SLIGHTLY STEEPER APPROACHES AIRSPACE REGULATOR QUESTIONS AND CLARIFICATIONS - JULY 2021

FINAL

Heathrow

1. INTRODUCTION

1.1 Purpose of this document

On 15th July 2021 the Airspace Regulators assessing the Heathrow SSA submission requested clarification on a number of topics associated with the Airspace Change Proposal. This document sets out the answers Heathrow provided in response.

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	Environmental	
Ref	**Request**	**Response**
1	Para 1.20 of CAP 1616A requires a change sponsor to take account of terrain adjustments within its noise modelling. Can the sponsor confirm that this has been taken account of?	Yes - terrain data has been taken into account as part of the noise modelling
2	The consultation material states a modal split of 70% Westerly / 30% Easterly operations. Can the sponsor therefore explain why 80% Westerly / 20% Easterly has been used for the purpose of noise modelling? In addition, can the sponsor provide the rationale for the modal split, for example is it based on a long-term average observed at Heathrow?	The analysis has attempted to provide a forecast comparison against 2019 in as fair a way as possible. To reduce the number of variables, we have used the actual modal split measured at Heathrow during Summer 2019 as is published in “Heathrow Airport 2019 Summer Noise Contours and Noise Action Plan Contours” for 2019 summer day and night period, which is 80%W/20%E.
3	Can the sponsor explain why the number of dwellings has been used for the purpose of the WebTAG Noise Impacts assessment when population data has been provided elsewhere? And why the national average of 2.3 people per household is considered appropriate rather than adjusting for local circumstances?	This is a limitation of the WebTAG workbooks in so much that they allow only a number of dwellings to be input. It is therefore not possible to account for specific population densities around the airport within this workbook. Given the changes proposed by the ACP, it was considered that relying on the default average population per household was a proportionate approach in this instance. All the population exposure data presented within the ACP include population growth and is based on counts and forecasts of populations at each post code.
4	Can the sponsor explain whether the data tables provided for the population impacted by noise is cumulative (e.g. reflecting the total population exposed to noise above 51 dB LAeq, 16hr) or whether it is the population bound within each 3 dB contour? Similarly, can this be confirmed for the Nx tables produced, for example does the N65 1 reporting line show those experiencing at least one event in excess of 65 dB Lmax or only those experiencing one event of 65 dB Lmax?	The data tables provided are cumulative.

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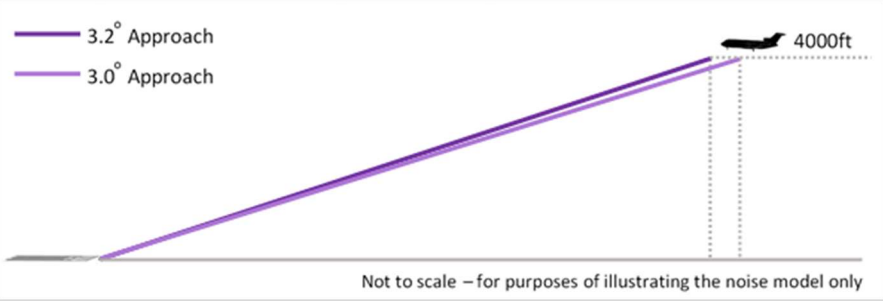
5	Based on the noise analysis provided, it is not apparent from the submission why some households are experiencing an increase in noise. It is understood that the increase in noise may be imperceptible to someone on the ground (for example 0.06 dB change), however, can the sponsor explain why these households will experience increased noise?	This is due to the flight procedure which was conservatively modelled for SSA which requires a slight idle step in order to start the 3.2 degree descent from 4,000ft. An idle step is a very short segment of level flight before the aircraft intercepts the final approach and begins its descent to land. This occurs on both 3.0° and 3.2° approaches. For noise modelling comparison purposes only, it was assumed that all aircraft will begin their descent when reaching a height of 4000ft. Owing to the increased descent angle on a slightly steeper approach when compared to a standard approach of 3.0° the point at which an aircraft begins its descent will be slightly closer into the runway as shown in the diagram below.  To maintain this very short portion of level flight, or idle step, the aircraft engines need to maintain a slightly higher thrust setting, and this leads to a slight increase in noise in comparison to an aircraft descending. The model assumes all arrivals perform this short level segment, whereas we know that most aircraft don't perform it at all. As mentioned in the question, the difference in noise levels on the ground is imperceptible and very small to the point it would normally be discounted and not reported as an actual change in noise in all other modelling circumstances. No households will 'experience' a perceptible increase in noise as a result of SSA. The WebTAG workbook presents this as an increase, and whilst a very small change, it has the effect of moving some dwellings into higher 1 dB noise classifications due to rounding to the nearest dB. Conversely, it also results in some dwellings being moved to lower bands.

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6	Similarly, some tables in Annex A of the Full Options Appraisal indicate that Option B1 impacts less people/dwellings than Option B2, in addition to some tables showing an increased number of people/dwellings experiencing noise for Option B2 when compared to 100% SSAs. Where there are increases in noise, the subsequent tables illustrating the area bound by each contour illustrates a decrease when compared to the baseline. Can the sponsor provide further explanation regarding these points?	Even though the contour areas are overall smaller for the B2 Option in respect of the B1 Option, the differences are generally very small. Our analysis indicates that this is due to the slightly different shapes of the contours and the distribution of the population within. For example, option B2 may cover an area where the population density is slightly higher, therefore, even though the overall number of people experiencing noise is lower for Option B2, for a certain contour band the table could show a very slightly increase of people exposed.
7	Can the sponsor explain why for Option B1 and Option B2, the figures within the data tables for 100% Easterly and Westerly operations are identical for 2019, when these differ for 2031? This is similar for some N65 tables for 80% West/20% East for 2031 (e.g. Full Options Appraisal Appendix A Page 40).	In reviewing our modelling for 2019, we identified that the 100% east and 100% west noise level grids generated from the model were to 2 decimal places rather than 3 decimal places. This meant that the differences between the B1 and B2 options were not apparent in the noise exposure statistics reported in the Appendix. Updated statistics for 2019 scenario have been provided.
8	CAP 1616 Para B61 requires a change sponsor to portray overflight (as detailed in CAP 1498) where a proposal is expected to change traffic patterns below 7,000 ft. Can the sponsor either provide this or explain why it has not been included within the submission? The CAA will weigh the outcomes from 'primary' metrics over 'secondary' metrics. Primary metrics are those that are used to determine significant noise impacts. Secondary metrics are those that are not being used to determine significant impacts but still able to convey noise effects. While not a noise metric, overflight contours are a secondary metric for the purposes of decision-making.	CAP1616a states that these contours are "particularly applicable where the degree of redistribution of noise impact may be large", and "Change sponsors may use different contours if it is considered that redistribution of noise impact is a potentially important issue" (para 1.35). We have not prepared overflight contours as there is no change to traffic patterns expected below 7,000ft as a result of SSA. The trials proved there was no change in overflight patterns as a result of SSA. In addition, Para 1.32 of CAP1616a also notes that differences are to be shown in bands beginning with +/- 1-2dB, but we do not see changes of this magnitude with SSA. This was explained in our Consultation Categorisation Response Document as this question was also asked by a community member.
9	As detailed in Section 2.3.39 of the Final Options Appraisal, can the sponsor explain what other relevant studies have been used to estimate the CO_2 emissions?	As described in the Final Options Appraisal (FOA), the study of CO_2 emissions has used a detailed fuel flow model (EUROCONTROL BADA model)[i] to simulate a fuel burn comparison between 3.2 and 3.0 glide slopes for an A320 aircraft. Fuel burn is linearly correlated to CO_2 emissions, therefore the analysis of CO_2 has focussed on fuel burn. The results of the BADA modelling for the A320 are consistent with the

		findings of a 2011 study by Koenig and Schubert[ii] which demonstrated fuel efficiencies using a 3.2 degree glide slope compared to a 3 degree glide slope. No other studies were found that examined final glide slope angles and fuel burn, but other studies into fuel efficiency of aircraft on approach have found that lower fuel burn can be achieved by delaying final decent[iii] (e.g. delaying commencement of the final decent and adopting a steeper initial glide slope before picking up a final glide slope intercept at lower altitude) or by using a delayed deceleration profile[iv,v.] Fuel flow benefits of a 3.2 degree glide slope vs a 3.0 degree glide slope will vary flight by flight depending on weather conditions and aircraft type and weight. Overall though, the available evidence supports the conclusion of the FOA that a 3.2 degree glide slope will result in fuel flow and CO_2 emissions reductions compared to a 3.0 degree glide slope. The differences in CO_2 emissions between these glide slopes is nonetheless very small in the context of the whole aircraft descent. References: i EUROCONTROL, (2011) Base of Aircraft Data Aircraft Performance Model version 3.9. ii Koenig R. and Schubert E., (2011) AIAC14 Fourteenth Australian International Aerospace Congress On the Influences of an Increased ILS Glide Slope on Noise Impact, Fuel Consumption and Landing Approach Operation. iii US Department for Energy, (1978) Examination of Commercial Aviation Operational Energy Conservation Strategies. iv Jean-Marie Dumont, (2012) Fuel Burn Reduction Potential from Delayed Deceleration Approaches. Massachusetts Institute of Technology v Boeing, (2007) Fuel Conservation Strategies: Decent and Approach
10	Can the sponsor explain how it has assumed the fleet mix for the 2031 forecast year and the proportion of aircraft forecast to operate the steeper approach?	The fleet mix of 2031 has been derived from a forecast designed schedule prepared by Heathrow. The proportion of aircraft forecast to use the steeper approaches is the same as the average proportion of aircraft currently using the steeper approaches at Heathrow.

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	Engagement & Consultation	
Ref	**Request**	**Response**
11	Two of the consultation responses suggested that this ACP should be withdrawn and implementation of SSA should be postponed and form part of the overall options for future Airspace Modernisation airspace change. How has the change sponsor captured and addressed/responded to this issue within their consultation response document (Step 4A)?	These two suggestions formed part of much longer consultee responses which were fully captured as part of our Consultation Categorisation Document at Stage 3D, where we explained that SSA does not prohibit Airspace Modernisation. We went on to respond point by point to each of the comments provided by the consultees. Our Stage 4A Consultation Response Document aimed to derive and aggregate the key themes and messages from the consultation. It was not considered proportionate to specifically highlight all the points raised by consultees within this document that were captured in Stage 3D. The key points that the consultees used in support of their suggestion to withdraw SSA were captured within section 3.1.19 and 4.1.9 in the Stage 4A document
12	How does the change sponsor consider closing the gap between 0.6% and 2% of aircraft flying SSA? Are these the limits, i.e. will anything above 2% be not operationally viable and anything below 0.6% not deliver the expected benefits?	The use of 0.6% and 2% are not limits but are two percentages used based on the trial data and the requirements of CAP1616. As outlined within Appendix A, Section 2.1.2 of the Final Options Appraisal, we explained that in 2019 0.6% of arrivals operated SSA however during the trials an average of 2% of aircraft operated SSA. We added that due to the higher ATC and pilot workload, even if more crews (above 2% of arrivals) elected to fly RNAV approaches, ATC might not be able to accommodate and could decline pilot requests. The FOA analysis is required by CAP1616 to be based on 2019 data and therefore a 0.6% 3.2° RNAV usage has been used. Further detail regarding ATC and Pilot workload is contained within the trial reports. In response to local community feedback Heathrow has committed to continuing to monitor the use of SSA, and consider ways, where possible, to incentivise the usage of SSA to maximise the benefits whilst maintaining a safe operation. However, we have made it clear that the current ATC and Pilot limitations on the number of aircraft able to perform SSA will remain.

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	Economics	
Ref	**Request**	**Response**
13	In para 1.1.23 the sponsor states that these Net community benefits (Noise) are already discounted but Table 1 includes a discount factor row, can the sponsor either: • remove the line in Table 1 that says discount factor and instead change the labelling for the Net community benefit into Discounted Net community Benefit (Noise). This will clarify why in the last row of this table the Present Value does not change; or • keep the discount factor line in and provide the non-discounted values to which that then will need to be multiplied by the discount factor and will result in the Present value as it is now in the table.	Heathrow will update the FOA to remove the line in Table 1 that says discount factor and instead change the labelling for the Net community benefit into Discounted Net community Benefit (Noise)