

Future of Aviation Noise Management – Case for Change

Mitigation and compensation

Summary

Excessive aviation noise, experienced over time has been shown to cause a range of negative health impacts (see the Health and Quality of Life Case for Change for further details) ([Haines, et al., 2001](#); [Cohen, et al., 1980](#); [WHO, 2009](#); [Fritschi, et al., 2011](#); [Lusk, et al., 2004](#)).

Communities living close to airports or under flightpaths may experience excessive and prolonged exposure to aircraft noise, therefore, there is a need to use measures that effectively mitigate the noise for affected communities. The provision of compensation to assist in re-location away from areas of excessive noise, can be offered, where mitigation is not effective.

Mitigation can take the form of noise insulation schemes and these are currently offered by some UK airports, where local communities are deemed, by the airport, to be eligible. Due to UK airports effectively setting their own insulation policy, there is a lack of standardisation regarding insulation product options and eligibility for noise insulation for communities across all UK airports. Where mitigation, such as noise insulation, is not effective in sufficiently reducing noise in households, financial compensation may be offered. Measures could include property buy-outs and re-location costs for moving, where householders want to re-locate to avoid excessive aircraft noise, or compensation for loss of value due to airspace change. Current government policy recommends assistance with re-location costs but this is not a statutory requirement.

Therefore, there is scope to improve current insulation policy to ensure the most appropriate insulation products are used and that a fair approach to eligibility is introduced. More policy options for compensation could be introduced to help householders re-locate where mitigation measures are not sufficient and alternative approaches to funding such measures are explored in this case for change document. Other approaches to mitigating aviation noise including directly from aircraft are covered in the Operating Restrictions Case for Change section.

Key issues

Noise insulation schemes (mitigation)

Concerns

Indoor aviation noise is often mitigated through the installation of acoustic insulation in houses. The schemes for indoor noise reduction are not uniform across UK airports since each airport sets their own insulation scheme policy. Some airports insulation schemes do not cover households within noise contours where excessive aviation noise may be experienced, resulting in health issues for affected householders.

Improvement opportunities

A standardised and scalable approach to noise insulation schemes throughout UK airports that meet appropriate acoustic standards can help to more effectively mitigate aviation noise.

Relocation costs for householders (compensation)

Concerns

Current government policy offers compensation for assistance regarding the re-location of householders within certain noise contours i.e. ≥ 69 dB L_{Aeq} , 16 hr. These contours do not

always include all households impacted by excessive aviation noise since they are an average, over time.

Improvement opportunities

An amendment to current policy that considers properties beyond those existing within the highest noise contours could be implemented to provide more householders with the opportunity of relocating. This option, for example, could be extended from ≥ 69 dB L_{Aeq} , 16 hr, down to 66 dB L_{Aeq} , 16 hr. More work needs to be conducted to examine the eligibility criteria and rationale for this form of compensation.

Purchase of property (compensation)

Concerns

Property owners living within high noise contours, closer to airports, may be more at risk of suffering health issues than others.

Improvement opportunities

An amendment to current policy could provide property owners with financial compensation as a result of property buy-outs, from airports, within a defined noise contour, or through individual testing of indoor noise, where appropriate.

Property values and airspace change (compensation)

Concerns

There is a risk of property values fluctuating as a result of airspace change, which causes an increase in overflights, and the related noise, above properties that would have previously experienced no, or very low aviation noise. This may result in previously unforeseen difficulties selling the property.

Improvement opportunities

There is an opportunity for new policy to ensure airports compensate property owners, as a result of airspace change, to ensure they get market value in the absence of increased aviation noise when they want to sell their home.

Funding of mitigation and compensation schemes

Concerns

If revised mitigation and compensation schemes result in greater eligibility for such schemes, there may be a greater uptake. Therefore, airports may need to look beyond their existing operational expenditure to provide sufficient funding.

Improvement opportunities

Developing new funding streams could ensure airports have a sufficient budget to provide mitigation and compensation schemes. Such schemes could adopt the polluter pays principle to gain additional revenue from airlines and/or customers such as a noise tax or an additional fee for passengers.

Supplementary information

Noise insulation schemes (mitigation)

Concerns

Communities living close to airports or under flightpaths may experience excessive aviation noise. The WHO state that aviation noise above 45 dB L_{den} is associated with adverse health effects, which is reduced to 40 dB L_{night} for night exposure ([WHO, 2018](#)). More specifically, the WHO have set guidelines for indoor noise levels where critical health effects (i.e. speech intelligibility and moderate annoyance) are experienced at 35 L_{Aeq} dB, 16 hr ([Berglund, et al., 1999](#)). Health issues associated with aviation noise may occur indoors and are amplified due to ingress of noise from roofs, walls, open doors, windows and ventilation. Noise insulation may reduce the ingress of aviation noise to a householder's property by a certain level but insulation will not eliminate aviation noise from the property.

Current approach and limitations

Many UK airports offer a noise insulation scheme to mitigate the negative effects of aviation noise. Eligibility is dependent on what noise contour (often expressed as dB L_{Aeq} , 16 hr) the property exists within. Current limitations of noise insulation schemes include potential eligibility issues. The majority of UK insulation schemes offer eligibility between the 63 dB L_{Aeq} , 16 hr and 69 dB L_{Aeq} , 16 hr noise contours. This is a limiting factor on the number of properties insulated because individuals can experience negative impacts of noise annoyance at lower dB. Noise insulation schemes offered by UK airports mostly offer insulation for habitable rooms (e.g. sitting rooms, bedrooms, kitchen diners but not kitchens) although some airports may include other rooms depending on their insulation policy ([Planning Portal, 2021](#)). Insulation schemes are rarely a whole-house solution that would insulate against noise ingress from all parts of the building ([BRE, 2020](#)). Ventilation is not included as a mandatory option in most airport insulation schemes but is essential to ensure windows can remain closed, particularly during the summer. There are very few product or testing standards (e.g. BS, EN, ISO), relating to acoustic insulation, used in current UK insulation schemes. Current airport sound insulation schemes do not appear to test properties before and after insulation has been installed to determine their effectiveness and only one UK airport (London City) sets an internal noise reduction target ([BRE, 2020](#)).

Opportunities for improvement and challenges

A broader approach to eligibility could be introduced, including lowering noise contours from 63 dB L_{Aeq} , 16 hr to an agreed level that better encompasses affected properties. Testing of properties to determine eligibility could also be conducted where it is difficult to determine eligibility from noise contours e.g. for unusual build types such as old farmhouses. A whole-house, or perimeter approach would provide noise insulation throughout the house thus improving noise reduction but would be costlier. BS, EN, ISO standards could be used to ensure appropriate acoustic products and test methodologies are being used. Other standards for quality management, including the use of competent persons schemes, could also be introduced to ensure that the installation of noise insulation is conducted to a high standard. Having an indoor noise reduction target to work towards would set a realistic standard and ensure all works meet an acceptable level of noise reduction. The implementation of effective but more costly insulation schemes (e.g. perimeter approach, see Sydney Kingsford Smith Airport example ([Burgess, 1997](#))) may be challenging to implement because there is no pressure on airports to do so from Government. Therefore, a change in legislation would be required to ensure airports provided the most effective insulation packages for householders.

Example 1: International Airports

Who What and How?

Sydney Kingsford Smith Airport (Perimeter approach): In 1995 Sydney Kingsford Smith Airport, Australia established a noise insulation programme due to construction of a third runway. To be eligible residential buildings needed to be located within the 30 ANEI (Australian Noise Exposure Index) and above noise contours. The total programme cost approximately A\$400m and was funded through an aviation noise levy. The maximum funding per household was A\$45,000 increasing to A\$50,000 over the duration of the programme. A perimeter (or whole-house) insulation approach was adopted. The project team were responsible for inspecting each property and selecting appropriate measures from a menu of approved treatments including:

- external doors by replacement and/or seals;
- external walls by blocking vents and openings;
- windows by replacement and/or secondary glazing;
- roof/ceiling by soft fibre insulation and loaded vinyl;
- air conditioning or mechanical ventilation

The program resulted in 94% of brick houses achieving a noise reduction greater than 34 dB (A). Homeowner surveys reported that 64% of respondents were entirely happy with the improvement and 24% were positive but with some complaints ([Burgess, et al., 2000](#)).

Frankfurt Airport: Residents surrounding Frankfurt Airport are entitled to the statutory reimbursement for the cost of noise insulation through Sections 9 and 10 of the Law on Protection against Aircraft Noise. For residents who occupied the building before 13th October 2011, buildings located within the following zones are eligible for improvements ([Umwelt und Nachbarschaftshaus, 2021a](#)):

- L_{eq} day 60 dB(A) - Day protection Zone 1
- L_{eq} day 55 dB(A) - Day protection Zone 2
- L_{eq} night 50 dB(A) - and $L_{max} = 6 \times 53$ dB(A) Night Protection Zone

The reimbursement scheme is part funded through the Regional Fund i.e. issuing of grants by the State of Hesse (€100 million) and by Frankfurt Airport (Fraport AG) (€15-20 million) with low-interest loans also available to complement the grant aid, if required ([Umwelt und Nachbarschaftshaus, 2021b](#)). Passive noise protection such as glazing or ventilation fans are considered for this grant scheme. These are applicable to living spaces.

How could the best practice be applied to UK aviation?

Best practice for noise insulation schemes could include the introduction of a best practice toolkit that would allow airports to identify a range of appropriate products and approaches to eligibility and testing to be used in a noise insulation package. The toolkit would include the many different factors and requirements for acoustic insulation and would provide performance outputs such as internal noise reduction targets. Guidance on the use of appropriate noise metrics can be published considering ICCAN's continued work on noise metrics guidance. Best practice for quality management could be applied by ensuring airport operators and schemes/professional bodies (including competent person schemes) develop a code of practice

or even a certification scheme relating to installation of acoustic insulation products (ICCAN could facilitate such collaborations).

Relocation costs for householders (compensation)

Concerns

Current government policy offers compensation for assistance regarding the relocation of householders within certain noise contours (i.e. the highest noise levels closest to airports i.e. ≥ 69 dB L_{Aeq} , 16 hr). There is a concern that properties in lower noise contours are not given the option to relocate.

Current approach and limitations

The current approach is limited to properties existing in the highest noise contours therefore barriers exist to householders in lower noise contours who wish to relocate.

Opportunities for improvement and challenges

A revised method that provides compensation to householders in lower noise contours could be created where it can be demonstrated that acoustic insulation will not effectively mitigate against aviation noise. Eligibility could be determined by in-situ testing (within defined noise contours) of properties external and internal noise to determine whether a given insulation package would be effective in reducing internal noise levels to below the WHO's recommended indoor levels. If the proposed insulation package were not deemed effective, then a compensation package for relocation could be agreed. This approach would provide robust justification for the provision of relocation compensation although it could be a costly exercise as different build types would need to be tested throughout different noise contours. Need to determine how much compensation is appropriate and who would evaluate this.

How could the best practice be applied to UK aviation?

An amendment to government policy with guidelines on how to determine appropriate grant funding.

Purchase of property (compensation)

Concerns

Property owners living within high noise contours, closer to airports, may be more at risk of suffering health issues than others. It could be beneficial for property owners' health to relocate, however, it may be difficult to get enough funds to purchase a new house from the sale of their current house, due to the relatively low property prices experienced closer to airports as a result of aircraft noise ([Zheng, et al., 2020](#); [Trojanek, et al., 2017](#); [Mense & Kholodilin, 2014](#)).

Therefore, airports need to ensure they can provide appropriate compensation (i.e. the market price for the cost of the property in the absence of aviation noise) for these exceptional circumstances.

Current approach and limitations

Purchasing properties may be challenging to implement due to the cost of purchasing multiple properties. However, it would be dependent on what noise contour eligibility was set. If the eligible contours were relatively high e.g. 69 dB L_{Aeq} , or above, fewer houses would be eligible, indeed several airports do not have any residential properties in the 69 dB L_{Aeq} contour (e.g. Stansted, Birmingham, Southampton, Newcastle) ([Ordnance Survey, 2021](#)). It is expected that, across most UK airports, there would be a relatively low number of properties qualifying for this compensation but these homes would exist in exceptionally high noise contours therefore the property buy-outs would be justified with low overall cost to the airports.

Opportunities for improvement and challenges

The contour for eligibility would need to be agreed and a rationale for the decision would need to be justified. The valuation approach need to be agreed which would adopt a Hedonic Pricing methodology ([ONS, 2018](#)). Airports would need to fund this form of compensation and it will be challenging in the current Covid-19 landscape for this measure to be implemented (please see the Funding of mitigation and compensation schemes section). A carefully timed approach to introducing this measure would need to be adopted.

It is possible that areas where properties that have been purchased can be re-developed into business parks, therefore, there is an opportunity to recover the initial cost of buying properties. This would be dependent on local land use and planning requirements. If enough houses in the same location are purchased by the airport, it is unlikely that they will be re-sold, given the noise levels experienced.

Example 2: US Approach

Who What and How?

In the US, airports may purchase properties in areas that are severely impacted by noise near to an airport. Funding is available through the Federal Air Improvement Programme to assist airports acquisition of property and help with relocation of householders (usually properties existing close to the ends of runways and under approach and climb out paths). Fair market value for the property is offered as compensation. US airports have the right to acquire private properties for public use (i.e. the power of eminent domain) however, the appropriate compensation must be issued ([FAA, 2021](#)).

How could the best practice be applied to UK aviation?

An amendment to current legislation (probably section 79 of the Civil Aviation Act 1982 ([UK Government, 2020](#))) would be required to ensure such a compensation scheme was introduced throughout UK airports.

Property values and airspace change (compensation)

Concerns

A property may have been purchased in a relatively quiet location and, due to airspace change, now experiences a significant increase in aircraft noise. This could have a negative impact on the property value and the householder may have no option but to sell their property at a lower than expected price due to the airspace change.

Current approach and limitations

No current approach. Compensating property owners to ensure they get a fair value for their home, should they choose to sell it, could prove to be complex to implement. More research needs to be conducted to determine whether this is an issue.

Opportunities for improvement and challenges

This approach could be a costly option to implement and may require new regulations and enforcement. On the other hand, many individuals living close to airports work in the aviation industry and may not consider moving therefore there could be a relatively low uptake for such a scheme. Perhaps a feasibility study would be required.

An independent assessor would provide the property owner and the airport with an estimate of the value of the property. The value would consider the absence of increased aviation noise (i.e. the unaffected market value), and pay the difference between the realised value (actual sale) price and the unaffected market value. Any valuation would need to be conducted by an independent, certified surveyor. A process for contesting the award would also need to be developed and administered by an independent arbiter.

Example 3: The negative impact of noise on house prices

Who What and How?

While research has been conducted on the impact of road and rail developments that demonstrate noise has a negative effect on house prices ([Levkovich, et al., 2015](#); [Diao, et al., 2016](#)), there are no known examples of organisations that issue compensation for a drop in the value of house prices, due to aviation noise, when it is sold.

How could the best practice be applied to UK aviation?

Best practice could take the form of guidelines which would detail an approach to providing compensation for loss of property value, if any. This would include details of independent and certified professional bodies that could accurately evaluate any potential loss of property value.

Funding of mitigation and compensation schemes

Concerns

If eligibility for mitigation (i.e. insulation) and compensation schemes increase, this will create a greater financial burden on airports as they attempt to fund these schemes. Therefore, the concern is that using traditional funding streams such as an airports OPEX may not be sufficient to cover the cost of these schemes, potentially resulting in a proportion of eligible households not receiving the mitigation or compensation to which they should be entitled.

Current approach and limitations

Heathrow Airport uses landing charges under the 'Fly Quiet and Green Programme' to encourage airlines to use the quietest Chapter 14 aircraft. Therefore, noisier aircraft are charged more for landing ([ANIMA, 2019](#)). It is not clear, whether these funds are ringfenced for mitigation or compensation schemes. This scheme is focused on encouraging the use of quieter aircraft therefore, once the majority of aircraft are transitioned over to Chapter 14, funds may not be sufficient to support mitigation and compensation schemes.

Opportunities for improvement and challenges

UK airports could introduce additional funding measures such as a noise tax or passenger fees to ensure there is a sufficient budget for mitigation and compensation schemes. These funding opportunities could be potentially difficult to implement in the current Covid-19 climate where airports and airlines want to encourage more people to fly. Passenger behaviour in the post-pandemic period is uncertain, balancing higher flight prices in a depressed economy against possible pent-up demand in those vaccinated against Covid-19.

Example 4: International approaches to funding

France (noise tax): A noise tax was introduced in France in 2003 (coming into effect in 2005), where all aerodromes with over 20,000 aircraft movements annually are taxed. The tax is scalable and is dependent on the size of the affected population. This approach raised €58m in 2010 and a proportion of these funds were used for noise insulation schemes ([CAA, 2014](#)).

US (Passenger Facility Charge (PFC)): This programme is administered by the FAA and fees are collected from every boarded passenger at commercial airports controlled by public agencies. Airports use these fees to fund FAA-approved projects that enhance safety, security, or capacity; reduce noise; or increase air carrier competition. As of March 2014, PFC revenue was \$2.8 billion, and noise insulation projects received 3.5 per cent of this ([CAA, 2014](#)).

How could the best practice be applied to UK aviation?

A noise tax could be introduced throughout UK airports and would be scalable, considering aircraft type (i.e. earlier chapters or most recent) and the population affected by aviation noise. An additional charge could be added to airline tickets to contribute towards the funding of mitigation and compensation schemes.

Appendices

Appendix I: Legislation

Section 79 of the Civil Aviation Act (1982), Secretary of State can use powers to implement a noise insulation scheme where an airport has not already implemented such a scheme ([UK Government, 2020](#)). These powers have not been used thus far, the Governments view in Aviation 2050, was that many airports have already implemented “reasonable compliance with noise controls” ([UK Government, 2018](#)).

Appendix II: Policy

The Aviation Policy Framework (APF) (2013) sets out Government policy on airport noise insulation schemes. The APF (2013) sets out guidelines for noise insulation schemes including the noise contour for which householders are eligible for noise insulation i.e. 63 dB $L_{Aeq, 16\text{ hr}}$ ([UK Government, 2013](#)). Since this is not legislation, airports are effectively free to set their own policy when it comes to noise insulation schemes. As such, there is a variation of eligible noise contours throughout some UK airports, although the majority use 63 dB $L_{Aeq, 16\text{ hr}}$ contour. For a compilation of current eligible noise contours throughout UK airports, please see Annex A of BRE’s insulation review ([BRE, 2020](#)). The APF also states that airports should offer acoustic insulation to noise-sensitive buildings e.g. schools, hospitals, exposed to noise of 63 dB $L_{Aeq, 16\text{ hr}}$ or more. Alternative solutions for noise sensitive buildings (such as schools, hospitals, care homes, community halls) should be sought where insulation is not appropriate but the APF does not state what these alternative solutions should be ([UK Government, 2013](#)).

Appendix III: Other

Aviation 2050 – The future of UK aviation, is a consultation document that proposes amendments to current policy by extending the noise contour for which householders are eligible for noise insulation from 63 to 60 dB $L_{Aeq, 16\text{ hr}}$. Also, where airspace change leads to significantly increased overflights a proposed new minimum threshold of an increase of 3 dB L_{Aeq} which leaves a household in the 54 dB $L_{Aeq, 16\text{ hr}}$ contour would be the new eligibility contour ([UK Government, 2018](#)). It is not clear whether noise sensitive buildings are included in these recommendations, this needs to be made clear.

ICAO’s Guidance on the Balanced Approach to Aircraft Noise Management discusses transaction assistance i.e. a form of compensation whereby an airport can assist with the costs of selling a property in a zone that experiences adverse aviation noise. The compensation could also include buying properties outright ([ICAO, 2008](#)).

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