

# Dublin Airport North Runway
# Relevant Action Application
# Regulation 598/2014 (Aircraft Noise Regulation) Assessment
# Non-Technical Summary

**December 2020**

daa

DublinAirport

Bickerdike Allen Partners
Architecture Acoustics Technology

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## Prepared for:

daa

## Prepared by:

AECOM Ireland Limited
4th Floor
Adelphi Plaza
Georges Street Upper
Dun Laoghaire
Co. Dublin A96 T927
Ireland

T: +353 1 238 3100
aecom.com

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# 1. Introduction

## 1.1 Overview

daa is submitting an application for a proposed Relevant Action to be taken in accordance with Section 34C(1)(a) of the Planning Development Acts 2000 - 2019, to amend and replace any existing planning conditions attached to previous planning permissions governing the operation of Dublin Airport which limit access or reduces the operational capacity.

The proposed Relevant Action specifically relates to the night-time use of the runway system at Dublin Airport. It involves amending Condition 3(d) and replacing Condition 5 of the North Runway Planning Permission[1], and the introduction of a number of noise mitigation measures in respect of noise from flights at night-time.

The North Runway planning permission granted in 2007 contained 31 planning conditions. Of these, Conditions 3(d) and 5, outlined as follows, are related to operating restrictions on the use of the runways and overall number of permitted flights at night. Both these conditions are due to come into force once the North Runway is operational:

- Condition 3(d) states: *Runway 10L-28R shall not be used for take-off or landing between 2300 hours and 0700 hours*; and
- Condition 5 states: *the average number of night time aircraft movements at the airport shall not exceed 65/night (between 2300 hours and 0700 hours) when measured over the 92 day modelling period*.

As Conditions 3(d) and 5 relate to the night-time use of the runway system and are therefore noise related, the 'Aircraft Noise (Dublin Airport) Regulation Act 2019' requires Fingal County Council's Aircraft Noise Competent Authority ('ANCA') to ensure compliance with 'European Union Regulation No 598/2014'[2] ('Aircraft Noise Regulation'). The Aircraft Noise Regulation adopts the "*Balanced Approach"* process for determination of aircraft noise management measures to meet specific Noise Abatement Objectives (NAO) of an airport.

daa subsequently commissioned specialist assessments pursuant of the requirements of the Aircraft Noise Regulation Annex I and Annex II. The objective of the assessments was to determine whether amending, replacing or revoking the two night-time operating restrictions in the North Runway Planning Permission conditions would require additional new noise mitigation measures. If so, the assessments enabled determination of a preferred option to include within the proposed Relevant Action.

The key specialist assessments were undertaken by Bickerdike Allen Partners LLP and Ricondo & Associates Inc. and reported in the following documents:

- 'Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment'. Bickerdike Allen Partners LLP, A11267_12_RP032_3.0, November 2020;
- 'ANCA Reporting Template v2.0 - Completed'. (ANCA excel template completed by Bickerdike Allen Partners LLP, December 2020;
- 'Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report'. Ricondo & Associates Inc, December 2020; and
- 'Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Cost Effectiveness Analysis Report'. Ricondo & Associates Inc, December 2020.

The document presented herein is a summary of key information from various assessments undertaken aligned to the headings of the Aircraft Noise Regulation Annex I. Overviews of the Aircraft Noise (Dublin Airport) Regulation Act 2019 and Aircraft Noise Regulation are also provided.

[1] Fingal County Council Reg. Ref. No. F04A/1755; An Bord Pleanála Ref. No.: PL06F.217429
[2] 'European Union Regulation No 598/2014 of the European Parliament and of the Council of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC'

## 1.2 Aircraft Noise Regulation

The Aircraft Noise Regulation considers the sustainable development of air transport and looks to implement measures to improve the noise environment and to maintain or improve the quality of life of neighbouring residential areas to European Union airports.

The Aircraft Noise Regulation requires that the "*Balanced Approach" (*as introduced by resolution A33/7 of the International Civil Aviation Organisation) is adopted in respect of aircraft noise management at those airports where a noise problem has been identified. The Balanced Approach considers the reduction of aircraft noise at source; land-use planning and management; noise abatement operational procedures; and operating restrictions in a consistent way with a view to addressing noise impacts in the most cost-effective manner. Under the Balanced Approach, noise-related operating restrictions are only introduced when other measures considered are deemed insufficient to attain the specific Noise Abatement Objective (NAO) of the airport in question.

## 1.3 Aircraft Noise (Dublin Airport) Regulation Act 2019

The Aircraft Noise (Dublin Airport) Regulation Act 2019[3] (hereafter referred to as the 'Aircraft Noise Regulation Act') implements the Aircraft Noise Regulation on the establishment of rules and procedures with regard to the introduction of noise related operating restrictions at European Union Airports within the Balanced Approach. The Aircraft Noise Regulation Act makes provisions for the regulation of aircraft noise at Dublin Airport and along with amendments to the Planning and Development Act 2000 allows for the Airport Authority to make an application to revoke, amend or replace operating restrictions.

The Aircraft Noise Regulation Act designates Fingal County Council as the competent authority for the purposes outlined within the Aircraft Noise Regulation. Fingal County Council established ANCA as a separate unit responsible for implementing the processes be followed when adopting operating restrictions, as defined in both the Aircraft Noise Regulation and Aircraft Noise Regulation Act.

The Aircraft Noise Regulation Act includes:

- the process of aircraft noise regulation and the appeals process to be followed should a noise problem be identified within Dublin Airport following a noise assessment carried out in line with Directive 2002/49/EC. In addition, the competent authority is to ensure the Balanced Approach is adopted. Any operating restriction to be introduced must comply with the technical requirements of the Aircraft Noise Regulation;
- the appeals process and authorities' responsibilities;
- the responsibility of daa to implement noise mitigation measures and operating restrictions where required to ensure appropriate noise mitigation measures are in place at Dublin Airport and sets out the requirement for and frequency of compliance reports; and
- the notification requirements should a new operating restriction be introduced to Dublin Airport and the associated timelines.

## 1.4 Report Structure

For ease of cross referencing, the headings used in the remainder of this document are consistent with the requirements of the Aircraft Noise Regulation Annex I.

Table 1 also outlines the corresponding requirements of both the Aircraft Noise Regulation and Aircraft Noise Regulation Act; and a reference to the reports where the detailed technical assessments and information can be found.

[3] http://www.irishstatutebook.ie/eli/2019/act/12/enacted/en/pdf (accessed June 2020)

**Table 1: Non-Technical Summary Structure, Regulatory Requirement and Technical Report Reference**

| Non-Technical Summary Section Heading | Aircraft Noise Regulation, Annex I Requirements | Competent Authority Reporting Requirements as per Aircraft Noise (Dublin Airport) Regulation Act 2019 Section 34C (11) | Specialist Technical Assessment Report / Source for Detailed Information |
|---|---|---|---|
| **1.0 Introduction** | - | - | - |
| **2.0 Current Inventory** | *1.0 Current Inventory* | | |
| 2.1 Airport Description | *1.1 A description of the airport, including information about its size, location, surroundings, air traffic volume and mix* | *(a) a summary of the data examined* | • AECOM, *Dublin Airport North Runway Relevant Action Application. Environmental Impact Assessment Report*. December 2020<br>• Fingal County Council, *Noise Action Plan for Dublin Airport, 2019 – 2023*. 19 December 2019 |
| 2.2 Dublin Airport Environment Objectives | *1.2 A description of any environmental objectives for the airport and the national context. This will include a description of the aircraft noise abatement objectives for the airport* | *(b) the noise abatement objective* | • Bickerdike Allen Partners LLP *Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment*. A11267_12_RP032_3.0 November 2020. |
| 2.3 Noise Situation | *1.3 Details of noise contours for the relevant previous years - including an assessment of the number of people affected by aircraft noise, carried out in accordance with Annex II to Directive 2002/49/EC* | - | • Bickerdike Allen Partners LLP *Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment*. A11267_12_RP032_3.0 November 2020.<br>• *ANCA Reporting Template v2.0*, completed by Bickerdike Allen Partners LLP, December 2020. |
| 2.4 Aircraft Noise Management Measures | *1.4 A description of the existing and planned measures to manage aircraft noise already implemented in the framework of the Balanced Approach and their impact on and contribution to the noise situation* | *(c) the measures considered to address any noise problem* | • Bickerdike Allen Partners LLP *Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment*. A11267_12_RP032_3.0 November 2020.<br>• Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December 2020. Table 2-1, Section 2.1. |
| **3.0 Forecast Without New Measures** | *2.0 Forecast Without New Measures* | | |
| 3.1 Current Approved and Planned Developments | *2.1 Descriptions of airport developments, if any, already approved and in the pipeline, for example, increased capacity, runway and/or terminal expansion, approach and take-off forecasts, projected future traffic mix and estimated growth and a detailed study on the noise impact on the surrounding area caused by expanding the capacity, runways and terminals and by modifying flight paths and approach and take-off routes* | - | • Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December 2020. Table 2-1, Section 2.1. |
| 3.2 Airport Capacity Extension Benefits | *2.2 In the case of airport capacity extension, the benefits of making that additional capacity available within the wider aviation network and the region* | - | • Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December 2020<br>• Bickerdike Allen Partners LLP *Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment*. A11267_12_RP032_3.0 November 2020. |
| 3.3 Noise Climate | *2.3 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* | - | • Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December 2020.<br>• Bickerdike Allen Partners LLP *Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment*. A11267_12_RP032_3.0 November 2020. |
| 3.4 Forecast Noise Contours | *2.4 Forecast noise contours - including an assessment of the number of people likely to be affected by aircraft noise - distinguishing between established residential areas, newly constructed or planned residential areas and planned future residential area that have already been granted authorisation by the competent authorities* | - | • Bickerdike Allen Partners LLP *Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment*. A11267_12_RP032_3.0 November 2020.<br>• Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December |
| 3.5 Consequences of Not Taking Action to Reduce Noise | *2.5 Evaluation of the consequences and possible costs of not taking action to reduce the impact of increased noise, if it is expected to occur* | | • Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December 2020 |
| **4.0 Assessment of Additional Measures** | *3.0 Assessment of Additional Measures* | | |
| 4.1 Outline of Proposed Additional Measures | *3.1 Outline of the additional measures available and an indication of the main reasons for their selection. Description of those measures chosen for further analysis and information on the outcome of the cost-efficiency analysis, in particular the cost of introducing those measures; the number of people expected to benefit and the timeframe and a ranking of the overall effectiveness of particular measures* | *(c) the measures considered to address any noise problem*<br>*(d) an evaluation of the cost-effectiveness of the various measures considered*<br>*(e) the application of the Balanced Approach*<br>*(f) the identification of additional or alternative measures (other than those proposed in the draft regulatory decision) that have been considered*<br>*(g) particulars of any proposed noise mitigation measures and operating restrictions (if any)*<br>*(h) if applicable, the reasons for the proposed introduction of any noise mitigation measures and operating restrictions (if any)*<br>*(i) the relevant technical information in relation to any proposed noise mitigation measures and operating restrictions (if any)* | • Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December 2020<br>• Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Cost Effectiveness Analysis*. December 2020<br>• Bickerdike Allen Partners LLP *Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment*. A11267_12_RP032_3.0 November 2020. |
| 4.2 Environmental and Competitive Effects of Proposed New Measures | *3.2 An overview of the possible environmental and competitive effects of the proposed measures on other airports, operators and other interested parties* | - | • Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December 2020 |
| 4.3 Preferred Option | *3.3 Reasons for selection of the preferred option* | *(h) if applicable, the reasons for the proposed introduction of any noise mitigation measures and operating restrictions (if any)* | • Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December 2020 |
| 4.4 Forecast including Additional Measures compared to Permitted Operation Situation | - | - | • Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report*. December 2020 |

# 2. Current Inventory

## 2.1 Airport Description

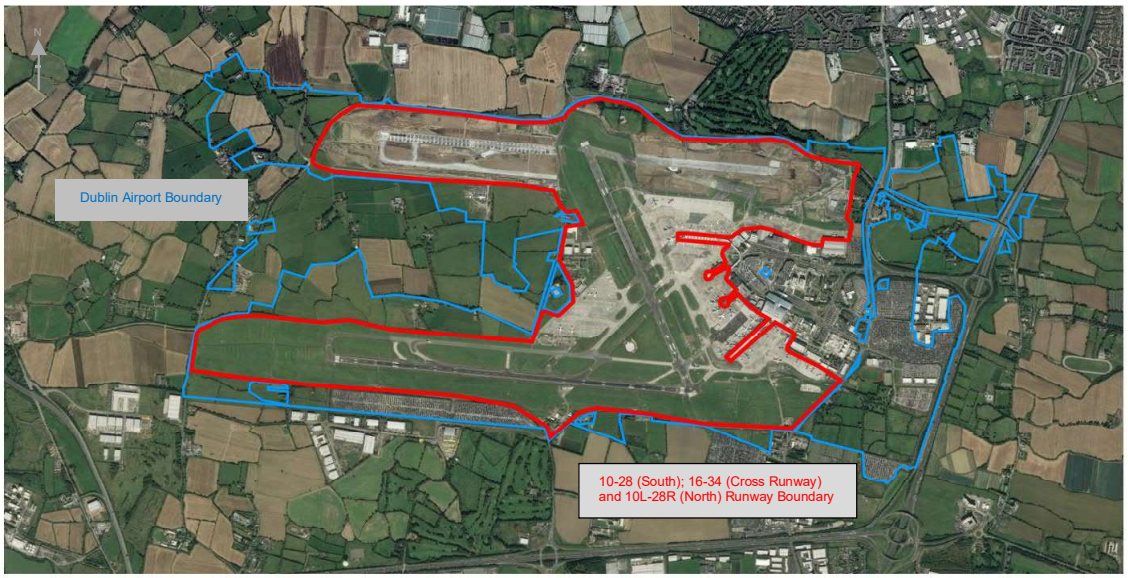
Dublin Airport is located circa 10 km north of Dublin City Centre and covers an area of over 1,000 hectares.

The airport currently has two operational runways (Figure 1):

- 10-28 runway, orientated in an east-west direction, which takes the majority of incoming and outgoing flights; and
- 16-34 runway, orientated northwest to southeast, which operates during certain weather conditions and in some cases to reduce congestion for aircraft on the taxiway infrastructure during early morning peak hours departure periods and to allow maintenance works on the main runway.

In addition, daa are currently developing the new North Runway (Runway 10L-28R), located north and parallel to the South Runway.

**Figure 1. Dublin Airport Main Runway (10/28), Cross Runway (16/34) and North Runway (under construction)**




Within Dublin Airport, there is a complex of buildings, such as terminal buildings, piers, hangers and car parking facilities. The current range of uses of existing buildings within Dublin Airport and its environs are wide ranging from commercial operations to supportive and ancillary uses and include structures for parking, offices, hospitability, commercial, logistics, residential and leisure, amongst others.

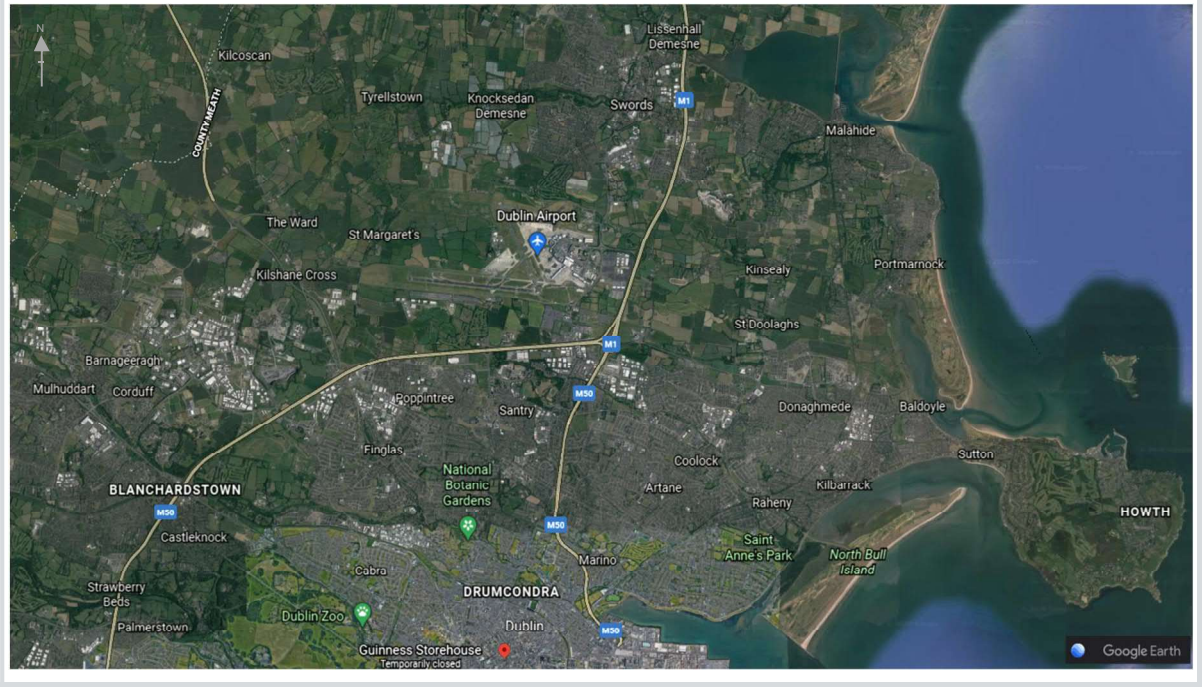
The overall airport area is framed by a high capacity road network, which includes the M1 motorway to the east, the M50 to the south, and the upgraded N2 to the west. Access to the airport complex is located to the eastern boundary via the Swords road, which links with a major motorway junction on the M1 (Figure 2).

Based on the latest population census of 2016 and as reported by AECOM in the Environmental Impact Assessment Report for the proposed Relevant Action[4], the resident population of the Dublin Airport electoral division was 5,018; while the Dubber electoral division was 7,372. Fingal County population was 296,020; while Dublin Regional Authority had a population of 1,347,359.

Dublin Airport operates 56 scheduled and charter airlines providing direct services to more than 190 destinations in 40 countries. Two main airlines provide the majority of flights: Ryanair and Aer Lingus. The airport serves mostly short haul services (90% of flights) to points in the UK and Europe. Long haul services are mainly to North America, plus some services to the Middle East, Asia and Africa.

[4] AECOM, *Dublin Airport North Runway, Relevant Action Application, Environmental Impact Assessment Report*, December 2020.

**Figure 2. Dublin Airport Surrounding Area**




*Source: Google Earth*

Between 2000 and 2008, passenger movements at Dublin Airport increased from 13.7 million to 23.5 million. Post 2008, the airport experienced significant declines in air travel due to the global economic downturn, but in recent years the airport has returned to a strong sustained growth trajectory. The Covid-19 pandemic, however, has had a profound impact on the aviation industry worldwide with passenger numbers dropping significantly in 2020. Currently International Air Transport Association are forecasting a return to pre Covid-19 passenger numbers by 2024 or 2025. Based on forecast prepared for the planning application, Dublin Airport would recover in the short term to a throughput permitted annual passenger capacity of the Terminals at Dublin Airport. Condition no. 3 of the Terminal 2 Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No. PL06F.220670) and Condition no. 2 of the Terminal 1 Extension Planning Permission (Fingal County Council Reg. Ref. No. F06A/1843; ABP Ref. No. PL06F.223469) provide that the combined capacity of Terminal 1 and Terminal 2 together shall not exceed 32 million passengers per annum..

The air traffic mix at Dublin Airport ranges from small propeller aircrafts to large commercial jets.

## 2.2 Dublin Airport Environment Objectives

As outlined in Section 1.2, the Aircraft Noise Regulation requires that member states ensure that the Balanced Approach is adopted in respect of aircraft noise management at those airports where a noise problem has been identified. To that end, they shall ensure that the NAO for that airport is defined.

At the time of completing the technical assessments, the competent authority under the 2019 Aircraft Noise Regulation (ANCA) had not determined whether a noise problem exists at Dublin Airport and therefore, at present, a formal NAO had not been defined. For the purpose of the assessments undertaken pursuant of the Aircraft Noise Regulation Annex I for daa's Relevant Action application, a candidate NAO (cNAO) was developed "*To limit and reduce the adverse effects of long-term exposure to aircraft noise, including health and quality of life, so that long-term noise exposure, particularly at night, does not exceed the situation in 2018. This should be achieved through the application of the Balanced Approach*"[5].

The cNAO metrics include the number of people "highly sleep disturbed" and "highly annoyed" in accordance with the approach recommended by the World Health Organisation's Environmental Noise Guidelines 2018, as endorsed by the European Commission through Directive 2020/367.

[5] Bickerdike Allen Partners LLP, *Dublin Airport North Runway Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment.* A11267_12_RP032_2.0, November 2020.

## 2.3 Noise Situation

The numerical results for the noise situation at the airport are contained in the completed template which was provided by the ANCA[6]; while the noise contours are detailed in Bickerdike Allen Partners LLP 'Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment'[6].

## 2.4 Aircraft Noise Management Measures

The Noise Action Plan[7] and conditions associated with the North Runway planning permission issued by An Bord Pleanála in 2007[8], together comprise an extensive aircraft noise management programme that includes 24 existing and planned noise mitigation measures covering the four principle elements of the International Civil Aviation Organisation recommended Balanced Approach to managing aircraft noise[9]:

- Reduction of noise at source, such as promoting quieter aircraft;
- Noise abatement operating procedures, such as preferential runway use programmes, preferential routes and limits to engine ground running;
- Land use planning and management, such as land use compatibility management frameworks, sound insulation and voluntary dwelling purchase schemes; and
- Operating restrictions. None were in place at the time of completing the Aircraft Noise Regulation assessments.

For the purpose of the detailed assessments undertaken the 'existing' noise mitigation measures identified are those as of 2018 and 'planned' are expected to be in place in 2025 (when air traffic movements return to accommodate the permitted passenger levels of 32 million passengers per annum (mppa)).

Description of the existing and planned noise management measures are detailed in Table 2-1 of the Ricondo & Associates Inc 'Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report'[10]; while the impact on and contribution to the noise situation is detailed in Bickerdike Allen Partners LLP noise information report[6].

# 3. Forecast Without New Measures

A noise issue may be identified using a forecast scenario that includes a relevant action (as defined in the Aircraft Noise Regulation Act 2019) that is proposed without implementing new noise mitigation measures and/or operating restrictions. Annex I of the Aircraft Noise Regulation calls this scenario the *Forecast without New Measures.* The Forecast without New Measures scenario for the North Runway Aircraft Noise Regulation assessments undertaken therefore revokes Condition 3(d) and Condition 5 operating restrictions for the North Runway and maintains existing and planned noise mitigation measures.

## 3.1 Current Approved and Planned Developments

### 3.1.1 Existing and Planned Measures

Existing and planned measures are outlined in Section 2.4.

### 3.1.2 Forecast Traffic and Fleet Mix

In March 2020 it became apparent that the Covid-19 crisis was having a significant impact on global aviation. The immediate impacts were severe and in the short-medium term these impacts will continue to manifest themselves in reduced air traffic demand in Ireland and globally. A forecast year, 2025, was therefore selected and evaluated to account for conditions when air traffic movements return up the permitted annual passenger capacity of the Terminals at Dublin Airport. Condition no. 3 of the Terminal 2 Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No. PL06F.220670) and condition no. 2 of the Terminal 1 Extension Planning

[6] Bickerdike Allen Partners LLP. *ANCA Reporting Template v2.0 – Completed,* December 2020.
[7] Fingal County Council. *Noise Action Plan for Dublin Airport 2019 and 2023*, December 2018.
[8] An Bord Pleanála Reference Number PL06F.217429/Fingal County Council Ref: F04A/1755/E1.
[9] International Civil Aviation Organization, *Guidance on the Balanced Approach to Aircraft Noise Management*, October 10, 2010.
[10] Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report,* December 2020.

Permission (Fingal County Council Reg. Ref. No. F06A/1843; ABP Ref. No. PL06F.223469) provide that the combined capacity of Terminal 1 and Terminal 2 together shall not exceed 32 million passengers per annum.

Both 'unconstrained' and 'constrained' air traffic forecasts were prepared by Mott MacDonald[11]:

- Unconstrained forecast: assumes no operating restrictions up to a forecast year with 32 mppa (i.e. Conditions 3(d) and 5 are not in place); and
- Constrained forecast: assumes the two night-time operating restrictions (Conditions 3(d) and 5) are in place.

The forecast movement demands prepared assumed the use of an increased percentage of quieter aircraft in 2025, given airline plans to replace older aircraft with newer aircraft. Annual average summer's day movements by aircraft type were determined and used to calculate the day-evening-night noise level ($L_{den}$) and night-time noise level ($L_{night}$). The predicated summer's day movements were also used to calculate the summer 16-hour average daytime sound level ($L_{Aeq,16h}$).

For the unconstrained forecast (assuming Conditions 3(d) and 5 are not in place), the total annual average (24 hour) number of aircraft movements determined for 2025 was 240,788; while a summer day (24hour) was 66,714 movements. 13% of the annual average and summer day (24hour) aircraft movements outlined were within night-time (i.e. 2300 to 0700).

Details of the average annual and summer's day movements by aircraft type for the unconstrained scenario during different periods are provided Table 2-2 of Ricondo & Associates Inc '*Forecast Without New Measures and Additional Measures Assessment Report'*. The unconstrained air traffic movement forecast was used to model the Forecast without New Measures scenario.

### 3.1.3 Forecast Runway Use

The Forecast without New Measures assumes preferential runway use as described within the North Runway Planning Permission[12], Conditions 3(a) to 3(c) between 0700 and 2259. These conditions would mean when the North Runway is operational, the parallel runways will predominately be operated in segregated mode during the daytime, i.e. one runway for all arrivals, the other for all departures. However, in peak periods, the runways will operate in semi-mixed mode, i.e. one runway used for both arrivals and departures simultaneously and the other runway for arrivals or departures depending on the wind direction.

The Forecast without New Measures assumes that between 2300 and 0659, there is no preferred runway use for purposes of avoiding noise-sensitive areas, and both the North and South Runways are available for arrivals and departures as needed. This fully mixed-mode operating scenario represents the most flexible runway operating condition during the night-time hours and places no preference on runways based on reducing noise for noise-sensitive areas. During mixed mode, the choice of runway for departures is based on the flight's destination. Arrivals are split equally between the two runways unless this exceeds the single-runway capacity for a given hour. In the Forecast without New Measures this mode of operation replaces the North Runway Planning Permission Condition 3(d), i.e. there are no specific noise related controls placed on the runway mode of operation.

Please refer to Section 2.1.4 of Ricondo & Associates Inc '*Forecast Without New Measures and Additional Measures Assessment Report'*.

### 3.1.4 Forecast Take-off and Approach Routes

Forecast take off and approach routes for Dublin Airport were considered and evaluated as part of the Aircraft Noise Regulation assessment process. The detail describing these routes is presented in Section 2.1.5 of Ricondo & Associates Inc '*Forecast Without New Measures and Additional Measures Assessment Report'*.

The Forecast without New Measures scenario assumes the same noise preferred departure routes which were subject to detailed public consultation in 2016 and which subsequently assessed in as part of the airspace design process and associated safety assessment process.

### 3.1.5 Noise Impact of Forecast Without New Measures

As previously outlined, the cNAO uses the number of people 'highly annoyed' and 'highly sleep disturbed' as a measure of noise impact from aircraft. Noise impacts for the Forecast without New Measures were then modelled

[11] Mott MacDonald, *Dublin Airport Operating Restrictions - Quantification of Impacts on Future Growth September 2020 Update 2022 2025 Period*, Draft version 5.2, September 2020.
[12] Fingal County Council Reg. Ref. No. F04A/1755; An Bord Pleanála Ref. No.: PL06F.217429.

and compared with those modelled for the 2018 situation to determine if the Forecast without New Measures met the cNAO.[13]

Assessment of the noise impact showed the Forecast without New Measures scenario reduces the number of people 'highly annoyed' and 'highly sleep disturbed' and reduces those highly impacted by night-time noise (above 55 dB $L_{night}$). The modelled results showed:

- 110,196 people falling within the highly annoyed criteria in the study baseline year of 2018; while the Forecast without New Measures in 2025 finding was lower with 82,271 people highly annoyed;
- 42,234 people highly sleep disturbed in 2018; reducing to 33,806 in 2025; and
- 548 people exposed to 55dB $L_{night}$ or higher in 2018; compared to 67 in 2025.

Assessment was also undertaken of the number of people forecast to experience a potential significant adverse effect caused by increases in the day-evening-night noise level ($L_{den}$) and/or night-time noise level ($L_{night}$). Findings showed that the Forecast without New Measures scenario is expected to result in noise level for increases for some receptors that have the potential to cause significant adverse effects (when compared to the 2018 situation).

Overall, the assessments indicated that the noise climate caused by the Forecast without New Measures scenario would meet the cNAO for Dublin Airport in the 2025 scenario with respect to highly annoyed and highly sleep disturbed impacts, however, had the potential to cause significant adverse effects due to increases in $L_{den}$ and $L_{night}$ levels compared to the 2018 situation. The consequences of not taking action to evaluate new additional measures would involve potential adverse effects associated with the increase in $L_{night}$ and $L_{den}$ levels in 2025 compared to the 2018 situation. Therefore, it was determined that there is a need to evaluate additional new mitigation measures to address the priority to minimise the potential to cause significant adverse effects.

## 3.2 Airport Capacity Extension Benefits

The Forecast without New Measures scenario revokes two operating restrictions which currently place a significant constraint on the use of Dublin Airport and its runway system. The benefits to revoking the two operating restrictions are to:

- Prevent constrained traffic impacts at Dublin Airport and associated reduction in air connectivity;
- Maintain consistency with the Irish National Aviation Policy; and
- Prevent forgone economic impacts for the Airport and the regional and national economy.

### 3.2.1 Prevent Constrained Traffic Impacts

The two North Runway permission conditions restrict movements during the night-time hours. Demand for flights between 2300 and 0659 is driven mainly by short haul services operated by aircraft based at Dublin Airport. Other 2300 and 0659 period flights are long haul arrivals in the early morning, and cargo flights mainly operated by the time critical package delivery integrators (for example, FedEx, DHL, TNT and UPS). To achieve the high levels of aircraft utilisation necessary for airline competitiveness, aircraft based at the Airport must depart their first flight early in the morning and return from their last flight late at night. In addition, the geographical position of Dublin Airport and the one-hour time difference between Ireland and mainland Europe means that Dublin Airport requires longer operating days than competing European hubs due to:

- flights that need to leave early (before 07:00) to arrive in time for business passengers to have a full working day at their destination;
- longer sector distances to many European destinations than from other competing airports, requiring earlier departures and later arrivals; and
- proximity to North America compared to the rest of Europe means that transatlantic flights arrive earlier in DUB than at other European airports.

As a result, the peak departure period is between 0600 and 0700 and the peak arrival period for based airlines is between 2300 and midnight; both of which fall within the night-time restrictions period at the airport. Prior to the global COVID pandemic, the airport had 113 flight movements per night (associated with regularly scheduled services on a typical busy day in summer 2019). Demand for night-time flights is not expected to reduce significantly during the post-COVID recovery. The operating restriction on movements (Condition 5) and restricted

[13] Bickerdike Allen Partners LLP, *Dublin Airport North Runway Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment.* A11267_12_RP032_2.0, November 2020.

use of North Runway (Condition 3(d)) between 2300 and 0700 severely limit the long-term potential for the Airport to grow in line with national policy.

A forecast study[14] looked at the impact the two North Runway operating restrictions and overall runway capacity on airline schedules, taking into account the impacts on aircraft rotations throughout the day. The study showed the impact caused by the two operating restrictions is a loss of air traffic movements in the night period and associated loss of 1.1 million passengers per year (3.5 percent decrease) and a cumulative loss over four-years (between 2022, when Runway North Runway is expected to be operational, and 2025) of 4.3 million passengers.

The Forecast without New Measures scenario would therefore avoid the impacts associated with the operating restriction constraints as forecast demand returns to pre-covid-19 levels expected to be in 2025. Avoidance of the capacity constraints would provide Dublin Airport the ability to meet demand up to 2025 and maintain its competitiveness in the European aviation network as the travel industry recovers post- Covid-19 where air connectivity will be critically important.

### 3.2.2 Maintain Consistency with the Irish National Aviation Policy

The Department of Transport, Tourism and Sport National Aviation Policy for Ireland (August 2015) sets out goals which aim to: enhance Ireland's connectivity; foster growth of aviation enterprise; and maximise the economic contribution of the aviation sector. The policy also includes the following regarding a second runway at Dublin Airport:

> *The process to develop the second runway at Dublin Airport will commence, to ensure the infrastructure necessary for the airport's position as a secondary hub and to operate to global markets without weight restrictions is available when needed.*[15]

Results from an economic assessment carried out by InterVISTAS[16] found the operating restrictions on air services at Dublin Airport related to the North Runway when fully operational, will contradict the aims and commitments of the National Aviation Policy. Revoking the two operating restrictions would seek to avoid the negative effects on flights and enhance the connectivity and competitiveness of Dublin Airport consistent with the National Aviation Policy.

### 3.2.3 Prevent Forgone Economic Impacts

The InverVISTAS economic study suggests that because of the operating restrictions, the Irish economy could forgo an additional 3,430 jobs and €963 million in Gross Value Added by 2025, relative to night movements modelled without these restrictions. The majority of this forgone economic impact would be expected to occur outside of the aviation sector. The Forecast without New Measures scenario would therefore seek to remove the overly restrictive constraints which would avoid the potential economic impacts identified.

## 3.3 Noise Climate

A description of the effect on noise climate without additional measures, and of those measures already planned to ameliorate the noise impact over the same period is summarised in Section 3.1.

## 3.4 Forecast Noise Contours

Metrics from the World Health Organisation guidelines[17] were used by Bickerdike Allen Partners LLP to develop contours for the Forecast without New Measures scenario. The findings are documented in the Bickerdike Allen Partners LLP 'Dublin Airport North Runway Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment' report.[18] All contours developed included established residential, newly constructed or planned future residential locations known at the time of assessment.

## 3.5 Consequences of Not Taking Action to Reduce Noise

The Forecast without New Measures scenario would meet the cNAO related to reducing highly annoyed and highly sleep disturbed people compared to the 2018 situation. Therefore, there would be no consequences associated with effects linked to annoyance and sleep disturbance. Implementing the Forecast without New Measure would

[14] Mott MacDonald, *Dublin Airport Operating Restrictions - Quantification of Impacts on Future Growth September 2020 Update 2022 2025 Period*, Draft version 5.2, September 2020.
[15] Department of Transport, Tourism and Sport. *A National Aviation Policy for Ireland*, August 2015, Action 4.5.1, page 50.
[16] InterVISTAS, *Update Report Draft Dublin Airport Economic Impact of Operating Restrictions*, October 2020.
[17] World Health Organisation, *Environmental Noise Guidelines for the European Region*, 2018, ISBN 978 92 890 5356 3.
[18] Bickerdike Allen Partners LLP, *Dublin Airport North Runway Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment*. A11267_12_RP032_2.0, November 2020.

increase noise levels that could cause potentially significant adverse effects compared to the 2018 situation. There would be 30,186 people exposed to increases in $L_{den}$ levels and 17,981 people exposed to increases in $L_{night}$ levels compared to the 2018 situation with the potential to cause significant adverse effects. The consequences of not taking action to evaluate new additional measures would involve potential adverse effects associated with the increase in $L_{night}$ and $L_{den}$ levels in 2025 compared to the 2018 situation.

# 4. Assessment of Additional Measures

## 4.1 Outline of Proposed Additional Measures

The next stage of the Aircraft Noise Regulation assessments undertaken was to use the Balanced Approach to identify additional noise measures that could be considered in addition to the Forecast without New Measures scenario to reduce the predicted increase in noise levels that could cause potentially significant adverse effects compared to the 2018 situation.

The types of additional noise measures considered following the Balanced Approach were:

- Reduction of noise at source such as promoting quieter aircraft;
- Noise abatement operational procedures, such as: design or preferential use of runways to avoid noise-sensitive areas; flight departure and approach routings; use of reverse thrust; and use of departure, approach and/or ground based operating procedures; and
- Land use planning and management (includes planning, noise insulation and financial instruments for, for example, promoting use of quieter aircraft).

The additional measures identified were then evaluated to determine if they continue to meet the cNAO if implemented and reduce the number of people potentially exposed to increases in Lden and Lnight levels that can potentially cause significant adverse impacts compared to the 2018 situation. The methodology for completing this involved the following:

1. Conducting a screening assessment of potential new noise mitigation measures;
2. Determining the effectiveness of the feasible measures identified in screening assessment;
3. Determining the cost-effectiveness of feasible measures considered effective; and
4. Determining if operational restriction measures would be required to meet the cNAO. If so, additional feasibility, effectiveness and cost-effectiveness analysis on operational restriction measures would then be undertaken.

### 4.1.1 Screening of Potential Additional Measures

Table 3-1 of Ricondo & Associates Inc 'Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report' provides a comprehensive matrix of 27 noise mitigation measures considered, including the existing and planned measures included in the Forecast without New Conditions scenario. Of the 27 measures considered, existing, currently planned, or those determined not to be practical and/or safe were screened out and not considered further as feasible additional measures.

The qualitative screening analysis identified the following potential additional measures to be feasible for continued evaluation:

- Preferential runway use, including runway use respite / alternate runway use; and
- Residential sound insulation schemes.

### 4.1.2 Effectiveness of Feasible Potential Additional Measures

In accordance with the Balanced Approach, the feasible '*noise abatement operational procedures*', i.e. preferential runway use measures, were first assessed in detail to determine their effectiveness in addressing the predicted night-time noise impacts. Those found to be effective were then carried forward and used to assess effectiveness of the *land use planning and management* measures, i.e. a modified or additional sound insulation programme.

Eight preferential runway use scenarios were assessed for effectiveness by Bickerdike Allen Partners LLP[19] and summarised in Table 3-2 of the Ricondo & Associates, Inc 'Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Cost Effectiveness Analysis Report'. The scenarios assessed all maintained a daytime mode of runway operation as per the existing planning permission however, differed in how the runways might be used in night-time hours.

When compared to the 2018 situation, all eight were found to be effective. Of the eight preferential runway use measure scenarios assessed, only one was found not to be effective in reducing the number of highly annoyed and highly sleep disturbed below the Forecast without New Measure scenario. The scenario (Scenario 7) was eliminated from further consideration.

The number of people exposed to a change in noise levels (considered to cause a potential significant adverse effect) compared to the 2018 situation was then evaluated for the remaining seven preferential runway use scenarios. Those which indicated the lowest total number of people exposed to significant adverse effect changes in $L_{night}$ and $L_{den}$ noise levels compared to the 2018 situation were then selected to proceed forward in the analysis.

Assessment findings showed the following preferential runway measure option to have the lowest number of people exposed to changes that potentially cause significant adverse effects. It also met the cNAO.

**SCENARIO 2: Option 7b and South Runway Only between 0000 and 0600**

**0700 to 2359**: When winds are westerly, Runway 28L shall be preferred for arriving aircraft. Either Runway 28L or 28R shall be used for departing aircraft as determined by air traffic control. When winds are easterly, either Runway 10L or 10R as determined by air traffic control shall be preferred for arriving aircraft. Runway 10R shall be preferred for departing aircraft.

**2300 to 2359:** When winds are westerly, Runway 28L shall be preferred for arriving aircraft. Either Runway 28L or 28R shall be used for departing aircraft as determined by air traffic control. When winds are easterly, either Runway 10L or 10R as determined by air traffic control shall be preferred for arriving aircraft. Runway 10R shall be preferred for departing aircraft.

**0000 to 0559:** Movements preferred on the South Runway only (single runway).

**0600 to 0659:** When winds are westerly, Runway 28L shall be preferred for arriving aircraft. Either Runway 28L or 28R shall be used for departing aircraft as determined by air traffic control. When winds are easterly, either Runway 10L or 10R as determined by air traffic control shall be preferred for arriving aircraft. Runway 10R shall be preferred for departing aircraft.

*Source: Ricondo & Associates Inc. Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report, November 2020*

Scenario 2 did however show an increase in the number of people highly impacted by night-time noise (i.e. at or above 55 dB $L_{night}$) when compared to the Forecast without New Measures and 2018 situation. As this scenario did not adequately address those people highly impacted by night-time noise, the residential sound insulation grant scheme measure was then considered for the selected preferential runway option. Sound insulation is recognised in the Balanced Approach and by the Environmental Protection Agency (EPA) as a measure for reducing the effects of aircraft noise[20]. To determine the effectiveness of a proposed residential sound insulation measure for purposes of this assessment, all people exposed to "high" external noise levels (high noise impact levels is 55dB $L_{night}$ or higher consistent with the thresholds discussed in Section 3.3 of the 'Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment' by Bickerdike Allen Partners LLP, have had a 5dB reduction in noise level applied to determine a residual noise assessment rating. If a medium residual noise assessment rating ($L_{night}$ levels between 50 and 55 dB) is determined following this calculation the sound insulation is considered to have reduced the effect on a person inside the dwelling at night from a high level to a medium level of impact. Based on the analysis, the proposed sound insulation grant scheme was found to be effective in reducing the exposure levels from high to medium level of impact for people inside a dwelling during night-time hours. The 5dB was chosen as a reasonable assumption on the improvement in internal sound levels that can be achieved through insulation measures.

[19] Bickerdike Allen Partners LLP. *Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment*, November 2020.
[20] Environmental Protection Agency, *Guidelines on the information to be Contained in Environmental Impact Assessment Reports* - DRAFT, August 2017.

### 4.1.3 Cost Effectiveness of Additional Measures

The Aircraft Noise Regulation recommends the use of a cost-effectiveness analysis as part of the overall Balanced Approach process in assessing new mitigation measures needed to meet a NAO.

Under the Aircraft Noise Regulation Act, a cost-effectiveness analysis is required when assessing multiple noise reduction measures. Effectiveness is based on the degree of noise exposure reduction that a measure can provide compared to a baseline noise exposure level. The selected *effectiveness* units or noise metrics and the results of the Forecast without New Measures scenario noise exposure levels were developed by Bickerdike Allen Partners LLP.[21]

Cost-effectiveness is then determined by dividing the cost to implement the measure by the change in baseline noise exposure levels resulting from the noise mitigation measures. A cost-effectiveness analysis of noise reduction measures for achieving the cNAO for Dublin Airport was undertaken by Ricondo & Associates Inc[22]. This involved calculating the ratio between cost and the reduction in the number of people exposed to a selected unit compared to a future "do nothing" (or as per the Aircraft Noise Regulation "Forecast without New Measures") noise exposure levels and the 2018 situation.

The cost-effectiveness analysis was completed for Scenario 2 with the proposed sound insulation grant scheme for people who are affected by high to very high levels of impacts at night. The cumulative cost calculated for the scenario was estimated at €2,013,525. This was then divided by the predicted reduction in highly annoyed and highly sleep disturbed populations compared to the 2018 situation to assess the cost-effectiveness in meeting the cNAO. The cost-effectiveness results representing the ratio of cost per person no longer considered highly annoyed or highly sleep disturbed with sound insulation measures in place were:

- Cost-effectiveness ratio to reduce the number of people highly sleep disturbed of €113; and
- Cost-effectiveness ratio to reduce the number of people highly annoyed of €49.

### 4.1.4 Need For Operating Restriction Measures

Scenario 2 with the proposed sound insulation grant scheme for people who are affected by high to very high levels of impacts at night met the cNAO, reduce significant adverse effects caused by increases in noise compared to the 2018 situation, and reduction in number of people highly impacted by night-time noise. No operating restriction measures were therefore deemed necessary.

Although the additional measures identified through the Balanced Approach process met the cNAO, daa proposes to include a limitation on the use of North Runway (10L-28R) between 0000 and 0559 and an Annual Night Quota (ANQ) to ensure that noise levels forecast to occur in 2025 meet the cNAO. The effectiveness of this limitation and ANQ were both included in the preferential runway use assumptions and forecast fleet mix of the assessments undertaken (including the cost-effectiveness assessment summarised in Section 4.1.3).

daa propose the limitation on the use of the North Runway would be as follows: North Runway would not be used for take-off or landing movements between 0000 and 0559, except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems, declared emergencies at other airports or where the length is required for a specific aircraft type. This limitation was considered a runway use operating restriction. Assessment determined that the proposed limitation is not expected to constrain aircraft movements or access at Dublin Airport, and is not expected to cause additional costs to airlines, passengers, the European air traffic system or the economy.[23]

The proposed ANQ measure would involve assigning a quota count value to individual aircraft movements based on the certifiied noise level of the aircraft. The quota count accumulates for each air traffic movement against the noise quota across an applicable period. As such, the system allows a greater number of quieter aircraft movements within a given quota, encouraging the use of quieter aircraft. Although a quota count measure would also considered an operating restriction, it was appropriate to include to allow the traffic movements at night forecast up to 2025, whilst ensuring that the overall effects of aircraft noise are no worse than that upon which North Runway permission was originally granted, and does not exceed the effects in the 2018 situation.[24]

[21] Bickerdike Allen Partners LLP. *Dublin Airport North Runway, Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment,* November 2020.
[22] Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Cost Effectiveness Analysis,* November 2020.
[23] Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Forecast Without New Measures and Additional Measures Assessment Report* November 2020.

## 4.2 Environmental and Competitive Effects of Proposed New Measures

Annex I of the Aircraft Noise Regulation requires *an overview of the possible environmental and competitive effects of the proposed measures on other airports, operators and other interested parties*. As the proposed new measures do not impact capacity up to 2025 at Dublin Airport or other airports, the proposed new measures would not cause environmental or competitive effects on other airports, operators, and other interested parties.

Please refer to 'Dublin Airport North Runway Relevant Action Application Environmental Impact Assessment Report' AECOM Ireland Limited (December 2020) for information related to potential effects on the local environment if the proposed measures are implemented.

## 4.3 Preferred Option

The purpose of the Aircraft Noise Regulation assessments undertaken was to assess whether amending, replacing or revoking two night-time operating restrictions in the North Runway Planning Permission conditions would require additional new mitigation measures to: meet the cNAO; and minimise potential significant adverse effects caused by increases in noise compared to the 2018 situation.

Based on the cost-effectiveness analysis findings, the following measures comprise the Preferred Option (or Forecast including Additional Measures scenario) that was recommended to be added to existing and planned noise reduction measures and implemented to amend North Runway Permitted Condition 3(d) and replace North Runway Permitted Condition 5:

- *Three-Runway Preferential Runway Use*
  - *0700 to 2259: When winds are westerly, Runway 28L shall be preferred for arriving aircraft. Either Runway 28L or 28R shall be used for departing aircraft as determined by air traffic control. When winds are easterly, either Runway 10L or 10R as determined by air traffic control shall be preferred for arriving aircraft. Runway 10R shall be preferred for departing aircraft.*
  - *2300 to 2359: Same as preferential runway use between 0700 to 2259.*
  - *0000 to 0559 – Limit take-off or landings to South Runway (Runway 10L-28R) except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports or where Runway 10R-28L length is required for a specific aircraft type. Refer to the proposed runway use limitation measure for further restrictions on the use of the North Runway between 0000 and 0559.*
  - *0600 to 0659 - Same as preferential runway use between 0700 to 2259.*
- *Provide residential sound insulation grant for dwelling units with exterior levels at 55 dB $L_{night}$ or higher based on forecast 2025 levels.*
- *Runway use limitation: Runway 10L-28R shall not be used for take-off or landing between 0000 hours and 0559 hours (except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports or where Runway 10R-28L length is required for a specific aircraft type).*
- *Annual night-time quota count of 7,990 between 2330 to 0600.*[24]

For purposes of the North Runway application, the Forecast including Additional Measures proposed the following Relevant Action:

- Amend Condition 3(d) so that it reads: *Runway 10L-28R shall not be used for take-off or landing between 0000 and 0559 except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports or where Runway 10L-28R length is required for a specific aircraft type.*
- Replace the existing operating restriction imposed by Condition 5 with a noise quota system also known as an Annual Night Quota that would read: *A noise quota system is proposed for night time noise at the airport. The airport shall be subject to an annual noise quota of 7990 between the hours of 2330hrs and 0600hrs.*

## 4.4 Forecast including Additional Measures compared to Permitted Operation Situation

As the Forecast including Additional Measures scenario and the Permitted Operations Situation scenario (with Condition 3(d) and Condition 5 in place in 2025) both meet the cNAO, a cost-effectiveness analysis was also conducted to compare and assess which of the two was more cost-effective.

The assessment and findings are documented in Ricondo & Associates Inc 'Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Cost Effectiveness Analysis'.[24] In summary, the cost-effectiveness ratio to reduce:

- the number of people highly sleep disturbed for the Forecast including Additional Measures was €113, while for the Permitted Operations situation was €42,215; and
- the number of people highly annoyed for the Forecast including Additional Measures was €49, while for the Permitted Operations situation was €21,162.

According to the Aircraft Noise Regulation, operating restrictions should only be considered if needed to meet an objective and if not more restrictive than necessary to meet an objective. The findings demonstrated that the Permitted Operations Situation by itself would meet the cNAO but is more restrictive and not as cost-effective compared to the Forecast including Additional Measures scenario.

[24] Ricondo & Associates Inc. *Dublin Airport North Runway, Regulation 598/2014 (Aircraft Noise Regulation) Cost Effectiveness Analysis*, November 2020.