quantified impacts of the above? (Insert details of description)</p> <p>The sponsor quantifies a potential 3% fuel burn reduction when aircraft use the 3.2° VPA rather than a 3.0° VPA, based on the 2019 arrivals data.</p>	
4.5	<p>What are the qualitative / strategic impacts described above?</p> <p>The sponsor promotes the implementation of a 3.2° VPA approaches that will lead to a reduction in the noise impact and potentially to a reduction in the fuel burn and CO₂ emissions and an overall better air quality. The sponsor acknowledges that the low usage of the 3.2 slope leads to an overall qualitative assessment of the fuel burn and CO₂ emissions.</p>	

4.6	What is the overall monetised benefits-costs ratio (BCR) of the policy? Is it more than 1? N/A	
4.7	Have the sponsors provided reasonable justification for the proportionality of analysis above? Yes, the sponsor undertakes a quantitative assessment of the noise impact and provides sufficient justification of the qualitative assessment carried out for the fuel burn, i.e. small percentage of 3.2° VPA approaches (0.6% in 2019) compared to a the 3.0° VPA ones.	   
4.8	If the BCR is less than 1, are the quantitative and qualitative strategic impacts proportional to the costs of the ACP? N/A.	

5. Other aspects	
5.1	-

6. Summary of Assessment of Economic Impacts & Conclusions	
6.1	<p>The sponsor undertakes the Full Options Appraisal (FOA) following CAP1616 steps and provides a more details analysis of the preferred option – Option B2: 3.2° RNAV SSA – which is assessed against the Do-Nothing (Option B1: 3.0° RNAV and ILS approaches).</p> <p>The aim of this airspace change is to introduce only vertical flight path changes, leaving the lateral flight paths unchanged, therefore only marginal benefits are envisaged such as a reduction in noise, fuel burn, CO₂ emissions and a better air quality.</p> <p>The proposed airspace change will not increase the airspace capacity and its usage since Heathrow airport is already operating at its maximum traffic of 480,000 movements per annum (2019), expected to be the same in 2031, as reinforced by the results of the flight trials conducted in 2017 and 2019. This is the reason why the sponsor only quantifies and monetises the noise impact (NPV of £27,632,143) due to the change to a steeper VPA, and undertakes a qualitative assessment for the fuel burn and CO₂ emissions based on a model that combines a simulation of future aircraft type usage (i.e. Airbus A320) and the effective usage of the 3.2° VPA approaches in 2019 (0.6% of the arrivals). The sponsor attempts to estimate the greenhouse gas impact and the CO₂ emissions but based on the small percentage of the approaches at the 3.2 slope (0.6% of arrivals in 2019) this impact is marginal and hence only qualitative assessment is provided. Despite the sponsor does not provide a 10-year traffic forecast as required in CAP1616, the qualitative assessment carried out sufficiently justifies the impact of the airspace change.</p> <p>The CAA concludes that based on the nature of the airspace change and the quantitative assessment provided, the FOA clearly summaries the main impacts that this airspace change will have, focusing mostly on the benefits of noise reduction.</p>

Outstanding issues?		
Serial	Issue	Action required (for CAP1616 Stage 4, Final Options Appraisal)
1	Traffic forecast	In line with CAP1616 the sponsor should provide a 10-years traffic forecast. The sponsor reports that Heathrow airport is already at its maximum movement capacity per annum (i.e. 480,000) and that the situation will not change by 2031. However, the recovery from C-19 might imply different traffic trends which could be considered.
2	Cost Benefit Analysis table	In line with CAP1616 the sponsor should provide a Cost-Benefit table as in Appendix E – Table E3. The sponsor has all the input data to fill Table E3, including the noise reduction benefit (monetised) expressed in net present value.
3	Noise WebTAG tables	The sponsor should use the latest updated WebTAG tables as per July 2020.

CAA Initial Options Appraisal Completed by	Name	Signature	Date
Airspace Regulator (Economist)			23/02/2021
Airspace Regulator (Environmental)			26/02/2021