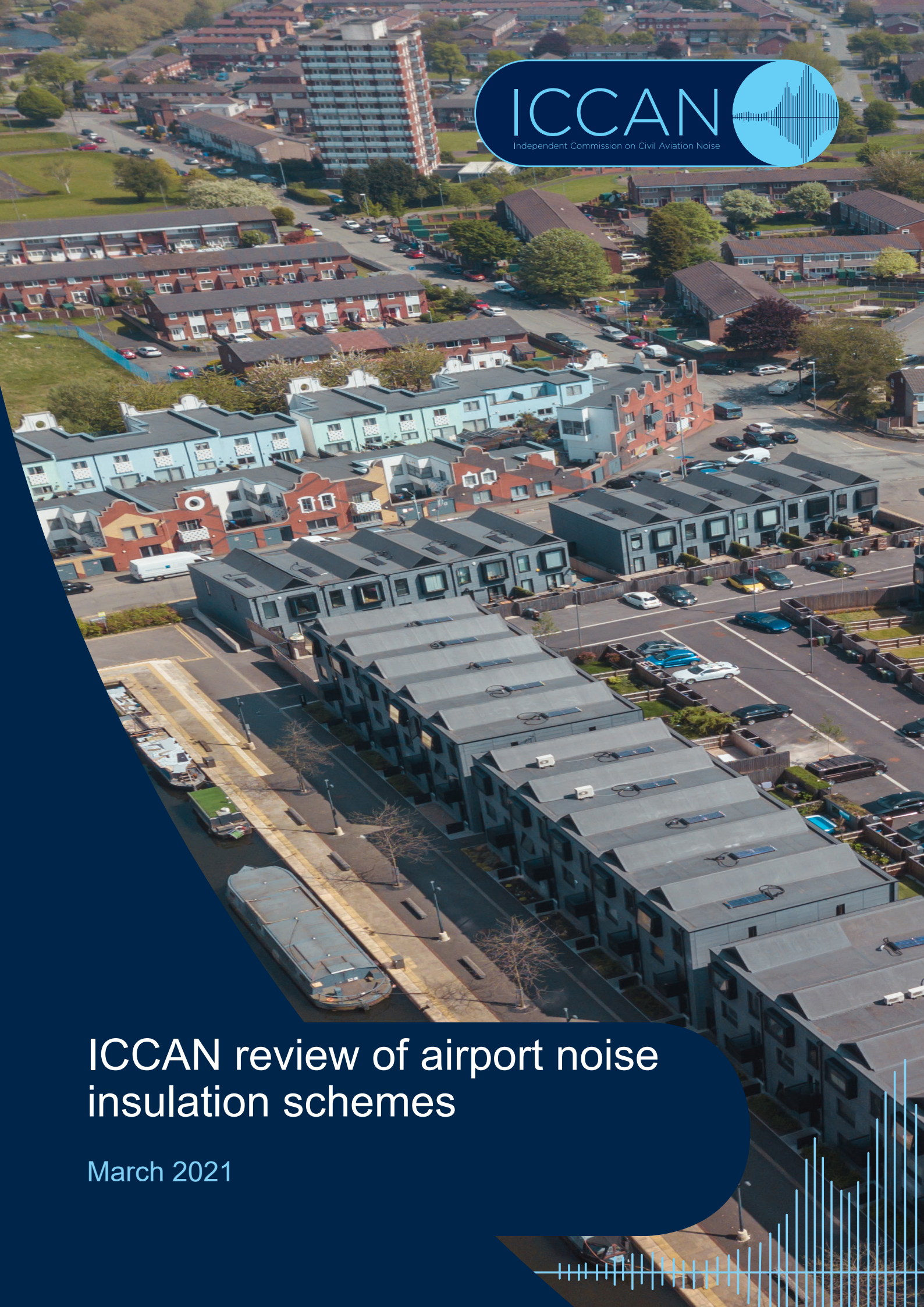

ICCAN review of airport noise insulation schemes

March 2021

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About ICCAN

The Independent Commission on Civil Aviation Noise (ICCAN) was established in 2019 and operates as an independent and impartial body on matters related to civil aviation noise and how it impacts communities. The first aim of our two-year programme has been to improve public trust and confidence in the management of aviation noise by developing expert knowledge and understanding of the challenges associated with aviation noise. Our expert knowledge base has resulted in a range of research and publications which we continue to build on, all of which are available on ICCAN's website.

Foreword

It is widely accepted that high-quality noise insulation is an effective way to mitigate the impacts of aviation noise inside people's homes. Future growth at many UK airports has rightly been conditional on airports providing funding to insulation schemes for the homes of people most impacted. I am sure that airports genuinely believe they are providing insulation of high enough quality to meet these conditions.

The question is how to ensure that the quality and effectiveness of the insulation used in airports' schemes is sufficient.

When ICCAN was established in January 2019, the Aviation Minister asked us to look into this very issue and recommend some ways forward. We wanted to examine what airports offer, and have promised through their schemes, and how the insulation providers have responded. So, we commissioned the Building Research Establishment (BRE) to conduct a technical review. This document summarises their key findings and sets out our initial recommendations.

We recognise that the Covid-19 pandemic has brought significant challenges for the aviation industry and we have revised our timescales on this work to take account of this. Though I also know that prior to the pandemic there was no shortage of willingness from airports to work with ICCAN on this issue, and we anticipate that many would welcome further guidance on what constitutes 'good' quality and 'fair' distribution.

We hope this report is a first step towards creating best practice to ensure consistency, clarity and fairness in the way insulation is used to mitigate aviation noise impacts in the future. In our recommendations we commit to working in partnership with manufactures, installers, and airports to support new standards in the future.

Rob Light

ICCAN Head Commissioner

Rationale

Noise insulation schemes created by UK airports are not subject to central legislation, so airports are free to create their own insulation policy, resulting in a variation of noise insulation schemes. In the consultation paper Aviation 2050 – The Future of UK Aviation (UK Government, 2018), the Government proposed that new guidance be issued to airports on best practice for noise insulation schemes, to improve consistency. ICCAN's first Corporate Strategy, therefore, had a commitment to review the performance and consistency of airports approaches to noise insulation schemes and provide guidance on best practice (ICCAN, 2019).

ICCAN recognises that since its formation in 2019 and the start of its work on insulation schemes, the aviation landscape has been dramatically altered by the Covid-19 pandemic with far fewer aircraft in the sky. While this is an uncertain time for airports and aviation, with their focus understandably on survival and economic sustainability, once aviation recovery is underway noise will return, and insulation schemes will come under the spotlight again.

Given the current situation regarding Covid-19, and the associated challenges the commercial aviation industry face, this document contains a summary of the key findings from our technical review. It sets out our initial recommendations, which future, more detailed guidance should address if consistent airport insulation schemes are to be provided. We will continue to work on more detailed recommendations and standards, consulting with industry and experts in the field.

ICCAN's approach

The overall aim of this study is to develop a detailed review of the components required to implement noise insulation schemes that deliver optimal standards for noise reduction in affected household properties. To gain a better understanding of how noise insulation schemes could deliver optimal standards, ICCAN commissioned the Building Research Establishment (BRE) to conduct a technical review. The comprehensive review considers the following key issues affecting insulation schemes designed to mitigate aircraft noise in existing residential properties:

1. Insulation products and systems
2. Testing of properties
3. Installation of insulation
4. Building Regulations
5. Quality management

Insulation products and systems: this was achieved by conducting a detailed review of products and systems which can be retrofitted to properties and mitigate the noise ingress from aircraft noise. The review examines key acoustic attributes of products and systems and highlights typical performance values. To give an idea of what is achievable in terms of the performance of acoustic insulation and the resultant internal noise levels, BRE examined different ranges of sound insulation in a what-if model.

Testing of properties: this involved a robust review of testing methods used to determine the level of noise intrusion entering properties from aircraft noise before and after the installation of acoustic insulation. This approach identified the most effective methods, including advantages and disadvantages, from a practical perspective.

Installation of insulation: this reviewed different existing approaches to the installation of acoustic insulation used in the UK and overseas, highlighting the benefits and disadvantages of these approaches from the perspective of the occupants and the airports that implement the measures.

Building Regulations: this examined current Building Regulations 2010, relating to the retrofitting of products and systems that improve sound insulation properties of a household. This review also examined any unintended consequences for the building or occupants that would not be addressed through existing compliance of the Building Regulations.

Quality management: this reviewed different approaches to measuring the quality of work conducted by installers of acoustic insulation products and systems. This included examining different approaches by quality assurance schemes and their applicability to airport noise insulation schemes.

Key findings and initial recommendations

1: Insulation products and systems

1. The review found that for each of the acoustic insulation product types examined, there is already a published framework for testing, reporting and declaring acoustic performance, except for secondary glazing. However, having reviewed industry documents and centrally issued guidance, it found that very few relevant industry standards exist in relation to the mitigation of aircraft noise and the required insulation products.

2. A lack of consistency and/or detail in terms of insulation product standardisation between different airports was identified. This makes it difficult to determine whether all UK airports currently offer products of an appropriate standard.

3. There is the potential that noise insulation schemes may include products that have not been tested for acoustic performance.

4. A model of what-if scenarios, created by BRE, demonstrated that a number of acoustic insulation treatments with a range of different insulation products should be capable of resulting in internal noise levels during the daytime that achieve current (WHO) guidelines (Berglund, Lindvall, & Schwela, 1999).

ICCAN's initial recommendations

1. ICCAN is committed to improving standards related to mitigating the effects of aircraft noise and recommends that a set of guidance should be created directly related to mitigating aircraft noise including the required product standards. This would include examining current British Standards (BS) to determine how effective they are at covering aviation noise.

2. In order to create a more consistent approach to the selection of acoustic insulation products, ICCAN aims to develop a best practice toolkit that can help airports to identify an appropriate range of insulation products.

3. Given the risk of untested insulation products not providing appropriate levels of indoor noise reduction, ICCAN will only recommend the use of products that meet standards for acoustic insulation.

4. To help with the selection process for choosing insulation packages, the toolkit mentioned in recommendation 2 will consider the many different factors and requirements based on noise reduction requirements. This will include performance-based outputs for chosen acoustic insulation products.

2: Testing of properties

1. Establishing the effectiveness of installed acoustic insulation products requires testing the indoor sound levels. The review found that, between industry guidance and standards published by the British Standards Institution (BSI), there are clear protocols for testing properties for levels of noise pollution, determining current acoustic performance of the building envelope, and assessing the effectiveness of mitigation deployed.

2. The Association of Noise Consultants (ANC) guidelines provides detailed and useful information necessary for measuring sound levels within properties due to internal and external sources. This, however, is only based on internal measurements of pre and post works. The review suggests that the ANC's methodology could be improved by including the measurement of external noise over the pre and post work time period, to ensure the variation in the external noise is accounted for.

3. The most accurate approach for in-situ testing of sound insulation characteristics would require using BS EN ISO 16283-3 methods. This approach helps to better understand all noise transmission paths allowing for an optimal insulation package to be delivered. Testing of a property by an experienced acoustician has been estimated to take around half a day but it may not be practical to test all properties surrounding an airport.

4. If it is desirable to understand the noise levels within a home over a long duration e.g. over the course of a year or more, the more reliable method may be to determine the sound insulation performance of the building envelope in conjunction with long term, predicted external noise levels using noise contours. Contours can provide a picture of the long-term external noise environment and so deal with the variability of external aircraft noise. However, these noise contours need to be accurate.

5. Only one airport was found to set indoor noise reduction targets. London City Airport set a target for their noise insulation works at the 57 dB noise contour and state the work must achieve "*an average sound reduction not less than 25 dB averaged over 100 to 3150 Hz in accordance with BS EN ISO 16283-3:2016*" (BRE, 2020).

ICCAN's initial recommendations

1. ICCAN recommends that external noise monitoring is conducted in parallel to internal noise measurements and we will work with ANC to offer advice on updating their current guidelines.

2. It is important to develop an effective sampling strategy to test sound insulation in-situ. This could include testing a sample of properties of the same build type and surveying individual properties with more unique attributes, such as old stand-alone cottages.

3. The use of accurate and appropriate noise contours should be used for understanding noise levels and insulation performance over long time periods. ICCAN will be using our own forthcoming noise metrics best practice guidance to determine the best approach to the use of noise contours for estimating long-term external noise.

4. Setting a performance based indoor noise reduction target is a good approach to setting realistic expectations with property owners. ICCAN welcomes this approach; however, more work needs to be done to determine the criteria used in setting such targets throughout UK airports.

3: Installation of insulation

1. Having studied a number of UK airports' approaches to the installation of acoustic insulation (BRE Report, Appendix A), BRE found that while airports often conducted home surveys prior to the installation of properties, there was no mention of prior testing. A detailed understanding of the pathways of noise ingress into a building is required to help provide the best approaches to installation of insulation.

2. There are two key approaches to the provision of sound insulation packages i.e. pre-determined solutions and tailored solutions. The pre-determined approach uses noise contours to determine the insulation products supplied. This is similar to insulation schemes mentioned in the Noise Insulation Regulations (NIR 1975), used for sound insulation addressing road and rail noise. A tailored approach, based on testing of properties, allows for a more specific range of insulation products to be used for individual properties, which could be more costly due to greater expert input and more insulation products used.

3. Airports sometimes give property owners the option to select their own insulation products and/or appoint a contractor to conduct the installation work. BRE determined that the homeowner may not necessarily be the correct, or indeed competent, person to make decisions regarding product and contractor selection due to their lack of expertise.

4. There are generally two approaches to the installation of insulation: individual rooms or the perimeter approach. UK insulation schemes generally target the insulation of habitable rooms rather than the entire property as in the perimeter approach e.g. Sydney Kingsford Smith Airport (Burgess, Cotton, & Butler, 2000). BRE adopts the view that the room approach is fit for purpose since the concept features in the NIR 1975 specification.

ICCAN's initial recommendations

1. ICCAN recommends property inspections and testing, in line with a detailed sampling strategy as mentioned in ICCAN principle 2 of Testing of Properties above.

2. A balance of both pre-determined solutions and tailored solutions should be used, depending on the attributes of the building. The noise contour approach will generally be acceptable for a range of properties with identical build qualities. The tailored approach should be used for unusual build types.

3. ICCAN recommends that airports should appoint approved contractors to install insulation products, but householders should be given the option to make non-technical decisions such as colour or style of window frames.

4. ICCAN recognises that in the majority of cases the 'room' approach to insulation will be appropriate. The 'perimeter' approach can be used at the discretion of the airport, depending on the build type and noise levels experienced.

4: Building Regulations

1. There are Building Regulations requirements that will come into force when acoustic insulation products/packages are installed, as relevant to the product or works undertaken. It is specifically the responsibility of the person undertaking the works to demonstrate compliance with the Building Regulations, rather than the homeowner.

2. BRE identified examples of unintended consequences of installing insulation for the building and/or occupants that were not addressed through the compliance of the Building Regulations. Overheating may occur where closed windows and loft insulation may reduce heat loss. It was found that there are no specific requirements relating to overheating in the Building Regulations (Association of Noise Consultants, 2020). Whilst NIR 1975 provides details of ventilation options, these were primarily aimed at maintaining indoor air quality (Committee on the Problem of Noise, 1963).

3. Without correct detailing, condensation can build up either between the primary and secondary units or on the inside (room side) face of the secondary glazing unit (Pickles, 2016). Either situation could lead to damage to the building or represent a health risk to the building occupant if left unchecked.

ICCAN's initial recommendations

1. ICCAN recommends a best practice approach is developed to address overheating. It will also explore the possibility of including an amendment to the Building Regulations, ensuring aviation noise is factored into any acoustic insulation works, including its impact on overheating.

2. The issue of condensation and how to mitigate it should be considered during the early stages of product selection for noise insulation schemes. Details of potential condensation issues and which specialists to contact for advice will feature in the toolkit as mentioned in ICCAN principle 2 under Insulation products and systems.

5: Quality management

1. The review was unable to establish whether there is a consistent approach to quality management for airport acoustic insulation schemes in the UK. This is not to say that individual schemes do not have their own quality management systems or requirements, but this information was not available for a detailed review.

2. There are centrally endorsed competent persons schemes covering installation of many products that may be used to provide acoustic insulation to properties. The schemes are directly concerned with satisfying Building Regulation requirements. However, noise ingress into a building from aircraft noise is not currently addressed by the Building Regulations so the relevant competent persons schemes do not specifically address sound insulation.

3. The review concluded that the use of a contractor or supplier who is a member of a competent person scheme or professional body does ensure benefits relating to quality including sound insulation.

4. BRE's findings determined that there could be an opportunity for collaboration between airport operators, schemes and professional bodies to develop a guide, code of practice or a certification scheme relating to the installation of sound insulation products.

ICCAN's initial recommendations

1. ICCAN recommends that only certified contractors should be used for the installation of noise insulation products.

2. ICCAN would look forward to adopting the role of a facilitator for the collaboration of relevant stakeholders to ensure the development of robust quality management standards relating to installation of acoustic insulation products.

ICCAN's next steps

Our review confirms the lack of any standardised approach to noise insulation schemes across UK airports and an apparent lack of pre and post insulation testing of properties that would determine the effectiveness of noise insulation products. Some aspects of product installation may require scrutiny by amendments to the Building Regulations and quality management should be more focused on the installation of acoustic insulation products.

The Government has already suggested some changes to insulation policy in the Aviation 2050 consultation paper. At the time of writing, it is unclear how the Government intends to progress the proposals in the Aviation 2050 consultation document in light of the Covid-19 pandemic. However, we look forward to working with them on the future strategy once the recovery has started.

We will continue to work on more detailed recommendations and standards, in parallel with our work on metrics best practice, on which some of our future insulation standards will rely.

ICCAN plans to work in collaboration with industry experts to ensure the most accurate technical advice regarding standards is incorporated into the development of our recommendations.

Similarly, we intend to work with other industry experts and airports to help develop new, standardised approaches to the installation of noise insulation products. Our standards will be proportionate, practicable and reflective of the current challenges facing the aviation industry.

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