Title: Assessing aviation noise impacts during airspace changes **IA No: DfT00392** **RPC Reference No:** Not applicable **Lead department or agency:** Department for Transport **Other departments or agencies:** Civil Aviation Authority	**Impact Assessment (IA)** **Date:** 02/08/2017 **Stage:** Final (fast-track validation) **Source of intervention:** Domestic **Type of measure:** Other **Contact for enquiries:** Tom Fletcher (thomas.fletcher@dft.gsi.gov.uk)
Summary: Intervention and Options	**RPC Opinion:** Not Applicable

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANDCB in 2014 prices)	**One-In, Three-Out**	**Business Impact Target Status**
-£0.9m	-£0.9m	N/A	N/A	N/A

What is the problem under consideration? Why is government intervention necessary?

The Government's overall policy on aviation noise is to 'limit and where possible reduce the number of people significantly affected by aviation noise', reflecting the negative consequences of noise on communities. New evidence on health impacts and sensitivity to noise is now available, and has led to questions over the suitability of the 57 dB LAeq 16 hr metric (an average noise contour measured in decibels) as the level at which 'significant' community annoyance begins. The metric is used for assessing noise impacts as part of airspace change proposals.

If the full range of dis-benefits of airspace changes are not sufficiently considered, this could lead to sub-optimal outcomes from airspace change proposals. By doing nothing, there is a risk that the Government will fail to achieve its aim of minimising the number of people affected by significant levels of aircraft noise. There is also a risk that decisions based on this policy could be challenged on the grounds that the policy does not reflect current evidence.

What are the policy objectives and the intended effects?

The objectives of the policy are to;

1) Revise the interpretation of the Government's overall policy on aviation noise to focus on minimising the total impact of noise (health and quality of life) rather than the number of people in certain average noise contours
2) Encourage an approach to options appraisal which allows for a comparison of health impacts across available options

The intention is to achieve this through the following revisions to the Department for Transport (DfT)'s statutory guidance to the Civil Aviation Authority (CAA);

1) Setting 51dB LAeq 16hr for daytime and 45 dB LAeq 8 hr for night time as the lowest observable level for assessing the health impacts from noise as part of airspace change proposals, along with the provision of supplementary noise metrics to capture overflight
2) Requiring a risk-based approach to options appraisal (such as the DfT's WebTAG[1] noise guidance and accompanying noise workbook), to be adopted when assessing noise impacts as part of a change proposal

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Updating the existing guidance to the CAA was considered the most appropriate way of achieving the above aims.

Will the policy be reviewed? No formal review will take place but the Department will continually monitor the effectiveness of the policy through engagement with the CAA.

Does implementation go beyond minimum EU requirements?		N/A		
Are any of these organisations in scope?	**Micro** No	**Small** No	**Medium** No	**Large** Yes
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)		**Traded:** N/A	**Non-traded:** N/A	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister: ..... **Date :** Enter a date

[1] WebTAG provides information on the role of transport appraisal, and how the process supports the development of decision-making.

Summary: Analysis & Evidence

Policy Option 1

Description: Updating statutory guidance to the CAA for Altitude Based Priorities during airspace changes

FULL ECONOMIC ASSESSMENT

Price Base Year: 2017	PV Base Year: 2018	Time Period Years: 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -	**High:** -	**Best Estimate:** -0.9

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-	1	-	**-**
High	-		-	**-**
Best Estimate	0.01		0.1	**0.9**

Description and scale of key monetised costs by 'main affected groups'

CAA (primarily industry funded): Minor transition costs are expected (first year only) due to the requirement for the CAA to familiarise itself with updated DfT guidance, and draft updates to their own guidance. These have been estimate as a maximum of £6,200. After the first year, no additional costs to the CAA are expected, as the policy will be incorporated into their own existing Airspace Change Process (ACP).

Airspace change sponsors (e.g. airports and air navigation service providers): Sponsors bear the main burden of costs. Minor familiarisation costs are expected in the first year, expected to cost under £5,000 for all affected parties. The primary expected cost results from the additional noise modelling down to lower levels (51 dB LAeq 16hr for daytime noise and 45 dB LAeq 8hr at night), as well as the provision of supplementary noise metrics (which capture frequency instead of average noise), and the incorporation of outputs into a risk-based approach to assessing noise impacts (such as the Department's WebTAG assessment guidance and accompanying noise workbook). Given uncertainty around future airspace changes, conservative assumptions were used to produce an estimate of a maximum of £100,000 additional per year across the sector (see para 4.3 d) for more information).

Other key non-monetised costs by 'main affected groups'

None expected.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-	Insert	-	**-**
High	-		-	**-**
Best Estimate	NQ		NQ	**NQ**

Description and scale of key monetised benefits by 'main affected groups'

None monetised.

Other key non-monetised benefits by 'main affected groups'

Environment (and local communities) – noise: the policy is designed to bring the assessment and consideration of noise impacts into line with the latest available evidence. This would ensure decisions reflect the most up to date and reliable information, and help to make sure that community noise outcomes are optimised.

Local communities and sponsors – engagement: improving the provision of information through supplementary noise metrics will ensure communities are more informed about how proposals might affect them, helping them to engage more effectively with the consultation process.

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5

Some uncertainty exists around the number of affected airspace changes in the future. In order to account for this, the analysis uses conservative assumptions for staff time required, per unit costs for additional noise modelling, and the expected number of changes (double the five-year annual high). The estimate can be considered a maximum, reflecting the inherent uncertainty.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m: N/A
Costs: N/A	Benefits: N/A	Net: N/A	

Evidence Base

1 Background and current system

1.1 Airports and Air Navigation Service Providers (ANSPs, such as NATS) are able to propose and make changes to the design of UK airspace in order to achieve their chosen economic, efficiency or environmental objectives. These changes can vary widely both in type and scale, but where they overfly communities on the ground, they can have significant impacts on audible noise levels.

1.2 The Government's overall policy on aviation noise is to 'limit and where possible reduce the number of people significantly affected by aviation noise'. The current interpretation of this policy assumes the 57 dB LAeq 16hr average noise contour is the approximate onset of 'significant' community annoyance, and therefore is used as the measure of those 'significantly affected'.

1.3 This measure is based on research carried out during the 1980s, since which the focus of the Department for Transport (DfT) and the Civil Aviation Authority (CAA, the airspace regulator) has largely been on minimising the number of people within this contour – as a result the aim has generally been for aircraft to be concentrated over as few routes as possible

1.4 The CAA's regulatory powers over airspace are based on legally binding directions issued by the Department for Transport (DfT, issued in 2001 and last updated in 2004), who also publish guidance on how they should take into account their environmental objectives, last updated in 2014 and known as the Air Navigation Guidance (ANG)[2].

1.5 In line with the above, when applying the Department's ANG, for changes where they deem it proportionate, the CAA currently requires sponsors to produce noise modelling to allow them to assess the number of households expected to be in each noise contour, as part of their Airspace Change Process (ACP). Independently of the DfT, the CAA have now consulted on updating the ACP, including to require sponsors to perform an options appraisal, including an assessment of health and quality of life impacts for options deemed to be viable and in line with the approved design principles.

1.6 In 2010, the Department for Environment Food and Rural Affairs (Defra) published the Government's Noise Policy Statement for England (NPSE)[3]. This sets out three aims, which are to;

1) Avoid significant adverse impacts on health and quality of life
2) Mitigate and minimise adverse impacts on health and quality of life; and
3) Where possible, contribute to the improvement of health and quality of life

1.7 As part of this paper, the following levels were developed from World Health Organisation (WHO) phrases to describe the effects of noise;

1) NOEL – **N**o **O**bserved **E**ffect **L**evel – this is the level below which no effect can be detected.

2) LOAEL – **L**owest **O**bserved **A**dverse **E**ffect **L**evel – this is the level above which adverse effects on health and quality of life can be detected.

3) SOAEL – **S**ignificant **O**bserved **A**dverse **E**ffect **L**evel – this is the level above which significant adverse effects on health and quality of life occur.

[2] 2014 published ANG: https://www.gov.uk/government/publications/air-navigation-guidance

[3] NPSE: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf

1.8 In 2014, the Department commissioned a Survey of Noise Attitudes (SoNA) research paper, designed to investigate attitudes towards aviation noise and how these have changed over time. This was published in February 2017[4], and builds on the levels outlined in the NPSE.

1.9 The SoNA paper suggests that significant community annoyance previously observed around 57 dB LAeq is now observed from 54 dB LAeq. This finding is supported by another study by Defra which suggests a LOAEL for aviation likely lies in the range of 50-54 dB LAeq[5], well below the current 57 dB measure of the onset of significance.

2 Problem under consideration and policy objectives

2.1 New evidence on sensitivity to noise is now available, including that drawn from the recent SoNA and Defra reports. This has led the suitability of the existing 57 dB metric as an effective significance measure to be called into question. The key reasons for this are as follows;

1) **It does not recognise the effects aircraft noise can have on health** – there is increasing evidence linking noise to health impacts such as heart attacks, strokes and dementia, in line with the NPSE. The Defra study suggests a LOAEL between 50 and 54 dB LAeq.
2) **It only considers those within the average noise contour** – the Department recognises that there are people outside the 57 dB contour who are affected, as evidenced by SoNA 2014, which found community annoyance was present at 51 dB in some areas.
3) **It does not fully capture how people experience noise** – as an average noise metric, increased concentration (and therefore frequency) of aircraft noise resulting from new technologies such as Performance-Based Navigation (PBN) is not captured. The DfT recognises that frequency is important. This is because for airspace changes at greater altitudes (heights above ground), where average noise levels are lower, it is often changes in the number of noise events (e.g. an overflight is a single event), rather than the noise level itself, that are more noticeable on the ground.

2.2 If the full range of dis-benefits of airspace changes are not sufficiently considered, this could lead to sub-optimal outcomes from airspace change proposals. By doing nothing, there is a risk that the Government will fail to achieve its aim of minimising the number of people affected by significant levels of aircraft noise. There is also a risk that decisions based on this policy could be challenged on the grounds that the policy does not reflect current evidence. Therefore, an update to Government guidance on the definition of significance is necessary in order to ensure this new evidence is sufficiently used to inform options through an improved methodology.

2.3 The objective is to update the methodology adopted when assessing noise impacts of airspace change proposals, to better align it with the aims of the NPSE, and be reflective of the new evidence drawn from the SoNA and Defra reports. In order to achieve this, the revised guidance would need to;

1) **Revise the interpretation of the Government's overall policy on aviation noise to focus on minimising the total impact of noise rather than the number of people in certain average noise contours**
   - → This would include an incorporation of new evidence on the health impacts of noise, and the level at which this is first observable (LOAEL).
   - → It would also allow event-based noise metrics which capture frequency to be considered, particularly in areas where average noise levels are lower.
2) **Encourage an approach to options appraisal which allows for a comparison of health impacts across available options**

[4] SoNA 2014: http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=7744

[5] Defra research paper: http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18157

3 Policy proposal

3.1 Between February and May 2017, the Department consulted on a wide range of airspace policies, including the updating of its guidance to the CAA on the treatment of significant noise impacts[6].

3.2 In order to meet the criteria outlined above, including the introduction of new guidance that reflects the NPSE, SoNA and Defra papers, the Department is proposing updating its guidance to the CAA with an expectation that airspace change sponsors undertake the following during an airspace change proposal;

1) **Setting 51dB LAeq 16hr for daytime and 45 dB LAeq 8h for night time as the LOAELs for assessing the health impacts from noise as part of airspace change proposals, along with the provision of supplementary noise metrics to capture overflight**

   → This level for the LOAEL has been chosen in order to ensure consistency with the Defra research paper, SoNA 2014, existing DfT WebTAG methodologies, and published WHO guidance[7].

   → It is the lowest level at which it is currently possible to reliably attribute the effects to the level of aviation noise itself[8].

   → Supplementary event-based metrics for overflight frequency (such as N70 – number of noise events above 70 dB) are proposed to reflect the fact that there are people outside the 51 dB average noise contour who are affected by aviation noise.

2) **A risk-based approach to options appraisal (such as the DfT's WebTAG noise guidance and accompanying noise workbook[9]) should be adopted when assessing noise impacts as part of an airspace change proposal**

   → This would allow 'numbers of households' outputs from noise modelling exercises to be linked to the most current evidence on the health and quality of life impacts of noise.

   → In addition, it provides a common basis for comparison between health impacts resulting from noise and emissions across options, as all impacts would be estimated in monetary terms.

3.3 Whilst the Department is proposing frequency metrics as supplementary evidence, there is insufficient evidence to link chronic outcomes on health from daytime noise exposure with event-based noise metrics such as N70. SoNA 2014 considered the effectiveness of various metrics as predictors of annoyance and found no evidence to suggest any of these are more effective than LAeq or to warrant a move away from its continued use by Government.

3.4 Nevertheless, the DfT believes that different metrics are useful for enabling communities to understand the changes that are being proposed and allowing them to engage in how these changes are implemented. It is therefore important that when noise is explained to communities, including for consultation for airspace changes, that sponsors provide a wide range of metrics to explain its effects. This reflects the increasing importance of frequency in areas where average noise levels are lower.

3.5 Implementation would be expected to take place from Spring 2018.

3.6 The CAA have proposed a definition of 'overflight' which can be used to assess the number of aircraft individuals or communities can expect to hear. The Department would like changes in overflight to be

---

[6] 2017 Airspace Consultation documents: https://www.gov.uk/government/consultations/reforming-policy-on-the-design-and-use-of-uk-airspace

[7] WHO guidance: http://www.euro.who.int/__data/assets/pdf_file/0008/179117/Methodological-guidance-for-estimating-the-burden-of-disease-from-environmental-noise-ver-2.pdf

[8] Due to technical constraints it is not possible to reliably map the 51dB contour, though it is suitable for the purposes of comparative analysis between options for airspace route design.

[9] Available at: https://www.gov.uk/guidance/transport-analysis-guidance-webtag

one of the measures sponsors should consider when airspace changes are made, along with other factors.

3.7 Collectively, these proposals are designed to ensure that impacts on health and quality of life are assessed as fully as possible, in line with current evidence, and allow this evidence to inform options for health and quality of life. In addition, the increased provision of information will allow communities to engage more effectively with decision making, through an increased understanding of the potential impacts of airspace change options.

3.8 The Department previously considered whether simply updating the definition for the onset of significant annoyance would sufficiently achieve the policy objective. However, this would ignore the wider impacts on health and quality of life that noise can have at different levels and would fail to provide specific advice for communities who experience noise below this threshold.

3.9 It would also not require sponsors to do a full assessment on health and quality of life to look at the cost and benefits of different options. As a result, suboptimal outcomes could persist. The proposals on metrics made as part of the UK Airspace Policy Consultation were generally agreed with by those who responded to the consultation. The majority of responses felt this would allow the impacts of noise to be better considered within airspace change decisions, although some responses did feel there should be less reliance on average noise metrics. However, as explained previously, the availability of existing evidence means it is only possible to reliably quantify impacts on health and life using average noise metrics.

3.10 Although the ANG is non-statutory guidance issued by the DfT to the CAA, the policy itself would be implemented by the latter as part of their ACP, alongside their existing proposals to require an options appraisal from change sponsors. The policy is designed to be consistent with the CAA 'levels' of airspace change – their process would determine where noise modelling was considered proportionate, as under the current system.

3.11 In addition to the above proposals, the Department also consulted on the clarification of its existing guidance on single and multiple airspace route considerations, to ensure that airspace change sponsors properly consider multiple route options where feasible, as originally intended. Since this clarification of existing policy would result in the consideration of different proposals but not necessarily a change to the final option chosen, this has not been incorporated into this Impact Assessment. It remains for industry to decide on the final option taken forward for the CAA to approve.

4 Expected costs and benefits

Table 4.1.1. Expected costs to industry under central case (2 significant figures, real 2017 prices)

Cost owner	Description of cost	Cost estimate	
		Transition year	Year 2 onwards
CAA	Familiarisation with the updated DfT ANG	under £1,000	-
	Updating CAA guidance to airports	£5,200	-
Change sponsors	Familiarisation with ANG, CAA guidance	under £5,000	-
	Additional noise modelling and production of supplementary noise metrics	£100,000	£100,000
Total industry		**£110,000**	**£100,000**

4.1 The main groups affected by this change will be the CAA, airspace change sponsors (largely ANSPs and airports) and communities. In the absence of this change, airspace changes will continue to be made and will go through the current required process. This assessment therefore focuses only on the additional impacts brought about by this change.

4.2 The CAA are funded by industry and therefore their costs are counted as being a cost to business. Costs borne by the CAA are limited to transition costs in the first year, after which the impact of the policy would be incorporated into their existing ACP. Costs include;

a) Familiarisation with the updated DfT ANG (one-off transition cost)

→ Within the Department's draft Air Navigation Guidance, the section on developments in airspace usage is approximately two pages.

→ Given this, we would not expect costs of more than £1,000 for anyone of relevance in the CAA to familiarise themselves with it – a disproportionate amount of staff time would have to be expended to exceed this figure[10].

b) Updating CAA guidance to airports (one-off transition cost)

→ The CAA is responsible for implementation of the policy through an update to their own guidance to airspace change sponsors.

→ As noted previously, the CAA have already independently consulted on requiring sponsors to perform an options appraisal, including an assessment of health and quality of life impacts, and so the additionality from this policy is not expected to impose a significant burden on the CAA in terms of updating their own guidance.

→ As such, two weeks of an Airspace Change Regulator's time has conservatively been assumed – this includes an allowance for a policy discussion, drafting and seeking sign-off.

→ This produces an estimate of £5,200 ((£135,000 / 52) * 2)[11].

4.3 Costs to wider industry include;

c) Familiarisation with CAA guidance (one-off transition cost)

→ Businesses involved with the airspace change process will then be expected to familiarise themselves with the updated CAA guidance.

→ This cost will apply to anyone who is planning to make an airspace change. In the absence of specific evidence on the number of airports that will seek to make airspace changes going forward we have made the conservative assumption that two people at each of the 51 airports that regularly report to the CAA (plus NATS as the UK's main ANSP) would have to familiarise themselves.

→ We would not expect familiarisation with the guidance to take more than an hour of a manager's time. As such, a maximum of £5,000 has been assumed across the sector – a disproportionate amount of staff time would have to be expended to exceed this.

d) Additional noise modelling and production of supplementary noise metrics (annual cost)

→ This is the primary cost expected to result from the policy, and is the only cost expected to recur beyond the first year.

→ As noted previously, the CAA have independently consulted introducing a revised ACP, including a requirement for change sponsors to use an options appraisal approach to assessing change proposals.

→ The modelling of noise impacts is already required where appropriate. As such, the additionality of the Department's proposal is measured as the cost of;

i) Additional noise modelling down to the lower levels (51dB LAeq16hr for daytime as opposed to 54dB LAeq16hr currently, and 45dB LAeq8hr for night time as opposed to 48dB LAeq8hr currently)

ii) producing supplementary noise metrics (e.g. N70)

[10] This is an approximation, but given the insignificant scale of these costs versus the total estimated costs of the policy, more detailed estimation was considered disproportionate.

[11] Based on CAA CAP 1389, p.106 (adjusted to 2017 prices using HM Treasury UK GDP deflators), these include a standard uplift to account for overhead, and are available at: http://publicapps.caa.co.uk/docs/33/CAP%201389%20March%202016.pdf

iii) incorporating results from noise modelling into a risk-based approach to noise assessment (such as the Department's WebTAG noise workbook)

→ Department experience of historic airspace changes suggests the total cost of measuring and modelling aviation noise is around £20,000 to £50,000, dependent on the scale of the airspace change proposal.

→ The marginal cost of the additional noise modelling for relevant airspace changes is likely to be low, and the time taken to incorporate into a system such as the WebTAG noise workbook is unlikely to be more than an average of a day's work for an options appraisal analyst.

→ As such, it has been conservatively assumed that the proposals would cost an average of an additional £10,000 per change (around 1/3 of the mid-range total cost) – in most cases it is unlikely actual costs from the additional work would be this high.

→ Between 2010 and 2015, the greatest number of airspace change proposals affecting traffic below 7,000 feet was five, with an average of 1.5[12]. However, the Department recognises that future developments such as airspace modernisation and the introduction of Performance Based Navigation (PBN) technologies may lead airspace changes to be more frequent in the near future.

→ As such, a conservative estimate of 10 relevant changes per year has been assumed, in order to capture potentially increased incidence of airspace change. This produces a cost estimate of £100,000 per year (£10,000 * 10).

4.4 In order to calculate the present value of these costs across the ten year appraisal period, a standard 3.5% discount rate has been applied in line with Green Book guidance. This reflects the fact that costs borne in the present are valued more highly than costs born in the future. As such, the estimated present value of all costs to industry over ten years is £0.9 million.

4.5 As noted previously, the benefits of the policy change are primarily directed at local communities surrounding airports. These include the potential benefits to health and quality of life resulting from an options appraisal process that incorporates the most recent, reliable evidence on possible impacts.

4.6 It would be disproportionate to attempt to quantify these benefits, given uncertainty around the number, scale and location of future airspace changes (the effects are highly dependent on the distribution of populations around specific airports), though as an indication of scale, the Department's 'WebTAG' appraisal guidance (based on WHO recommended values) suggests the loss of a single disability adjusted day to noise for one person is worth approximately £164[13]. If, as expected, this policy were to have a meaningful impact on the assessment and consideration of noise, it is clear to see how the benefits could stack up quickly, particularly across populated areas surrounding airports.

4.7 In addition, the provision of supplementary noise metrics will allow those communities outside average noise contours to better understand the proposed changes and how they might impact them. The Department believes access to a wider range relevant information will allow these communities to become more informed, engaging more effectively with the process and improving the quality of conversations, including via consultation. There are therefore potential indirect benefits to industry, should the consultation process be improved by these changes.

4.8 Finally, the policy is designed to ensure Government continues to progress towards its aim of minimising the number of people affected by significant levels of aircraft noise, via improved assessment and consideration of noise impacts, and greater provision of information. Reflecting the findings of the most up to date literature will ensure that decisions made on the basis of Government policy are not subject to challenge for being based on out of date evidence.

---

[12] Based on CAA CAP 1389, p.96 (where 'Level 1' is defined as a change affecting traffic below 7,000 feet), available at: http://publicapps.caa.co.uk/docs/33/CAP%201389%20March%202016.pdf

[13] See page 11 (£60,000 for one year, divided by 365) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/638648/TAG_unit_a3_envir_imp_app_dec_15.pdf

5 Policy risks and sensitivities

5.1 There is some uncertainty around the number of airspace changes that might be affected by this change in the future, and therefore the potential costs to industry. This is because airspace changes are proposed by sponsors, and so it would be infeasible to accurately estimate their behaviour. Given the small scale of the expected impacts, any attempt would be disproportionate.

5.2 However, the Department believes that the relatively conservative assumptions used in this Impact Assessment, including for staff time required, per unit costs for additional noise modelling, and the expected number of changes (double the five-year annual high) means that the estimate provided is likely to be conservative. We would not expect actual costs to be this high, and so the estimate can be considered a maximum, reflecting the inherent uncertainty.

6 Wider impacts

6.1 **Equality** - communities affected by aircraft are expected to benefit from this policy equally. The Department believes there are no race, gender or disability equality impacts.