An tÚdarás Inniúil um Thorann Aerárthaí

Aircraft Noise Competent Authority

A review of the effectiveness of noise mitigation measures at Dublin Airport for the year 2022 on achieving the noise abatement objective

27 July 2023

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Glossary

ANCA - Aircraft Noise Competent Authority.

Balanced Approach - The aircraft noise management policy of the International Civil Aviation Organization that consists of identifying a noise problem at a specific airport and analysing various measures available to reduce noise. The Balanced Approach aims to address noise problems on an individual airport basis and identify the noise related measures that achieve maximum environmental benefit most cost effectively using objective and measurable criteria.

daa - The airport authority for Dublin Airport.

Highly Annoyed (HA) – Metric used to describe the number of people calculated to be Highly Annoyed by Aircraft Noise.

Highly Sleep Disturbed (HSD) – Metric used to describe the number of people calculated to be Highly Sleep Disturbed by Aircraft Noise.

ICAO - International Civil Aviation Organization, a specialised agency of the United Nations to coordinate the principles and techniques of international air navigation and transport.

L_{den} - (day-evening-night noise level in dB). The long-term annual average indicator in decibels, designed to assess annoyance. It refers to an A-weighted average sound pressure level over all days, evenings and nights in a year, with an evening weighting of 5 dB and a night weighting of 10 dB as noise is generally more annoying during these periods.

L_{night} - (night noise level in dB). The long-term annual average indicator in decibels, designed to assess sleep disturbance. It refers to an A-weighted annual average night period of exposure.

NAO - Noise Abatement Objective

WHO - The World Health Organization. A specialised agency of the United Nations responsible for international public health.

Introduction

In 2022, ANCA defined a Noise Abatement Objective (NAO) for Dublin Airport. An NAO is a policy for managing the effects of aircraft noise emissions on the surrounding communities and environment at an airport. It is a plan to ensure that any growth at the airport occurs in the most sustainable manner possible. The NAO for Dublin Airport was defined by ANCA to ensure that aircraft noise is considered as part of the sustainable development of the airport. It has a clear policy objective set against measurable criteria and outcomes.

The airport authority for Dublin Airport (daa) is responsible for introducing and ensuring that airport users comply with noise mitigation measures in place at the airport.

This report reproduces the NAO for Dublin Airport together with an inventory of the measures identified by daa to mitigate the noise impacts of aviation activity on the communities surrounding Dublin Airport. Environmental noise legislation standardises how environmental noise impacts are calculated and presented in the European Union. Noise contour maps are provided in this common format for both the NAO baseline year of 2019 and assessment year of 2022.

The NAO has specific outcomes to be achieved and an analysis of operational data is presented for the health impacts of aviation activity.

On an annual basis, ANCA has a remit to review the effectiveness of noise mitigation measures at Dublin Airport in achieving the NAO.

01

The Noise Abatement Objective

01 The Noise Abatement Objective

A noise management plan for Dublin Airport

The NAO for Dublin Airport is structured in a manner that sets objective and measurable criteria to limit and reduce the adverse effects of aircraft noise on health and quality of life over time.

Although technology may not yet be at the stage that will permit the delivery of the desired objectives in the immediate term, the NAO establishes outcomes that may require measures to be put in place to ensure that the noise outcomes will be achieved over time.

The Noise Abatement Objective for Dublin Airport

The NAO for Dublin Airport has five parts:

Part 1	**Policy Objective** Limit and reduce the long-term adverse effects of aircraft noise on health and quality of life, particularly at night, as part of the sustainable development of Dublin Airport.
Part 2	**Explaining the Objective** Noise from Dublin Airport should be limited and reduced in line with principles of sustainable development. As Dublin Airport grows, the long-term adverse effects on human health and quality of life should progressively reduce over the lifetime of this NAO. The Balanced Approach will be used to ensure that cost-effective, practicable and sustainable measures are implemented to achieve this objective.
Part 3	**Measurable Criteria** The NAO will be primarily measured through the number of people highly sleep disturbed and highly annoyed in accordance with the approach recommended by the World Health Organization's Environmental Noise Guidelines 2018 as endorsed by the European Commission through Directive 2020/367, taking into account noise exposure from 45 dB L_{den} and 40 dB L_{night}. These metrics describe those chronically disturbed by aircraft noise. These metrics help articulate the effect of aircraft noise on health and quality of life. The following will also be used to help identify where noise exposure results in the populations experiencing the harmful effects. These are the number of people exposed to aircraft noise above: • 55 dB L_{night} (a level of night-time noise exposure described by the WHO as representing a clear risk to health) • 65 dB L_{den} (where a large proportion of those living around Dublin Airport can be considered highly annoyed) In order to measure performance, these metrics shall be completed using a noise model prepared in accordance with the methodology described in Directive 2015/996 (European Civil Aviation Conference (ECAC) Doc.29 4th Edition or as amended). The noise model shall be validated using local noise and track keeping performance data from Dublin Airport's systems.

Part 4 Expected Outcomes

In context of its recovery from the global pandemic, noise exposure from Dublin Airport is expected to increase up to 2025. Whilst the resultant health effects are expected to be lower than those which occurred prior to the pandemic and in the years 2018 and 2019, these effects should then reduce over the medium to long-term, to improve the noise situation at Dublin Airport whilst allowing for sustainable growth. ANCA therefore expects the following outcomes to be achieved through this NAO as set against the measures described in Part 3.

The number of people highly sleep disturbed and highly annoyed shall reduce compared to conditions in 2019:

- The number of people highly sleep disturbed and highly annoyed in 2030 shall reduce by 30% compared to 2019;
- The number of people highly sleep disturbed and highly annoyed in 2035 shall reduce by 40% compared to 2019;
- The number of people highly sleep disturbed and highly annoyed in 2040 shall reduce by 50% compared to 2019 and;
- The number of people exposed to aircraft noise above 55 dB L_{night} and 65 dB L_{den} shall be reduced compared to 2019.

Part 5 Monitoring

Monitoring of the NAO will be informed by annual reports which will be reviewed by ANCA as part of its obligations under the Aircraft Noise (Dublin Airport) Regulation Act 2019.

02

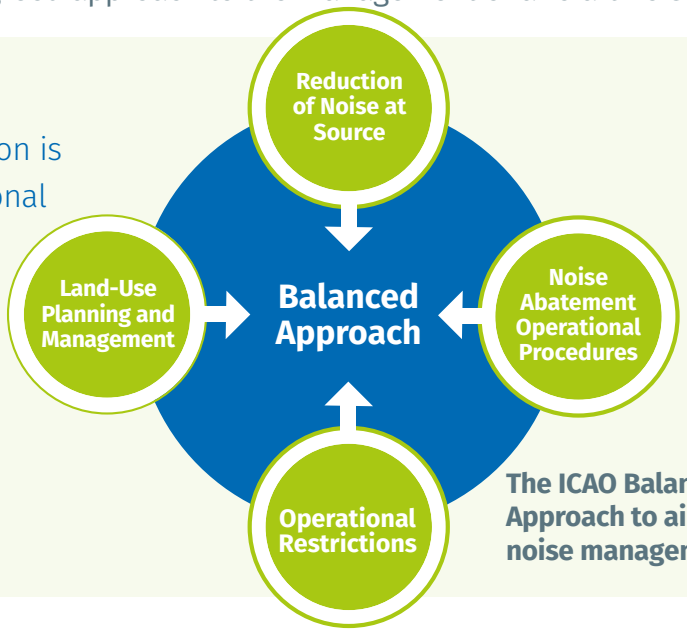
Aircraft Noise Management

02 Aircraft Noise Management

Aviation policy is coordinated at an international level by the International Civil Aviation Organization (ICAO). ICAO is a specialist division of the United Nations that guides the planning and development of the international air transport system. The recommendations of ICAO are given legislative effect at European and national level. The main overarching ICAO policy on aircraft noise is the Balanced Approach. This policy provides an internationally agreed approach to the management of aircraft noise.

The Balanced Approach

International policy on aviation is coordinated by the International Civil Aviation Organization, a specialised agency of the United Nations to coordinate the principles and techniques of international air navigation and transport.



The ICAO Balanced Approach to aircraft noise management

Examples of the elements of the balanced approach:

Reduction of noise at source
Technology improvements that contribute to the use of quieter aircraft.

Land use planning and management
Proactive management of noise through appropriate development policies and controls.

Noise abatement operational procedures
- Preferential runway use
- Aircraft arrival and departure procedures

Operational restrictions
- Time related airport curfews
- Runway access restrictions
- Restrictions on specific aircraft types
- Aircraft movement limits

Although aircraft noise management requires the coordination and input of a wide range of stakeholders, daa is responsible for introducing and ensuring that airport users comply with noise mitigation measures in place at the airport.

Noise mitigation measures in place at Dublin Airport

A new north parallel runway (designated as 10L/28R) commenced operations at Dublin Airport on 24 August 2022. This event increased the operational capacity of Dublin Airport from two runways to three. Data for the full calendar year encompasses the accumulated noise exposure outcomes for the periods that the airport operated in both two and three runway formats.

In response to a direction to provide information by ANCA dated 19 December 2022, daa identified the schedule of measures listed in Appendix A as the noise mitigation measures in place at Dublin Airport for 2022.

In addition to this schedule, the grant of planning permission for the north parallel runway[1] (10L/28R) at Dublin Airport contains thirty-one conditions, several of which relate to aircraft noise management. This report notes that all of these measures have not been incorporated into the noise management inventory provided by daa (Appendix A).

There are also planning conditions in place at Dublin Airport that limit the terminal passenger capacity.

1 Planning register reference number F04A/1755 / An Bord Pleanála reference number PL 06F.217429

03

Aircraft Activity

03 Aircraft Activity

Aircraft movements at Dublin Airport

Quantifying the number of arriving and departing aircraft at an airport is not a reliable indicator that an increase or decrease in noise exposure will follow but it is relevant to establish whether noise mitigation measures continue to remain effective in the context of the growth of an airport. Passenger numbers and / or aircraft movement increases are often used as growth indicators. The following figures depict the annual aircraft movements by year and hourly segments of the 24-hour day for Dublin Airport during 2019 and 2022.

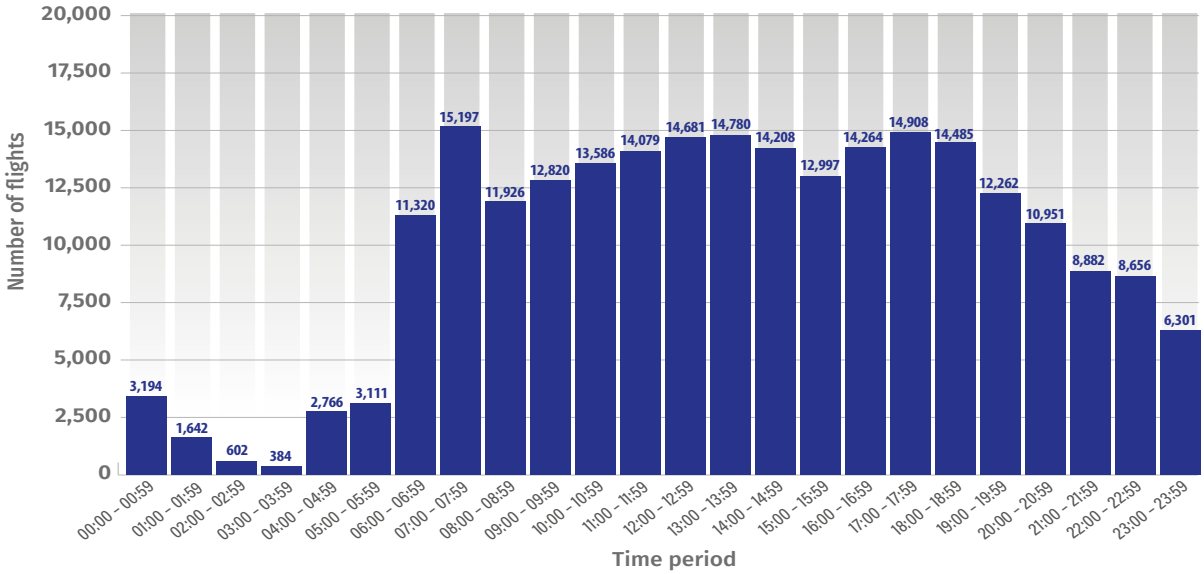


Figure 1 - 2019 Annual flight activity by hour

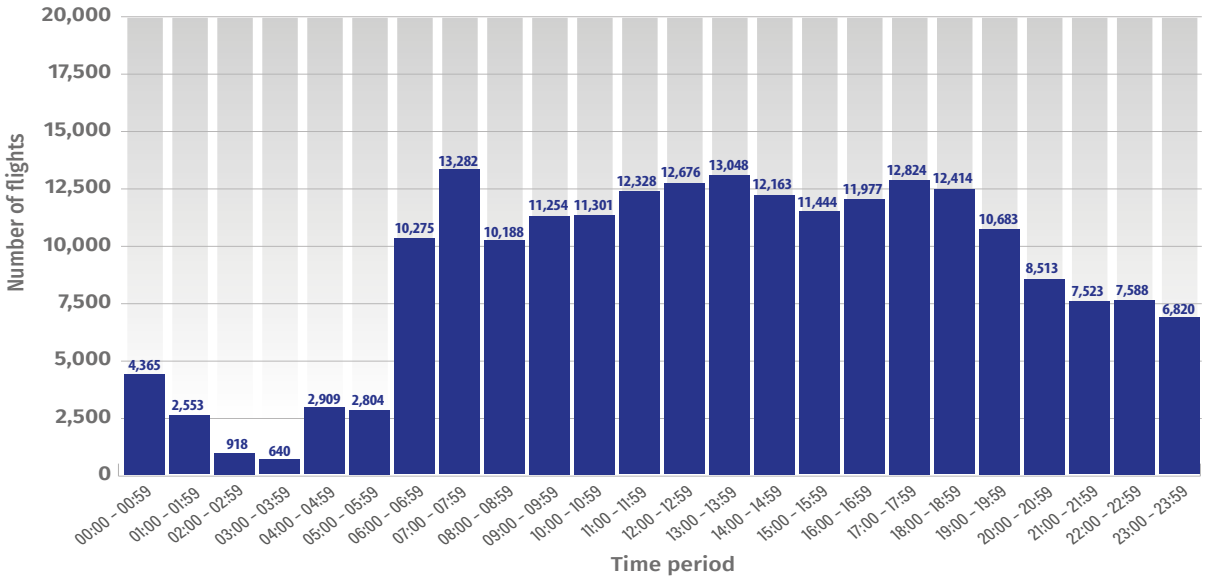


Figure 2 – 2022 Annual flight activity by hour

Figures 1 to 5 show that, although the overall number of aircraft movements was lower in 2022 than in 2019, the number of aircraft movements between the night-time hours of 23:00 and 05:00 was higher in 2022 than in 2019

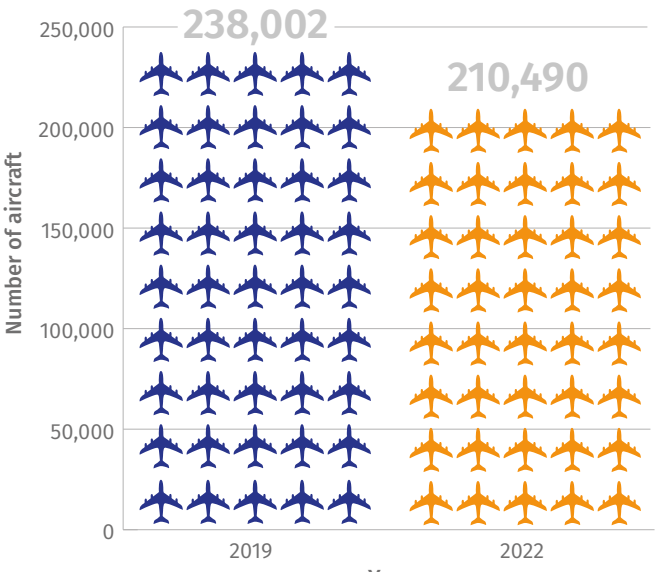


Figure 2(a) – Annual aircraft movements by year

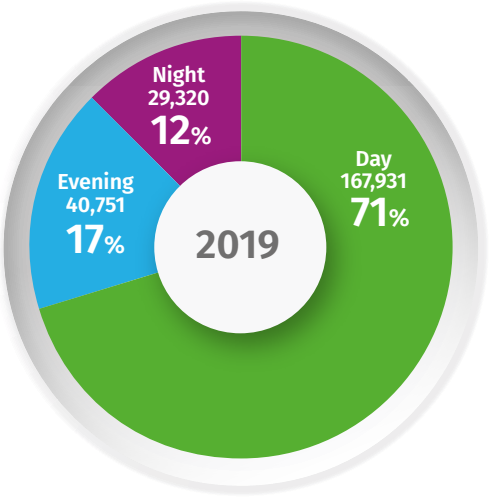


Figure 3 – 2019 Annual aircraft movements by period of the day

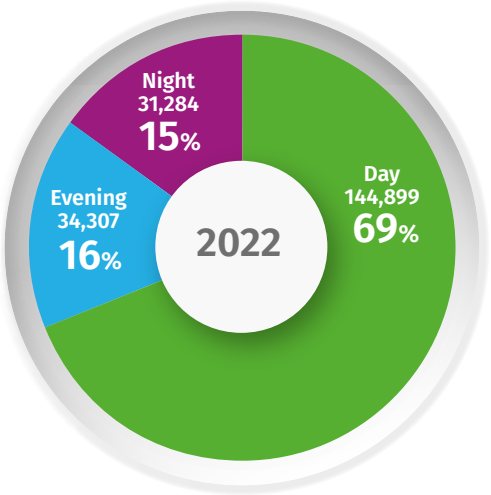


Figure 4 – 2022 Annual aircraft movements by period of the day

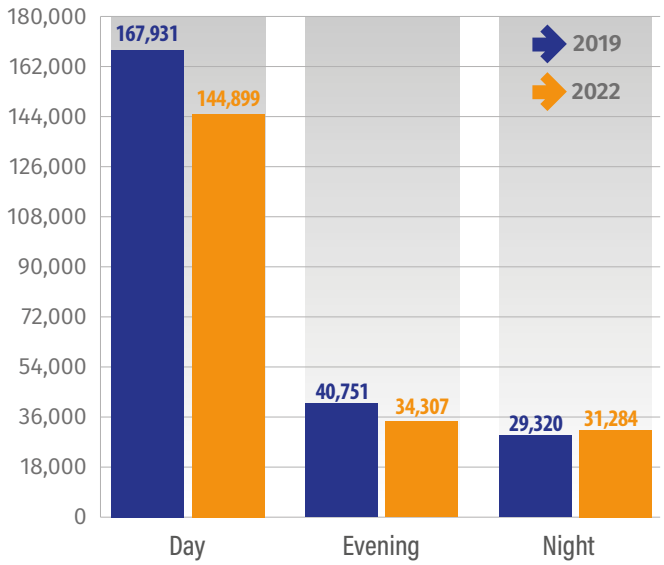


Figure 5 – Annual Aircraft Movements by year

Presenting the noise impact of aircraft activity at Dublin Airport

Environmental noise assessments are based on noise that is averaged across a full calendar year. Although noise is not experienced in an averaged way, this approach permits:

- an examination of noise exposure trends over time and the effects of aircraft noise;
- a comparison of different ways of operating the runways;
- an examination of the predicted impact of development proposals.

The impact of aircraft noise is presented through annual noise contour maps that show the evolution of the noise climate in the communities around an airport.

Data relating to the noise impact of individual aircraft events around Dublin Airport is available on a near-live and historical basis on the daa public web portal Webtrak[2].

The aircraft noise impact on the communities around Dublin Airport is presented in the following pages for both the 2019 NAO baseline and the 2022 assessment years. Noise contour maps are provided for both the combined 24 hour (weighted) day-evening-night period and the night-time period. The periods of a day are defined in environmental noise legislation as: Day is 07:00-19:00; Evening is 19:00-23:00; Night is 23:00-07:00.

These contour maps are published on the maps section of the ANCA website[3] on an annual basis to facilitate an examination of the aircraft noise impact down to the level of individual properties. Extracts of these maps are reproduced in this report for the purposes of assessing the effectiveness of the noise mitigation measures in place, in achieving the NAO.

The primary noise metrics prescribed by environmental noise legislation are:

i. The night-time indicator $L_{night;}$
ii. The weighted day-evening-night indicator $L_{den.}$

There is more information on the ANCA website explaining what the L_{den} and L_{night} indicators mean and why they are used.

2 https://webtrak.emsbk.com/dub1
3 https://www.fingal.ie/aircraftnoiseca

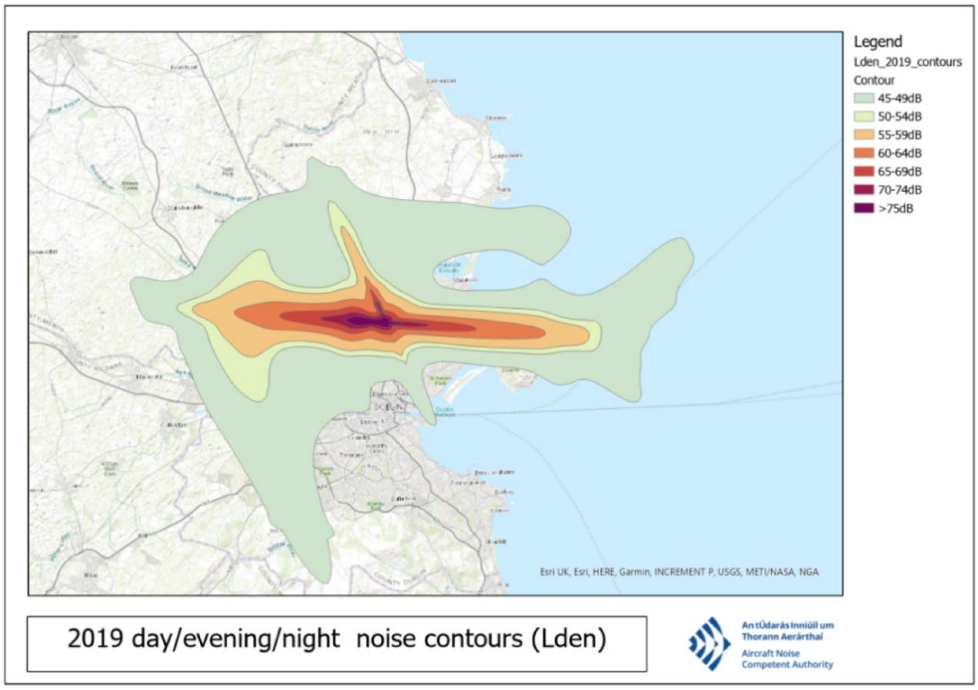


Figure 6 – 2019 Day/evening/night noise contours (L_{den})

Dublin Airport operated a single primary runway and shorter cross-wind runway during 2019. The asymmetrical contour shape reflects the westerly dominated operations due to prevailing wind conditions.

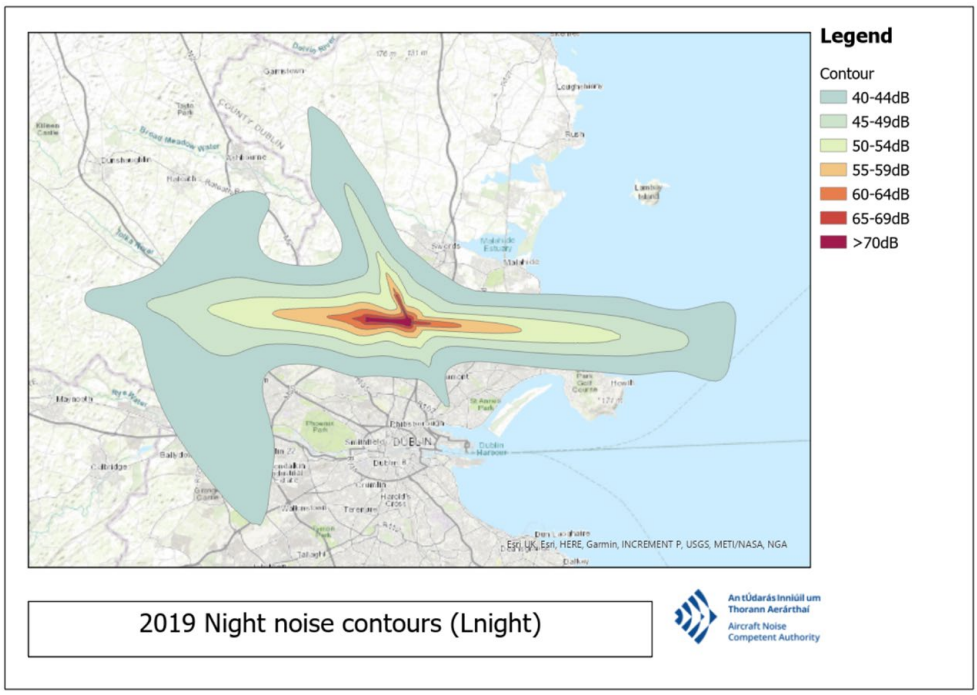


Figure 7 – 2019 Night noise contours (L_{night})

These maps can be examined on the interactive viewer on the Maps Section of the ANCA website down to the level of individual properties.

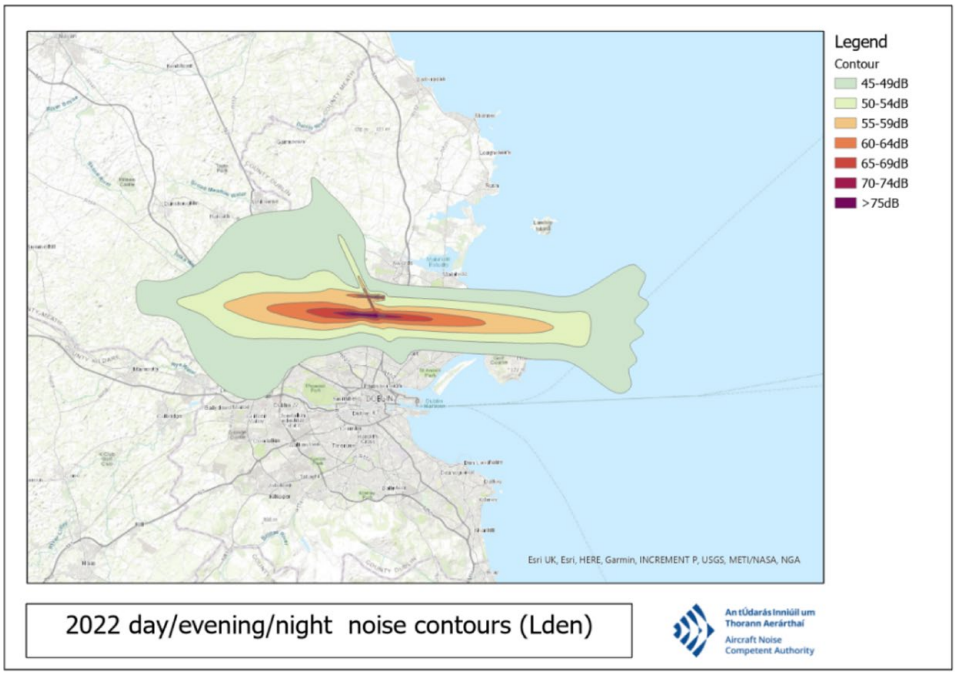


Figure 8 – 2022 Day/evening/night noise contours (L_{den})

The new north parallel runway (10L/28R) opened for restricted hours from 24 August 2022. The impact of this runway on the full-year contours is therefore limited.

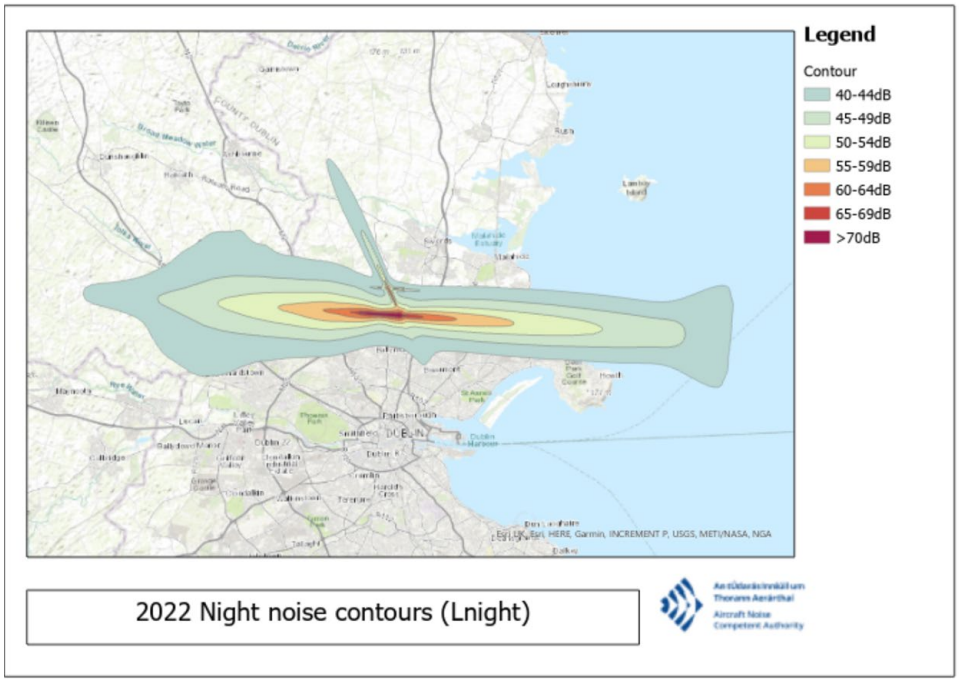


Figure 9 – 2022 Night noise contours (L_{night})

Planning conditions restrict the use of the north parallel runway during night-time hours. Permitted exceptions to this provision are detailed in planning consent conditions

04

Implementing the Noise Abatement Objective

04 Implementing the Noise Abatement Objective

Quantifying the impact of aircraft noise on human health

The aircraft noise contour maps permit the impact of aircraft noise on the population to be quantified using the methodologies prescribed in environmental noise legislation for the calculation of the portions of population classified as highly annoyed (HA) and highly sleep disturbed (HSD). The NAO for Dublin Airport incorporates these assessments into the expected outcomes and also places additional emphasis on assessing the number of people exposed above the priority levels of 65dB L_{den} and 55dB $L_{night.}$

The NAO applies the HA and HSD indicators to quantify and manage the long-term adverse impacts of noise on annoyance and sleep disturbance.

It is important to note that HA and HSD are used for the overall assessment and management of aircraft noise impacts on the population surrounding an airport rather than for identifying specific locations for mitigation interventions. Although the legislative priority is to avoid, limit and reduce the harmful effects of noise, mitigation measures can be implemented at specific population exposure levels such as the NAO priority levels of 55dB L_{night} or 65dB $L_{den.}$

Management of aircraft noise should include measures to limit noise at the source where possible, protect noise sensitive locations, and give priority to the prevention of noise through the implementation of the ICAO Balanced Approach, prior to the implementation of measures to mitigate the impact of noise.

The following figures compare the noise exposure outcomes as detailed within the NAO for 2019 and 2022, both those that have decreased and those which have increased.

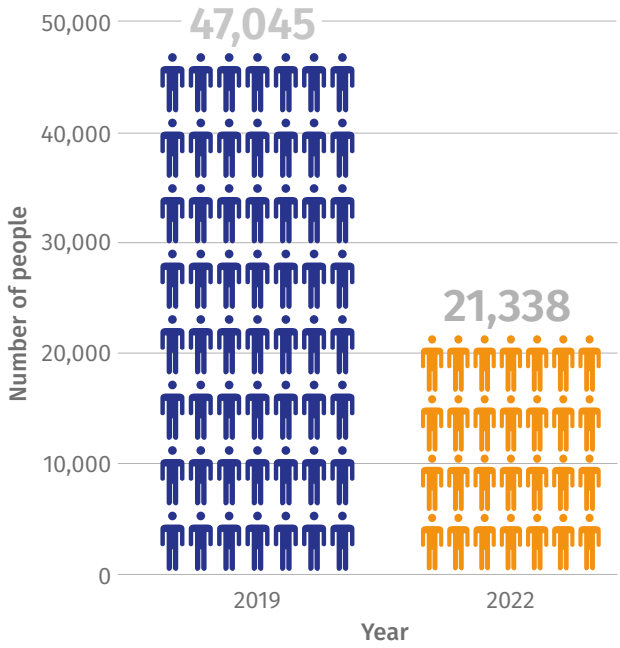
The night-time NAO indicators

The NAO utilises two indicators for monitoring the impact of night-time aircraft noise:

1) The number of people categorised as highly sleep disturbed (HSD) and,
2) The number of people exposed to aircraft noise above the priority level of 55dB $L_{night.}$

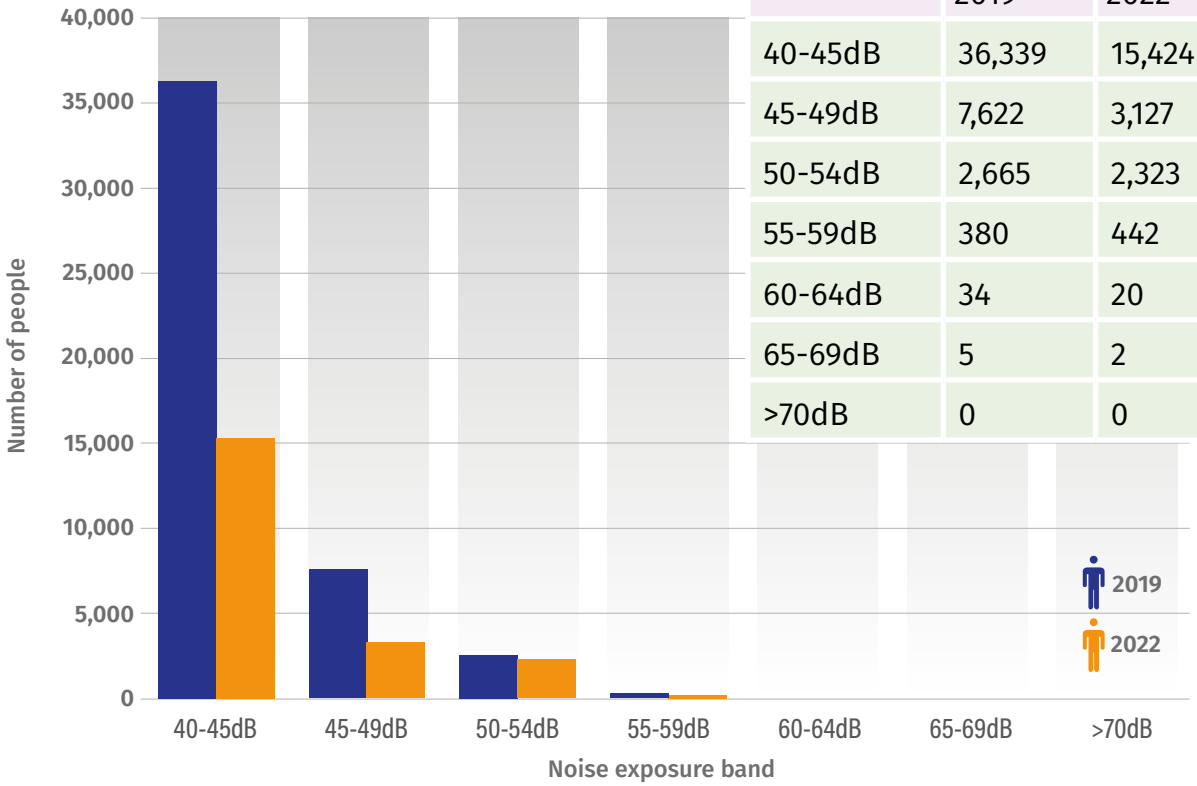
Figures 10 to 13 present these indicators on an overall assessment level and in further detail at the level of individual noise bands down to the thresholds as recommended by the World Health Organization.

Numbers of people categorised as Highly Sleep Disturbed



The NAO requires quantification of the overall numbers of people HA and HSD in accordance with the methodologies prescribed by legislation. However, it is important to understand the evolving noise impact at the level of each noise assessment band. This approach is consistent with the assessment methodologies of the World Health Organization.

Figure 10 – Number of people Highly Sleep Disturbed by year

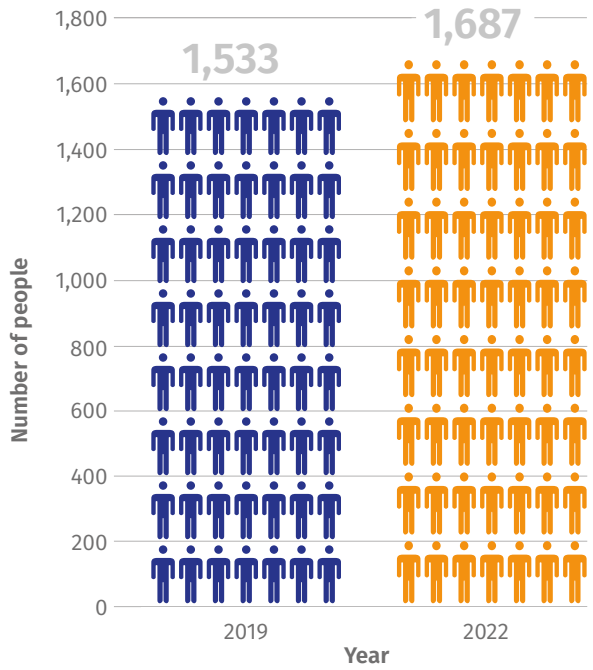


Noise band	2019	2022
40-45dB	36,339	15,424
45-49dB	7,622	3,127
50-54dB	2,665	2,323
55-59dB	380	442
60-64dB	34	20
65-69dB	5	2
>70dB	0	0

Figure 11 – Number of people Highly Sleep Disturbed by noise exposure band per year

The night-time NAO priority indicator

The fourth indicator of the NAO has regard to the total number of people exposed above the NAO priority level of 55dB $L_{night.}$



These overall figures must also be examined at the level of individual noise bands to facilitate the identification of targeted measures where necessary.

Figure 12 – Number of people exposed to aircraft noise above 55dB $_{Lnight}$

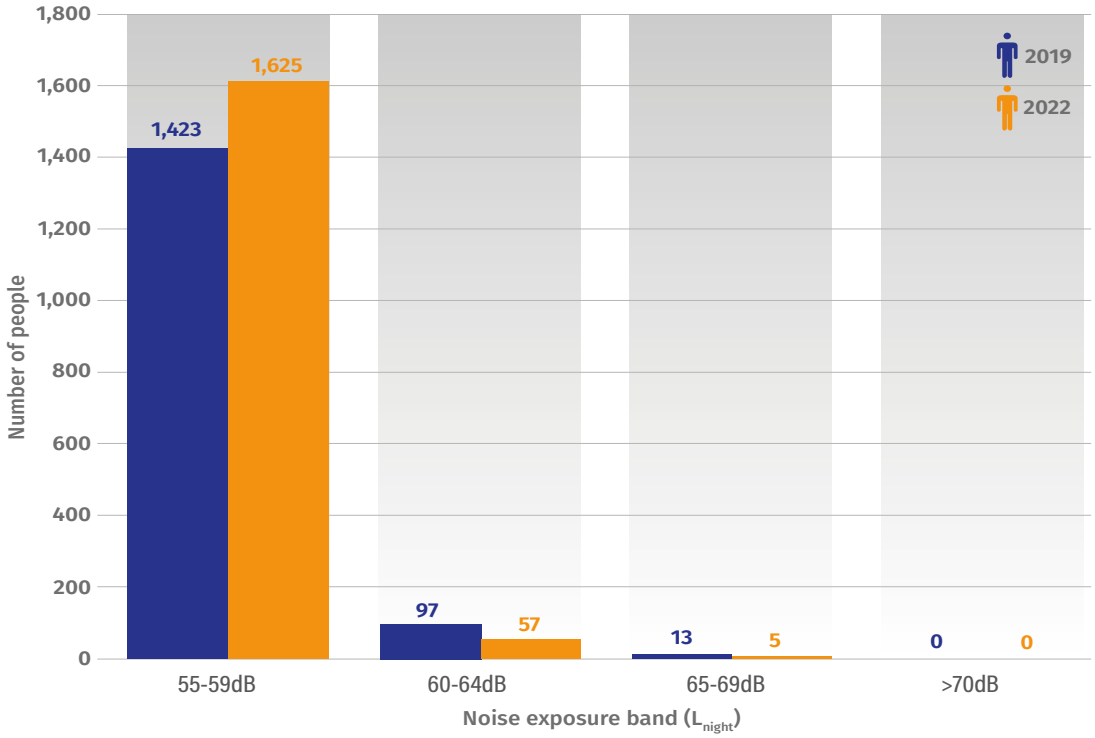


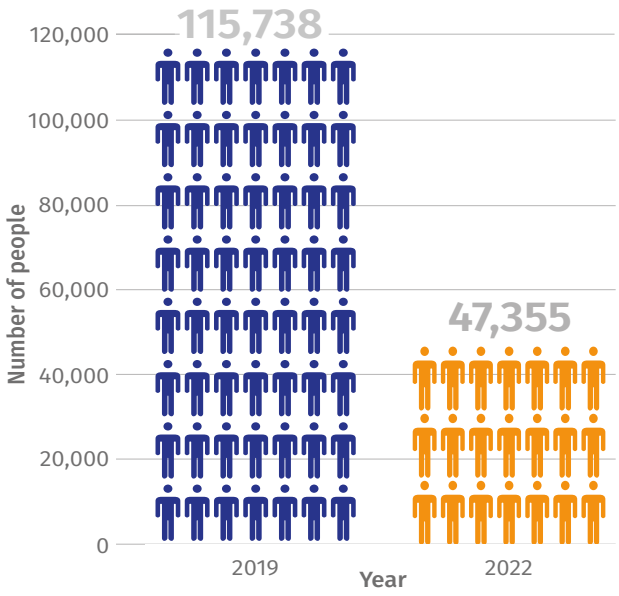
Figure 13 – Number of people exposed to >55dB L_{night} by noise exposure band per year

The day-evening-night NAO indicators

The NAO utilises two indicators for monitoring the impact of aircraft noise on a full twenty-four-hour basis:

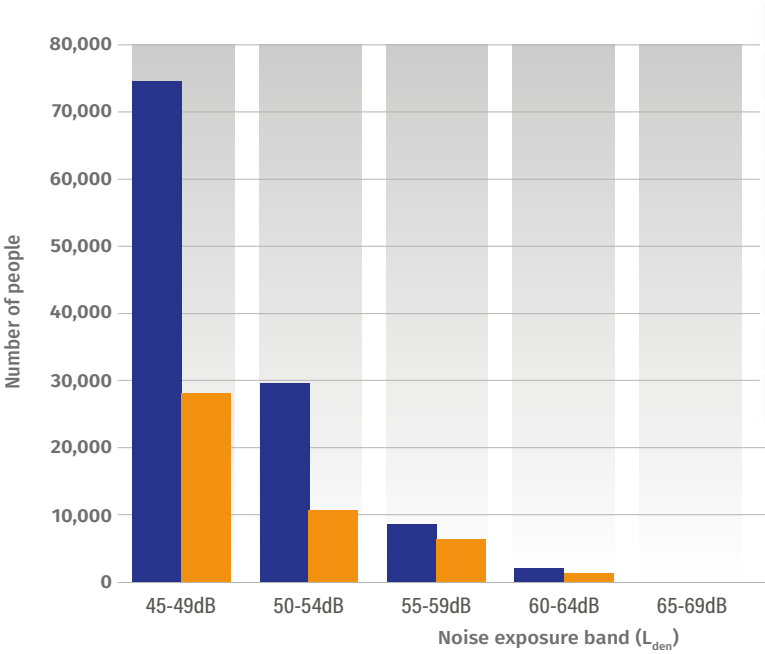
1) The number of people categorised as highly annoyed (HA)
2) The number of people exposed to aircraft noise above the priority level of 65dB $L_{den.}$

Figures 14 to 17 below present these indicators on an overall assessment level and at the level of individual noise bands down to the measurement thresholds as recommended by the World Health Organization.



Similar to the examination of data for HSD at the level of individual noise bands, the evolving noise impact at the level of each noise assessment band should also be examined for the portion of the population classified as HA.

Figure 14 – Number of people classified as Highly Annoyed by year

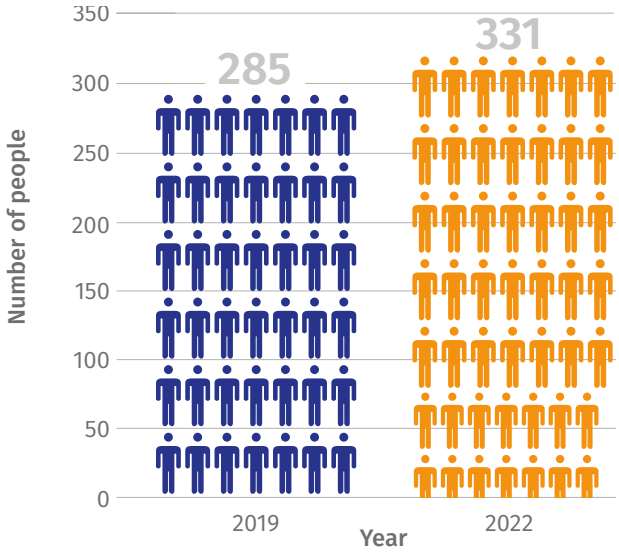


Noise band	2019	2022
45-49dB	74,905	27,929
50-54dB	29,814	11,523
55-59dB	8,546	6,227
60-64dB	2,328	1,513
65-69dB	126	154
70-74dB	15	9
>75dB	4	0

Figure 15 – Number of people classified as Highly Annoyed by noise exposure band per year.

The day-evening-night NAO priority indicator

The fourth indicator of the NAO has regard to the total number of people exposed above the NAO priority levels of 65dB $L_{den.}$



These overall figures must also be examined at the level of individual noise bands to facilitate the identification of targeted measures where necessary.

Figure 16 – Number of people exposed to aircraft noise above 65dB L_{den}

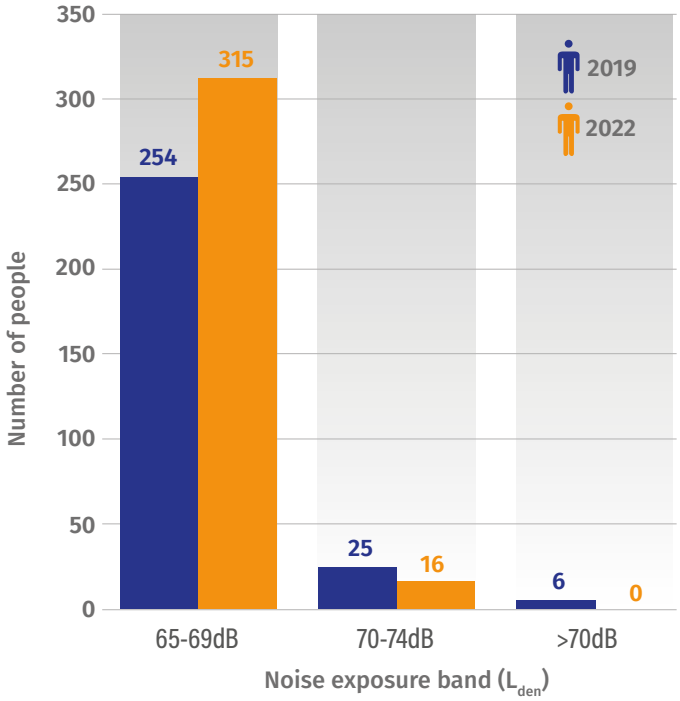


Figure 17 – Number of people exposed to >65dB L_{den} by noise exposure band per year

05

Summary of data analysis

05 Summary of data analysis

Summary of data analysis

An analysis of the data supplied by the airport authority indicates that, compared to the situation that pertained in 2019:

1) The number of people categorised as highly sleep disturbed (HSD) decreased during 2022 by 25,707 (55%). A reduction was achieved across all assessed 5dB noise bands except for the 55-59db L_{night} band.

2) The number of people exposed to aircraft noise above the priority level of 55dB L_{night} increased by 154 (10%) during 2022. The increase was limited to the 55-59dB L_{night} noise band. The noise bands 60-64dB and 65-69dB L_{night} decreased and the noise band >70dB L_{night} remained at zero. There are homes located within the 2022 55-59dB L_{night} contour east and west of the south runway that are not eligible for insulation measures through the Home Sound Insulation Programme (HSIP) or the Residential Noise Insulation Scheme (RNIS).

3) The number of people categorised as highly annoyed (HA) decreased by 68,383 (59%) during 2022. A reduction was achieved across all the assessed 5dB noise bands except for the 65-69dB L_{den} band.

4) The number of people exposed to aircraft noise above the NAO priority level of 65dB L_{den} increased by 46 (16%) during 2022. The increase was limited to the 65-69dB L_{den} noise band and the numbers within noise bands 70-74dB and >75dB L_{den} both decreased. All homes located within the 2022 65-69dB L_{den} contour are also located within home insulation eligibility contours for measures through the Home Sound Insulation Programme (HSIP) or the Residential Noise Insulation Scheme (RNIS) and are entitled to access insulation measures in accordance with the applicable criteria for those schemes.

5) Although the overall number of aircraft movements was lower in 2022 than 2019, the night-time movements increased by 1,964 (7%).

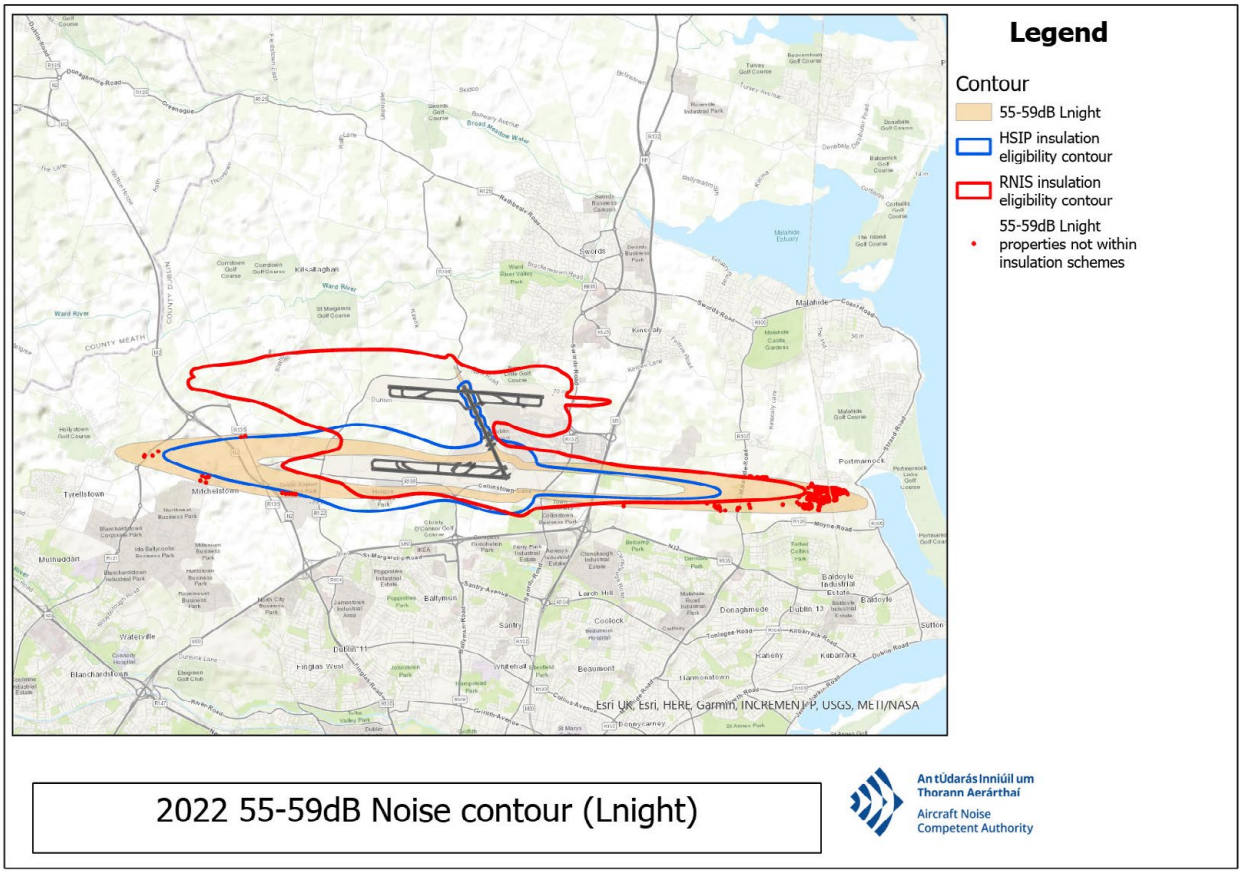


Figure 18 – 2022 55-59dB noise contour (L_{night})

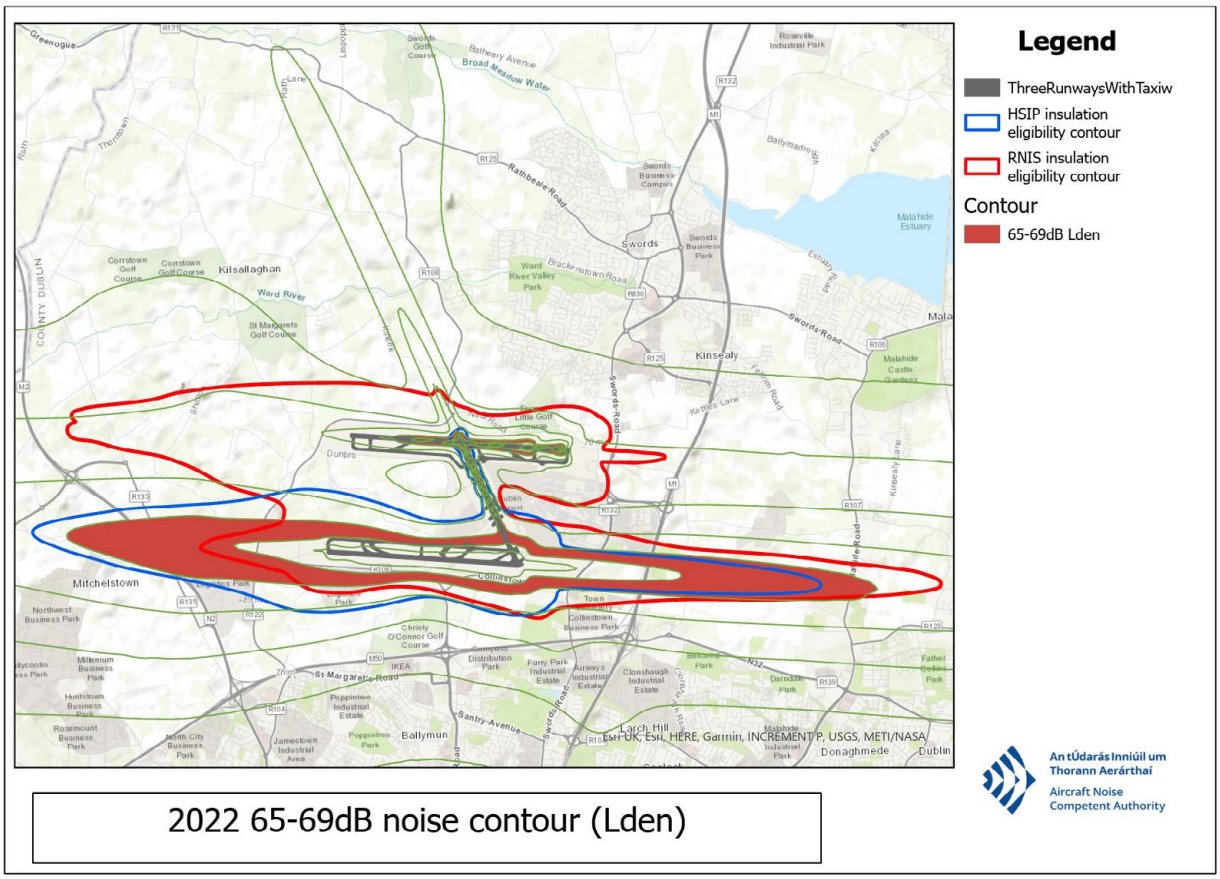


Figure 19 – 2022 65-99dB Noise contour (L_{den})

06

Summary

06 Summary

The 2022 annual aircraft noise contour maps were prepared for the full calendar year encompassing the noise situation that pertained in the months prior to and after the commencement of north runway operations. The new north runway became operational for restricted hours from 24 August 2022 and the impact of this runway on the full-year contours is therefore limited.

This review indicates that although the longer-term NAO required outcomes are lower than the 2019 baseline levels, one of the four NAO expected outcomes has not been achieved for the 2022 assessment year. The inventory of noise mitigation measures in place at Dublin Airport as submitted to ANCA does not incorporate all noise mitigation measures contained within planning consents and does not reflect three runway operations as in place since August 2022. It must be concluded that that the noise mitigation measures identified by daa and provided to ANCA (Appendix A) have not been effective in achieving the fourth NAO outcome within localised noise bands.

Although this report is for the 2022 assessment period, it is noted that airspace changes were introduced for westerly departure routes from the north runway in February 2023. This change will further affect the noise climate around the airport and may have an impact on the effectiveness of the noise mitigation measures in place at the airport for 2023.

Where effective measures are not in place to ensure that the outcomes of the NAO will be achieved, interim targeted measures may be required to mitigate the aircraft noise impact. For example, there are homes located within the NAO priority level of 55dB L_{night} that do not currently have access to home insulation measures through an approved insulation scheme.

07

Next Steps

07 Next Steps

The report finds that one of the four NAO expected outcomes has not been achieved for the 2022 assessment year and concludes that the noise mitigation measures identified by daa have not been effective in this respect. ANCA will take such action, whether under Regulation (EU) 598/2014 or the Act of 2019, or both, as it is of the opinion will be effective towards achieving that objective.

Appendix A

Appendix A

Noise Mitigation Measures in place at Dublin Airport

Noise management inventory submitted by daa in response to ANCA direction to provide information dated 19 December 2022.

Item	Ref	Description	Source	ICAO Balanced Approach Element
1*	NS-1	Encourage daa to promote quieter aircraft through incentives such as Fly Quiet programmes.	FCC-NAP	Reduction of Noise at Source
2*	NS-2	Encourage daa to work with airline partners to introduce quieter aircraft, particularly at night – including consideration of incentives	FCC-NAP	Reduction of Noise at Source
3	NA-1	Two Runway Preferential Runway Programme	FCC NAP; daa NMP; AIP;	Reduction of Noise at Source
4	NA-2	Two Runway Noise Preferential Routes (NPR's) and Track Keeping	FCC NAP; daa NMP; AIP;	Reduction of Noise at Source
5	NA-3	Noise Abatement Departure Procedures (NADP) Climb Profile	FCC NAP; daa NMP; AIP;	Noise Abatement Operating Procedure
6	NA-4	Visual Approach Jet Aircraft (Cat C/D)	FCC NAP	Noise Abatement Operating Procedure
7	NA-5/6	Continuous Climb Operations / Continuous Decent Approach	IAA ATC	Noise Abatement Operating Procedure
8	NA-7	Reverse Thrust	FCC NAP; daa NMP; AIP;	Noise Abatement Operating Procedure
9	NA-8	Engine Ground Running	FCC NAP; daa NMP; AIP;	Noise Abatement Operating Procedure
10	NA-9	Monitor and Report	FCC NAP; daa NMP;	Noise Abatement Operating Procedure
11	LU-4	Sound Insulation (RNIS)	FCC NAP; daa NMP;	Land Use & Planning Management
12	LU-6	Voluntary Dwelling Purchase Scheme	NR - RFI 116	Land Use & Planning Management
13	LU-7	Voluntary School Sound Insulation	NR - RFI 116	Land Use & Planning Management
14	CE-1	Stakeholder Engagement	FCC NAP; daa NMP;	Monitoring & Community Engagement
15	CE-2	Community Engagement Programme	FCC NAP; daa NMP;	Monitoring & Community Engagement
16	CE-3	Noise & Flight Track Monitoring System	FCC NAP; daa NMP;	Monitoring & Community Engagement
17	CE-4	Noise Complaint Management Systems	FCC NAP; daa NMP;	Monitoring & Community Engagement

*NS-1, NS-2 are noise mitigation objectives as outlined in the FCC Noise Action Plan

Compliance Statement

This report has been prepared pursuant to Section 21(2)[4] of the Aircraft Noise (Dublin Airport) Regulation Act 2019.

4 Subject to subsections (3) and (4), the competent authority shall, on or before each anniversary of the date of commencement of this section, review the effectiveness of the noise mitigation measures and operating restrictions (if any) on achieving the noise abatement objective.

An tÚdarás Inniúil um Thorann Aerárthaí

Aircraft Noise Competent Authority

Comhairle Contae Fhine Gall

Fingal County Council