



**An tÚdarás Inniúil um
Thorann Aerárthaí**

**Aircraft Noise
Competent Authority**

Draft Regulatory Decision

Appendix I

draft Cost Effectiveness Guidance Note



**An tÚdarás Inniúil um
Thorann Aerárthaí**

**Aircraft Noise
Competent Authority**

Cost Effectiveness Assessment Advice under
The Airport Noise (Dublin Airport) Regulation Act 2019

Draft Version 1

May 2020

Introduction

This advice has been prepared by the Airport Noise Competent Authority (ANCA) in support of the ‘Process of Aircraft Noise Regulation’ as defined in Part 2, Section 9 of the Aircraft Noise (Dublin Airport) Regulation Act 2019 (‘the Act’, S.I. No. 12 of 2019).

It provides detail on the information and evidence that ANCA will require to ensure the cost-effectiveness of noise mitigation measures and operating restriction has been evaluated thoroughly. It also provides advice on aspects of the methodology for undertaking a cost-effectiveness assessment, where ANCA considers such approaches are necessary to ensure the completeness of the evaluation.

At this stage of the process, ANCA is avoiding taking an overly prescriptive approach to the cost-effective methodology. Instead, this note discusses the key methodological decisions that require consideration by applicants when undertaking a cost-effectiveness assessment. ANCA will be reliant on a transparent presentation of methodological decisions, calculations, and results, in order to fulfil its scrutiny role as Competent Authority effectively. ANCA will also be developing a cost-effectiveness reporting template to help applicants with transparent presentation of the cost-effectiveness analysis.

ANCA also strongly advises applicants to follow, where appropriate, guidance provided within the Public Spending Code and associated documentation, and the precedent established by similar economic appraisals undertaken in Ireland and elsewhere in Europe. We recognise that in some instances, the applicant’s approach will need to be tailored to the context of this specific cost-effectiveness assessment.

Context

The broad outline of a cost-effectiveness assessment is as shown in Figure 1. This figure is a guide; provided all the steps are included within the cost-effectiveness assessment, the exact steps do not necessarily need to follow the structure shown.

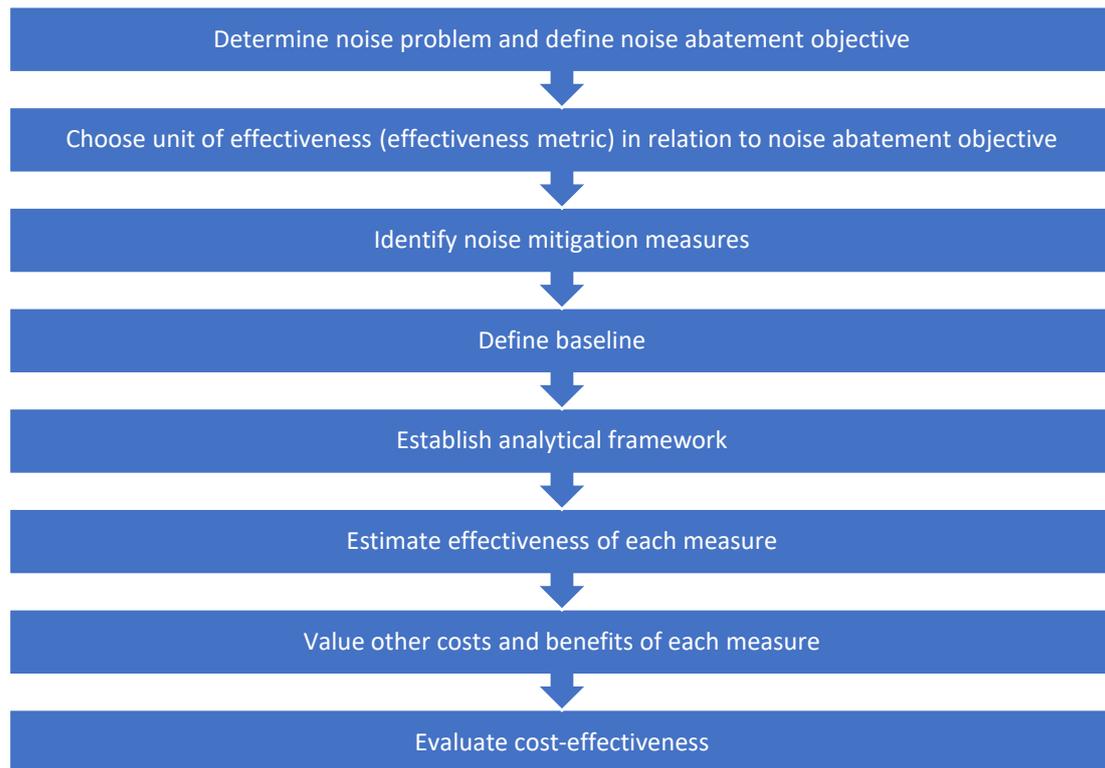
Structure of this note

The note is presented so to describe the general methodological considerations required when undertaken cost-effectiveness assessment in line with the process set out in Figure 1.

In particular, the note discusses the issues relating to the definition of the baseline and decisions over the overall analytical framework for assessing the costs and benefits of each measure and the process for identifying and valuing the costs and benefits of each measure (other than the noise impact).



Figure 1: Steps for undertaking a cost-effectiveness assessment of noise mitigation measures



1. Determine noise problem and define noise abatement objective

Under the Act the process of aircraft noise regulation can proceed if ANCA identifies a ‘noise problem’ and for “any noise problem that would arise from carrying out... development as proposed”.

A ‘noise problem’ will be determined considering the information provided by the applicant along with general reporting. Specifically, ANCA will have regard for information reported by the applicant within its ‘Noise Information Report Template’ along with the detail of any development as proposed.

Should a noise problem be determined, ANCA will ensure that a noise abatement objective is, as appropriate, defined, restated or amended. The noise abatement objective will comprise of several parts outlining the key objective, describing how the objective should be approached, and over the period for which the objective should apply or would be subject to review. The measurable aspects of the noise abatement objective will have regard to the information provided by the applicant within the ‘Noise Information Report Template’.

2. Choose unit(s) of effectiveness (effectiveness metrics) in relation to noise abatement objective

The unit(s) of effectiveness (i.e. effectiveness metrics) for the noise abatement objective will be declared as part of the noise abatement objective. ANCA will state specifically how the noise abatement objective can be measured. This will comprise of a selection of metrics taken from the information provided by the applicant within the ‘Noise Information Report Template’.

3. Identify noise mitigation measures

ANCA has a responsibility under the Act to ensure that the ICAO balanced approach that the measures available to reduce the noise impact are identified. ANCA’s preferred approach for the demonstration of the ICAO ‘Balanced Approach’ with respect to identification of the ‘measures available’ is as follows.

(a) A comprehensive list of ‘noise mitigation measures’ should be identified under each of the pillars of the ICAO balanced approach. Such a list has already been provided for under the headings of ‘Noise Management Information’ within the Information Reporting Template as prepared by ANCA. For the avoidance of doubt, the pillars should refer to headings as presented in Reg598 Annex I ‘Noise Management Information’ i.e.

- Reduction of noise at source
- Land-use planning and management
- Noise abatement operational measures
- Operating Restrictions
- Financial instruments

(b) The feasibility of all measures excluding operating restrictions should be identified and where these are found to be unsustainable or impractical (due to factors such as safety) then these should not be considered further. However, evidence should be provided to demonstrate that such measures have been considered.

For measures relating to airspace or aircraft operating procedures ANCA expects a sufficient level of technical coordination has taken place between the applicant, its airlines and the air navigation service provider. To this end, ANCA has requested a ‘Noise Mitigation Feasibility Report’ (see Section 4.8 of the Aircraft Noise Information Reporting Template Guidance).

In identifying noise mitigation measures, it is emphasised that the applicant must identify and consider each in isolation before developing combinations of such measures.

4. Baseline and Analytical Framework

The following section describes key aspects of the overall analytical framework required to undertake a cost-effectiveness assessment. Consideration of the topics covered in this section should be presented within a methodology report, alongside the applicant's reasoning and rationale, to allow ANCA to review the approach taken and determine its appropriateness.

Definition of the Baseline

In a cost-effectiveness assessment, a baseline is used as the counterfactual against which alternative options are compared. A typical baseline would use a 'forecast without new measures', which is referred to in Annex I of Reg598:

“A description of the effect on noise climate without further measures, and of those measures already planned to ameliorate the noise impact over the same period.”

This definition of the 'forecast without new measures' implies the inclusion of all existing measures. This would be akin to the 'current consented north runway operation upon opening' and the 'future forecast north runway operation' as described within the Aircraft Noise Information Reporting Template Guidance. These scenarios describe what would happen if no changes are made to the Airport's existing noise management and restrictions. However, it is noted that the applicant may wish to replace some existing measures with alternatives. Consequently, including existing measures in the baseline would make it challenging to compare the 'consented situation' to other noise mitigation measures. ANCA therefore strongly recommends excluding existing noise mitigation measures and restrictions that the applicant is proposing to replace, from 'the forecast without new measures'.

In the context of development at Dublin Airport, ANCA therefore envisages two baselines to be considered. A 'forecast without new measures' and future baseline scenario describing the situation should no changes be made to the airport's existing noise management and restrictions. This would enable the existing cost-effectiveness of the airport's existing noise management and restrictions to be determined.

Appraisal Time Horizon

Cost-effectiveness assessments are typically appraised over a fixed time horizon. The appropriate time horizon is dependent on the context of the measures being assessed and should be chosen in a manner that avoids biasing the results of the cost-effectiveness assessment in favour of one measure over another. The selection of the time horizon should include a consideration of the expected life of the measures, taking into account when such measures may be reviewed in future, or be superseded.

It is expected that any approach or methodology description developed by the applicant will include consideration of the most appropriate time horizon for the assessment, informed by appraisal guidance within the Irish Public Spending Code, precedent from previous appraisals, and the context of the specific measures being assessed.

Evaluating the Baseline

To assess the cost-effectiveness of each measure, it is anticipated that there will be some consideration of what the costs and noise impacts would be in the baseline, and how they would change over the appraisal time horizon. This in turn will require a number of underlying assumptions to support the baseline forecasts. Such assumptions need to be a realistic reflection of the state of the world in the absence of the new / proposed measures.

Any material provided in relation to the cost-effectiveness assessment should include a presentation of the baseline scenario. This extends to providing the key assumptions that underlie the main costs and noise impacts. This should include but not necessarily be limited to:

- (a) the number of flight movements in the night period,
- (b) the number of passengers,

- (c) improvements in aircraft technology that allow for lower noise emissions,
- (d) expected pace of fleet replacement,
- (e) the forecast number of households and population around the airport.

These are all matters for which information is required within the Aircraft Noise Information Reporting Template.

Basis for assessing noise-noise costs and benefits

The description of the cost-effectiveness methodology should clearly state the basis for assessing the costs and non-noise benefits of each measure. These could be assessed from several different perspectives, such as:

- (a) The financial costs and benefits to the applicant only
- (b) The financial costs and benefits to the aviation sector as a whole
- (c) The costs and benefits to the Irish economy
- (d) The social and economic costs to Ireland (i.e. socio-economic welfare)

In line with the Public Spending Code, ANCA advises that costs and benefits are assessed from a socio-economic welfare perspective. If an alternate basis for assessing costs and benefits is used, this will need to be explained and justified.

Geographical Constraints

Cost-effectiveness assessments often include geographic constraints around the assessment of costs and benefits. Any costs and benefits that are incurred by individuals or firms outside this geographic boundary, are excluded from the analysis.

Common practice in other appraisals in the aviation sector has been to:

- (a) Include impacts on all passengers travelling to and from the country (i.e. costs and benefits to passengers when travelling to/from Irish airports)
- (b) Include impacts on airlines during their operating within the country (i.e. costs and benefits to airlines when operating out of Irish airports, but not including any costs and benefits that occur through an airline operating at a non-Irish airport).
- (c) For all other affected parties, only including costs and benefits occurring to Irish residents.

The cost-effectiveness methodology should include explicit consideration of the geographic constraints of the assessment. ANCA considers the precedent set by previous aviation appraisals is a helpful one and would suggest adopting a similar geographic constraint. If an alternate geographic constraint is used, this should be informed by guidance within the Irish Public Spending Code, precedent from previous appraisals, and the context of the specific measures being assessed.

5. Estimate effectiveness of each measure

The effectiveness of each measure and combinations of measures should be estimated with respect to the objective measures described within the noise abatement objective. The effectiveness should take into account the performance of measure(s) with respect to the baseline, any situations described by the noise abatement objective itself.

6. Assessment of Costs and Benefits

The following section begins with general recommendations relating to the process for identifying and valuing costs and benefits, before describing the information and evidence that ANCA requires in order to review the costs and benefits of each measure and the approach taken to estimating them.

In this section, when referring to costs and benefits, benefits in relation to noise impacts are excluded as they are considered within the effectiveness estimate covered in Section 5. The term benefit is also used to acknowledge

that some measures may be beneficial in terms of reducing costs for affected interdependent factors (e.g. by reducing air pollution).

General principles for estimating costs and benefits

ANCA advises that the guidance within the Irish Public Spending Code, and the precedent established by other appraisals, is followed wherever possible when identifying and valuing costs and benefits. This covers guidance in relation to what is considered a cost and benefit and using standard reference values where market values for costs and benefits do not exist.

There are five specific aspects of the Public Spending Code that are highlighted in the following paragraphs:

- (a) **Consistency and neutrality of assumptions** – It is anticipated that there will be several assumptions and parameters that are used across the analysis of different measures, such as wage rates and labour costs. It is expected that these assumptions are applied consistently for all measures unless there is a reason for expecting them to be different. The choice of assumptions should also be realistic and neutral to the measure being assessed, with overly optimistic or overly pessimistic assumptions avoided.
- (b) **Additionality** – When identifying and estimating costs and benefits, the additionality of such impacts should be addressed. In other words, the assessment should carefully consider whether the impacts are genuinely additional rather than double counting an effect that has been captured elsewhere, displacing or substituting impacts occurring elsewhere, or are costs and benefits that occur within the baseline.
- (c) **Proportionality** – Over the course of an appraisal, there can be many potential costs and benefits that are identified. However, the overall effect of many of these may be negligible. ANCA recommends taking a proportionate approach to the analysis, and excluding monetary assessments of any costs and benefits where the effect is likely to be small.
- (d) **Non-monetised costs and benefits** - For certain costs and benefits, it may not be possible to attach a monetary value to the effect, either because such values do not exist, or it is not proportionate to do so. In such instances, the cost or benefit should be described in detail, either qualitatively or quantitatively if possible, and an assessment made of the likely scale of the effect. Even in instances where it is considered that the cost and benefit is negligible, explicitly stating this provides completeness in the assessment and provides transparency during consultation.
- (e) **Clarity of presentation** – Given the importance of the cost-effectiveness assessment in determining the preferred measure or package of measures, it is important that the analysis and results are presented clearly, transparently and comprehensively.

Identifying costs and affected parties

The cost-effectiveness assessment should identify all relevant costs and benefits. It should include a detailed description of the cost or benefit, the party or parties that incur the cost or receive the benefit, and whether the cost is one-off or recurring. Where the costs and benefits are indirect or second-order effects, the assessment should include an explicit consideration of the additionality of the impact, with supporting evidence provided as necessary.

Quantifying and valuing costs and benefits

The calculations underlying the costs and benefit values should be provided to a sufficient level of granularity such that the analysis is replicable. The analysis should ideally be provided in the form of an Excel spreadsheet model, with inputs, calculations and outputs presented clearly, transparently and comprehensively.

The valuation of costs and benefits will require a quantification of the effect and the attachment of a monetary value to that effect. It is anticipated that both stages will require the use of internally and externally sourced assumptions, parameters and data.

Where appropriate, values for costs and benefits should come from market prices and, where market values do not exist, from reference values within the Public Spending Code. They should also reflect consideration of

whether values are likely to increase in real terms over time, e.g. labour costs. All assumptions, parameters and data sources should be documented within material provided to ANCA, with links provided to sources or the underpinning evidence appended to the appraisal report.

7. Evaluating Cost-Effectiveness

This section describes how cost and effectiveness calculations are brought together and used to evaluate the cost-effectiveness of different measures

Calculating cost-effectiveness ratio

The cost-effectiveness ratio should be calculated as follows:

$$\text{Cost effectiveness ratio} = \frac{\text{Net cost}}{\text{Total effectiveness}}$$

The net cost is estimated in *present* value terms – calculated by discounting future costs and benefits that occur over the appraisal period and then adding them up. The discount rate should be chosen in line with the context of this assessment and relevant appraisal guidance and should be explained in the methodology description.

Although the main cost-effectiveness ratio shows the cost-effectiveness of measures over the whole period that is appraised, it is possible that effects will vary over time. We recommend explicit consideration of whether the cost-effectiveness of measures varies over time. This can be done by presenting the cost-effectiveness ratio for spot years or by conducting a sensitivity test with a shorter time horizon.

The presentation of the cost-effectiveness ratio should also include explicit consideration of non-monetised costs and benefits, and an assessment of whether they are likely to be sufficiently substantial to change to conclusions of the analysis.

Sensitivity analysis

Valuing costs and benefits will often mean relying on assumptions that are uncertain. Developing a central scenario means picking a single figure for each assumption. However, a thorough cost-effectiveness assessment would normally take into account uncertainties around the assumptions and data, and risks surrounding individual measures.

Similarly, where measures impose requirements on other parties or are designed to change their behaviour, it may be the case that compliance is not 100% and as such the effect is diluted. For example, a measure that requires airlines to use a steeper approach on landing may not achieve full compliance.

ANCA strongly recommends that sensitivity analysis is undertaken and presented alongside the central result, to allow a full assessment of the uncertainty surrounding the cost-effectiveness ratio. ANCA also suggests that a sensitivity scenario is undertaken that assumes realistic levels of compliance with requirements and uptake for voluntary measures.

Identifying the most cost-effective measures

Once all the previous steps have been conducted, the cost-effectiveness ratio can be reviewed alongside the other evidence to select the most cost-effective measure or measures. In typical cost-effectiveness analyses, this is a one-stage process. The cost-effectiveness of all measures is compared against one another and the most cost-effective set of measures are chosen.

However, Reg598 states that operating restrictions should only be considered once all other measures under the Balanced Approach have been considered. The 2019 Act requires undertaking a cost-effectiveness analysis of each noise mitigation measure, using this to combine measures into packages, and then undertaking a second cost-effectiveness analysis of each package of measures.



The cost-effectiveness assessment should therefore include a detailed description of how the cost-effectiveness of individual measures has been evaluated and packaged, and how the cost-effectiveness of each package of measures has been evaluated to select the preferred option.