An tÚdarás Inniúil um Thorann Aerárthaí

Aircraft Noise Competent Authority

Aircraft Noise Mitigation at Dublin Airport

Overview of Current Systems and Practices

Comhairle Contae Fhine Gall
Fingal County Council

September 2020

Contents

Introduction

Who We Are

Fingal County Council is the competent authority for aircraft noise regulation at Dublin Airport under the Aircraft Noise (Dublin Airport) Regulation Act 2019. The Aircraft Noise Competent Authority (ANCA) was established by Fingal County Council in 2019.

The statutory functions of ANCA are performed by the Chief Executive of Fingal County Council assisted by designated local authority officials. ANCA has access to specialist national and international expertise in aviation, acoustics, environment, and planning in the performance of its duties.

What We Do

We are responsible for ensuring that noise generated by aircraft activity at Dublin Airport is assessed in accordance with EU and Irish legislation. The 2019 Act provides for ANCA to monitor compliance with noise mitigating measures and operating restrictions at Dublin Airport.

Where a noise problem or potential noise problem at the airport is identified, ANCA ensures that the ICAO Balanced Approach to aircraft noise management is adopted (see next section).

Where there is a noise abatement objective in place at the Airport, our remit is further extended to include a review of the effectiveness of the noise mitigation measures and operating restrictions (if any) on achieving the noise abatement objective. There is currently no noise abatement objective for Dublin Airport. Consideration for the need for a noise abatement objective will take place within the process of an overall assessment of the aircraft noise environment at the airport. The 2019 Act facilitates public participation and access to appeal to An Bord Pleanála.

About this Review

This report provides an overview of current noise management and mitigation measures at Dublin Airport.

The first section presents examples of mitigation measures which can be used by the aviation industry to help reduce and manage aircraft noise. These measures are presented under the various pillars of the ICAO Balanced Approach (see next section).

The second section of the review considers the range of active and passive noise mitigating measures in place at Dublin Airport and the systems employed by the airport authority in the management of noise.

Further detail on many of the topics discussed within this review is available on the websites of the relevant authorities.

Aircraft Noise Mitigation

What is Aircraft Noise Mitigation?

Aircraft noise mitigation is any measure that is designed to limit or improve the noise climate around an airport. Measures to reduce noise may be through airport operations (active) or non-operational measures (passive).

The Balanced Approach to Aircraft Noise Management

The Balanced Approach to aircraft noise management was developed by the International Civil Aviation Organisation (ICAO). It is an internationally agreed approach to managing noise at large airports. It consists of identifying whether a noise problem exists at an airport and then analysing the various measures available to reduce noise.

Noise reduction is explored through four principal elements, namely, reduction at source, land use planning and management, noise abatement operational procedures and operating restrictions.

The objective is to address noise problems in the most cost-effective manner.

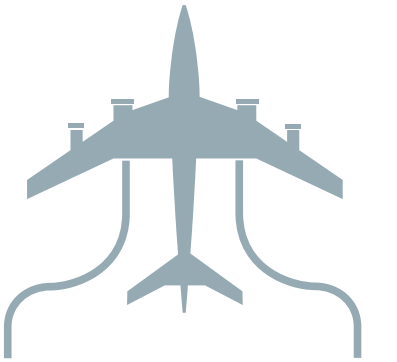
The reduction of noise at source relies on the development and uptake of progressively quieter aircraft. Advances in aircraft design have resulted in the introduction of quieter aircraft. However, providing incentives for airlines and airports to bring forward quieter aircraft types is also an important factor to encourage uptake and reduce noise at airports.

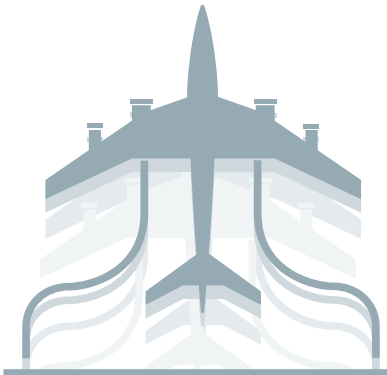
Non-operational noise mitigation measures relate to land-use planning and management. This can include measures such as zoning and noise insulation schemes.

A noise abatement operational procedure is a measure that limits or improves the noise climate at an airport without restricting aircraft access. An operating restriction is a noise-related action that limits access to or reduces the operational capacity of an airport. Operating restrictions are only to be applied as a last resort measure.

Aircraft Noise Mitigation

ICAO Balanced Approach to Aircraft Noise Management





Passive Measures

Active Measures

Noise Reduction at Source

- Aircraft Design
- Aircraft Fleet Mix
- Scheduling & Slot Selection
- Incentives

Land Use Planning & Management

- Zoning
- Noise Insulation Schemes
- Property Purchase and Relocation Schemes

Operational Procedures

- Arrival & Departure Procedures
- Directional Runway Usage
- Preferential Runway Use
- Runway Alternation
- Noise Preferential Routing
- Multiple Routes and Route Alternation

Operating Restrictions

- Movement Limits
- Noise Quotas
- Passenger Limits
- Noise Contours
- Noise Budgets

Examples of Aircraft Noise Mitigation Measures

This section provides examples of aircraft noise mitigation measures which are available to the aviation industry. Aircraft noise mitigation measures require coordination between all stakeholders including the airport, the air navigation service provider and airlines. The measures are presented under the headings of the ICAO Balanced Approach.

Examples of Aircraft Noise Mitigation Measures

Noise Reduction at Source

Aircraft Design

Better aircraft design has led to significant reductions in aircraft noise. Advances in airframe and engine technology mean that aircraft are significantly quieter today than they were 30-40 years ago. At an international level, ICAO sets progressively more stringent aircraft noise performance criteria.

Aircraft Fleet Mix

Noise is one of a range of factors which are considered when new aircraft are purchased. Noise restrictions at airports often increase the priority which airlines place on noise when selecting aircraft to upgrade their fleets.

Incentives

The ability to mitigate noise impacts is dependent upon the uptake of quieter aircraft by airlines and the use of these aircraft during times when it matters most. This is usually achieved through the use of operating restrictions. Some airports allow increased movements of quieter aircraft using noise quotas or noise contour limits (as discussed below). However, incentives to use quieter aircraft at airports can also take the form of reduced landing charges for aircraft with better environmental performance.

Scheduling and Slot Selection

The impact of aircraft noise above certain levels particularly at night-time is recognised as impacting quality of life by causing annoyance in local communities. Recurring noise issues may lead to sleep disturbance which can be harmful to health. The scheduling of quieter aircraft during more noise sensitive periods can be used to reduce impacts.

Examples of Aircraft Noise Mitigation Measures

Land-Use Planning and Management

Land and buildings surrounding airports can be planned and managed in order to mitigate aircraft noise at those locations. Some examples include:

Zoning

Zoning can be used to ensure that aircraft noise is taken into account when planning decisions are made in areas around airports. Typically, zoning can help advise on the compatibility of a location for noise-sensitive development. It can help to advise on, for example, what form of sound insulation is required for a development to be made compatible.

Noise Insulation Schemes

One of the most common means of mitigating aircraft noise impact is to insulate buildings which are sensitive to noise, such as residential properties, schools and hospitals.

Depending on the scheme, full or partial financial contributions towards the insulation works may be provided. Examples of insulation measures include uprated windows, loft and roof insulation, acoustic door seals and ventilators.

Property Purchase and Relocation Schemes

Where aircraft noise impacts could be harmful to health or quality of life, and could potentially result in an unacceptable living environment, schemes can be put in place to support those impacted to relocate. Property purchase and relocation schemes tend to result from either government intervention or planning decisions. How the scheme operates can vary from airport to airport. For example, some schemes offer compensation based on a market valuation of the property and cover relocation costs. Other schemes may offer an increased valuation and cover payment of legal fees, taxes and relocation expenses.

Examples of Aircraft Noise Mitigation Measures

Noise Abatement Operational Procedures

This section provides an overview and examples of the operational procedures which can be used to help mitigate aircraft noise.

Departure Procedures

For departing aircraft, the noise impact is a combination of the amount of power and noise generated by the aircraft's engines and the height at which the aircraft is at. Aircraft manufacturers have focused on reducing engine noise and improving aircraft climb rates. This reduces departure noise levels for communities below.

There are various ways which aircraft departures can be optimised to further reduce noise, taking into account the balance between engine power, altitude and speed. These include:

- 'Noise Abatement Departure Procedures' (NADP) describe different ways in which an aircraft can climb away from an airport and are incorporated into the airlines' standard operating procedures. NADP reduce noise on communities either closer in or further away from the airport. It is now becoming common practice at EU airports for these procedures to be used for certain routes or runways.

- Departure procedures can be designed so that aircraft perform Continuous Climb Operations (CCO). This procedure allows aircraft to continuously climb away from the airport with minimal level flight. This procedure can be helpful in reducing noise on certain communities. It is also possible for airspace to be designed to allow for 'high performance departures' allowing steeper climb gradients for aircraft which can perform these.

Arrival Procedures

For arriving aircraft, there are a number of mitigating actions that can be taken to reduce noise.

These include:

- Continuous Decent Approaches (CDA) – Continuous descent approaches allow aircraft to be kept as high as possible for as long as possible and generally requires less engine thrus to maintain than level flight, reducing noise levels on the ground. Without CDA, some pilots may descend earlier than they need to and may need to use their engines more which can result in increased noise.

- Slightly Steeper Approaches (SSA) – SSA involves increasing the approach angle of the aircraft which can reduce noise.

- Segmented Approaches – A segmented approach is where an aircraft descends at multiple angles. In most instances, a higher decent angle can be flown before final approach. This procedure has high potential for noise reduction at communities further out and under the final approach because the aircraft stays at a higher altitude for a longer time.

- Low Power / Low Drag Procedures (LPLD) – These operations require the coordination of the air navigation service provider, airport and aircraft operators. By delaying landing gear deployment and using a reduced landing flap both aerodynamic and engine noise for aircraft on approach can be reduced.

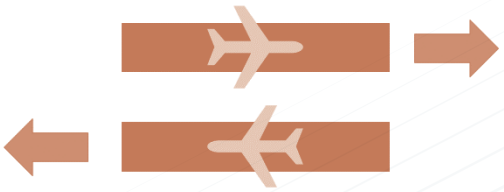
Examples of Aircraft Noise Mitigation Measures

Directional Runway Usage

It is preferable for an aircraft to take off and land into the wind. However, runway direction can be managed at low wind speeds. Generally, where crosswinds and tailwinds are low (below 5 knots) it is possible for aircraft to take-off and arrive counter to the prevailing wind direction. Greater take-off distances and speeds are required. This can allow operating directions to be partially managed to reduce the noise impact of the airport.

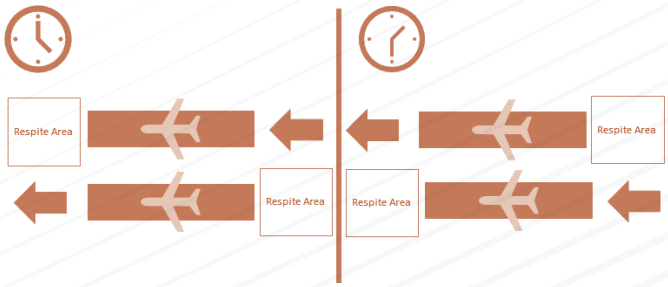
Preferential Runway Use

For airports with multiple and equally capable runways, preferential runway use can be used to reduce the overall noise impact of the airport. This can include using certain runways for only arrivals or departures to avoid or reduce impacts on certain areas. This can be extended into setting rules, quotas or targets for the use of certain runways to help manage noise impacts.



Runway Alternation

For airports with multiple runways, runway alternation is a measure which can be used to afford communities with respite from aircraft noise. Runway alternation means switching arrivals or departures from one runway to another providing a break from noise for communities affected by aircraft. The measure is used at a number of European and international airports and can be delivered in a range of patterns. For example, daily or weekly.



Noise Preferential Routing

Some airports operate Noise Preferential Routes (NPRs). These are specific flight paths which route aircraft over areas which are considered to be less sensitive to noise, such as industrial and commercial land uses, or less populated areas.

Multiple Routes and Route Alternation

An airport's local airspace can be designed to allow for multiple routes for noise management reasons. These routes can be used to spread out aircraft - reducing the number of times certain locations are overflown. This provides communities with respite from aircraft noise.

Examples of Aircraft Noise Mitigation Measures

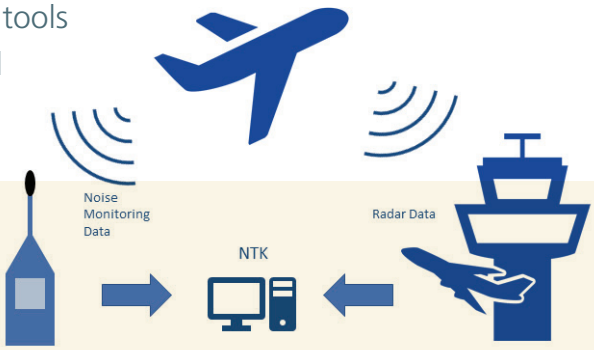
Noise-Related Operating Restrictions

Operating restrictions provide limits within which aircraft noise can be managed. Under the ICAO Balanced Approach, noise-related operating restrictions are only to be considered as a last resort. There are various types of operating restrictions, as described below.

- **Movement Limits** – aircraft movement limits can be set for different periods and seasons, such as day and night-time, and summer and winter respectively. Movement limits are a simple way of restricting aircraft noise. However, movement restrictions do not take into account differences and improvements in aircraft noise levels.
- **Noise Quotas** – noise quotas are systems which limit aircraft noise taking into account both the number of aircraft movements and the noise levels of individual aircraft events. Like movement limits, noise quotas can be assigned to different periods and timeframes. Such systems tend to rely on scoring the noise performance of aircraft types using their noise certification, and setting a quota based on these scores in order to balance aircraft noise performance with movements. Noise quotas can help to incentivise the use of quieter aircraft.
- **Noise Budgets** – noise budgets take a similar form to noise quotas. However, these can be extended to capture aspects such as how much noise may occur over certain communities. Noise budgets can include the amount of time an airport should operate in a certain direction or the number of movements which are allowed to fly over certain areas.
- **Passenger Limits** – limiting the number of passengers at an airport can be used to restrict and limit aircraft noise. Whilst it is possible to increase passenger movements without increasing noise, substantial changes in passenger numbers often require additional or larger aircraft.
- **Noise Contours** – noise contours can provide the basis to limit and progressively improve noise impacts. Movement limits can be set around the size, area or shape of the noise contours surrounding an airport.

Noise Management Systems and Tools

A range of noise management systems and tools can be used by airports to help monitor and address airport noise. These include:



- **Noise and Track Keeping Systems (NTK)** NTK systems measure aircraft noise events whilst displaying other information on aircraft operations, such as the height, type and flight path of aircraft arriving and departing at the airport. NTK systems are particularly helpful for addressing aircraft noise complaints. With technological advances, NTK systems have increasingly become community engagement tools to provide interactive information on aircraft noise at certain communities around airports. Good practice in this area includes providing public access to live noise data and aircraft tracking via a website.

- **Complaint Management** – complaint management is an important part of an airport's noise management practice. The way in which an airport manages and addresses complaints can influence community annoyance. In general, good practice in this area includes allowing complaints to be made as easily as possible and ensuring that complaints are followed up in a timely manner with supporting information.

- **Noise Reports** – routine presentation of information on airport operations and aircraft noise can be helpful for community engagement purposes and for tracking an airport's noise performance over time. A number of European airports produce quarterly reports which can provide a range of statistics including the number of aircraft movements; overflights over certain areas; operating patterns; and noise measurement data.

Noise Management and Mitigation at Dublin Airport

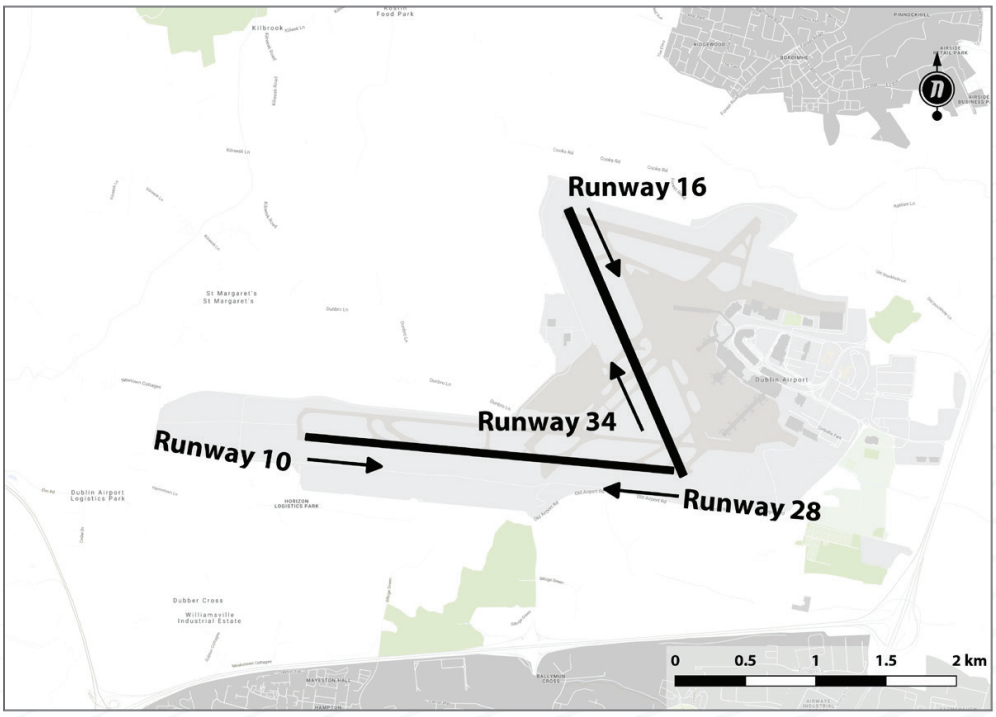
This section considers the range of noise mitigating measures currently in place at Dublin Airport and the systems employed by the airport authority in the management of noise.

Noise Management and Mitigation at Dublin Airport

Dublin Airport Runway Operations

Dublin Airport currently operates two runways designated 10/28 and 16/34. These designations are derived from the points of a compass. Runway 10/28 is the primary operational runway and is approximately oriented east/west. Runway 16/34 is shorter and approximately oriented in a north/south direction.

Aircraft generally take-off and land into the prevailing wind. Aircraft taking off or landing into the west are on runway designation 28. Aircraft taking off or landing into the east are on runway designation 10. At present, approximately 70% of flights at Dublin Airport take off and land into the west on runway 28. It is inevitable therefore that communities will be overflown by arriving and departing aircraft. As such, procedures should be employed to help mitigate and minimise the effects of noise in those communities.



Runway layout
Dublin Airport

Noise Management at Dublin Airport

Airport Operator

The management of aircraft noise emissions is coordinated by daa as the airport authority.

The 2019 Act assigns responsibility to the airport authority for:

a) introducing any noise mitigation measures and operating restrictions;

b) ensuring that appropriate noise measuring systems are in place at the Airport on an ongoing basis;

c) taking appropriate steps to ensure that all airport users comply with all noise mitigation measures and operating restrictions.

The role of daa includes the development and implementation of aircraft noise mitigation measures in conjunction with its aviation stakeholders and the management of aircraft noise complaints. daa has published its current noise management strategy 'The Dublin Airport Noise Management Plan 2018' which is available on the daa's website.

Air Traffic Control

The airport's air navigation service provider is the Irish Aviation Authority (IAA). Their role includes the provision of operational services such as air traffic control in airspace controlled by Ireland to manage the safe and orderly flow of aircraft into, out of, and across Irish airspace.

Airline Operators

Airline operators are required to comply with noise abatement procedures in place at the airport subject to any direction from air traffic control. Where noise abatement procedures are not prescribed airlines will use their own standard operating procedures.

Dublin Airport

Noise Mitigation Measures at Dublin Airport

Noise Abatement Operational Procedures

The noise abatement procedures for Dublin Airport are set out in IAA publication Integrated Aeronautical Information Package (AIP) Ireland under EIDW AD 2.21 Noise Abatement Procedures. These include:

- Strict compliance with Standard Instrument Departure (SID) is mandatory. All SIDs are published in section EIDW AD 2.24 of the AIP.
- Details of other instrument departures are also laid down in this document including procedures for Category A/B (non-jet and jet aircraft) and Category C/D (airliners and large jets). These departure procedures are issued to aircraft when it is not possible for them to follow the published SID.
- The take-off profile Noise Abatement Departure Procedure (NADP) is also published in this section.
- The preferential runway usage parameters including the crosswind components for day and night operations are laid down as well as details of the environmental corridors. These corridors must be followed by all Category C/D aircraft.
- The rules for performing visual approaches at Dublin Airport as well as a statement prohibiting aircraft from using reverse thrust between 2300-0600hrs on landing except in specified circumstances.

The Integrated Aeronautical Information Package is available to view at www.iaa.ie.

Noise Management and Mitigation at Dublin Airport

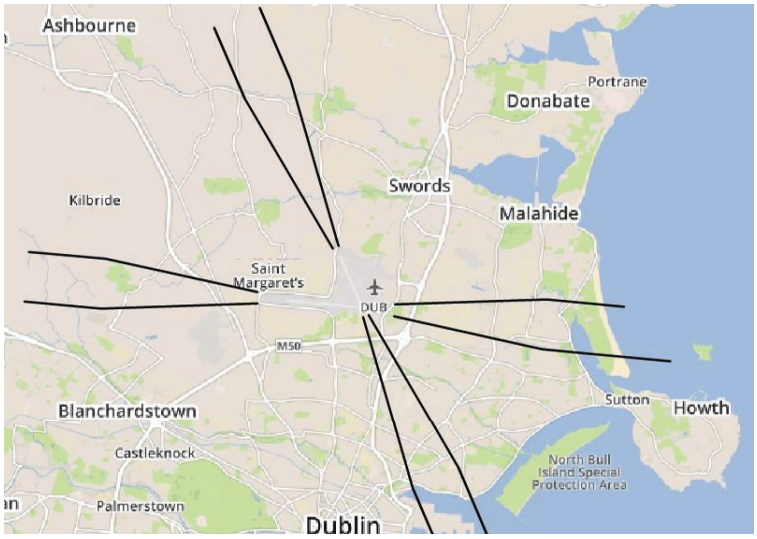
Noise Preferential Routes

Dublin Airport operates Noise Preferential Routes (NPR), also referred to as environmental noise corridors. These relate to aircraft departures and must be maintained by aircraft taking off until directed by air traffic control onto their main air traffic route to their destination.

These 1.8km wide corridors extend in a straight line from the end of each runway out to distances ranging from five to six nautical miles. Most propeller aircraft are permitted to operate outside the NPR due to their lower noise emissions.

The operation of these corridors, including all exemptions, is detailed in the IAA's Integrated Aeronautical Information Package (section EIDW AD 2.21). Compliance with these requirements by airlines is mandatory except where exempt or where directions to the contrary are issued by air traffic control.

Although there will be occasions when air traffic control has to route an aircraft outside of the established environmental air corridors (for safety or weather reasons) deviations from noise corridors can give rise to annoyance in the community.



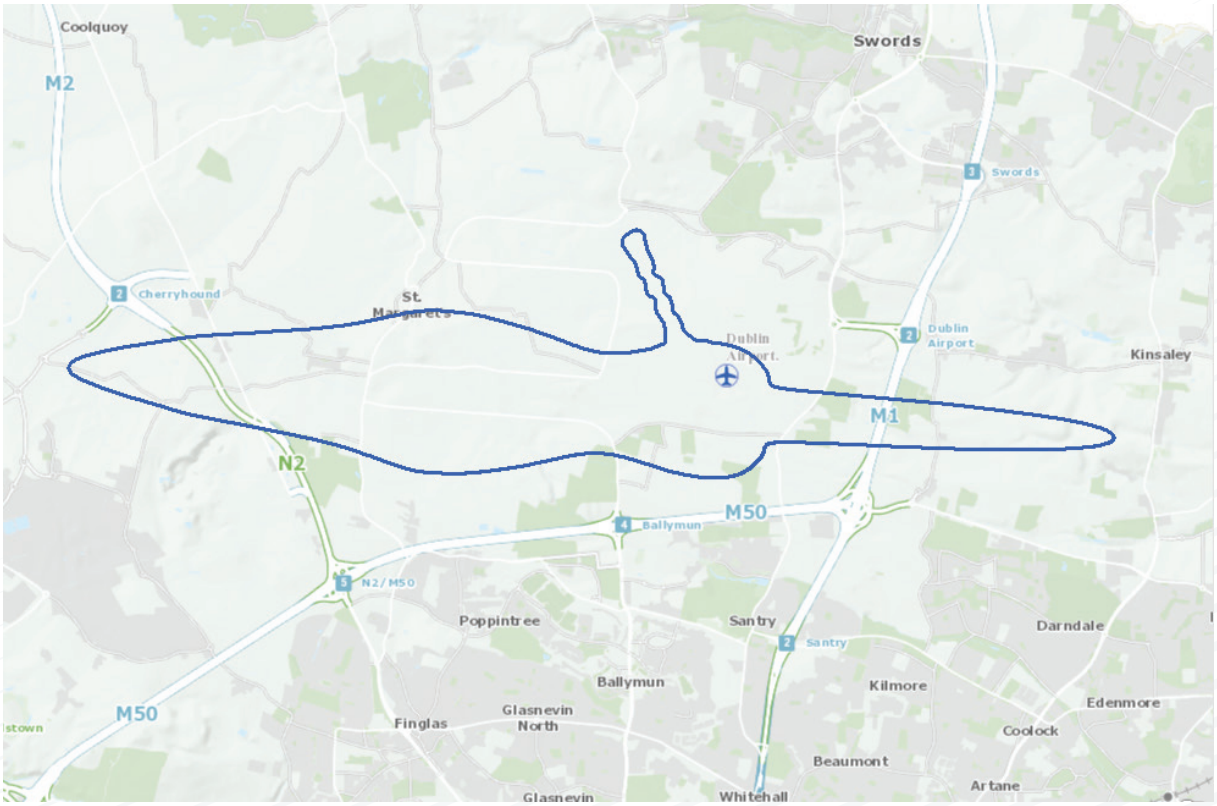
Non-Operational Noise Mitigation Measures at Dublin Airport

Home Insulation

daa has a home insulation scheme for dwellings most impacted by current operations at Dublin Airport called the Home Sound Insulation Programme (HSIP).

ANCA is responsible for ensuring that the insulation scheme applies to all homes in an area that is referred to as a "defined noise contour" (as shown below). The contour is the area within which homes are eligible for insulation.

A review of the eligibility of homes for inclusion within the home insulation scheme was undertaken by ANCA in 2020. Details of the scheme and an interactive map are available on our website.



Noise Management

Noise Measuring Systems

Dublin Airport operates a Noise and Flight Track Monitoring Service (NFTMS) to monitor aircraft in the vicinity of the airport. This system records all aircraft movements and correlates them with data received from eight noise monitoring terminals. The majority of the terminals are positioned within a 6.5km radius of the airport's runways. The terminals constantly record all noise in their vicinity as well as individual noise from each aircraft. Half-yearly reports of the captured data are published by daa.

The monitoring system is used to determine whether an aircraft has gone off track by exiting a noise preferential route before it has reached its required distance or below a designated altitude.

daa's Noise and Flight Track Analyst publishes a monthly analysis of aircraft noise complaints received. Noise complaints are analysed by area, runway and the category of noise e.g. aircraft flying off track, engine test runs, specific noise, noise and vibration amongst others. Extracts from the NFTMS are provided in Appendix A.

Under the 2019 Act, ANCA can, after consultation with the airport authority, direct the airport authority to install noise measuring systems at appropriate locations within or outside of the airport.

Noise Monitoring Terminals near Dublin Airport

Managing Aircraft Noise Complaints

Systems to facilitate the self-reporting of noise disturbance are an important aspect of managing noise. daa manage customer complaints through a free-phone number and an online aircraft disturbance complaint facility. The steps involved in investigating an aircraft disturbance complaint by the airport authority may include some, or all, of the following:

Aircraft noise complaint received by daa
Complaint logged for investigation and statistical analysis.

Initial investigation by daa using NFMS
Establish whether aircraft in question operated outside of defined noise corridors.

Referral to IAA ATC for investigation
Review of complaint with air traffic controller.

Referral to airline if more investigation needed
Chief pilot reviews complaint with flight crew.

Findings issued to Complainant

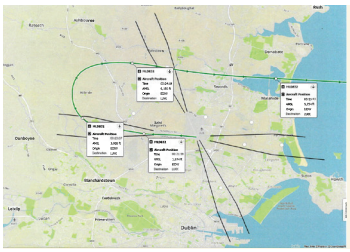
Compliance with Noise Mitigating Measures and Next Steps

The 2019 Act requires the airport authority to prepare an annual report on the compliance or otherwise of airport users with noise mitigation measures and operating restrictions at the airport. The first compliance report must be prepared by 1st September 2020 for review by ANCA. The airport authority report will be published on our website. ANCA will also be undertaking a review of noise measurement systems in use by the airport.

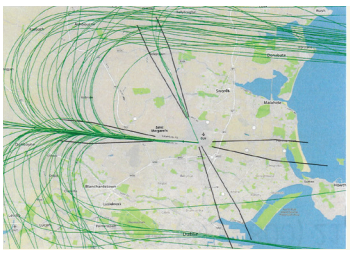
Aircraft Noise Competent Authority Contact Details

Telephone	01 890 5998
Email	aircraftnoiseca@fingal.ie
Web	www.fingal.ie/aircraftnoiseca
Opening Hours	Monday – Thursday: 9am – 5pm Friday: 9am – 4.30pm
Address	Aircraft Noise Competent Authority, Fingal County Council, County Hall, Main Street, Swords, Co Dublin K67 X8Y2.

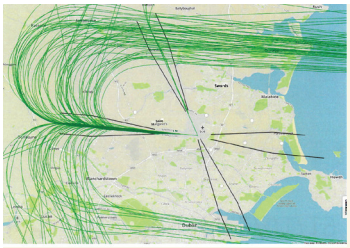
Appendix A: Extracts from Dublin Airport Noise and Flight Track Monitoring Service



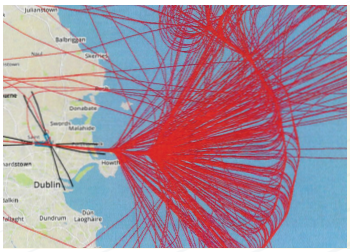
Tracking an individual flight



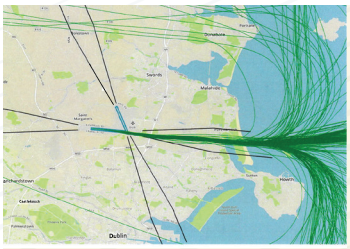
Tracking an individual airline



Tracking a specific aircraft type



Tracking arrivals over 1 day



Tracking category C/D aircraft departures over 1 day

Tracking all arrivals and departures over 1 day

Appendix B: Noise Management at Dublin Airport - Responsible Bodies

Useful Links

AIRCRAFT NOISE COMPETENT AUTHORITY

https://www.fingal.ie/aircraft-noise-ca

FINGAL PLANNING SEARCH

https://www.fingal.ie/view-or-search-planning-applications

AIRCRAFT NOISE (DUBLIN AIRPORT) REGULATION ACT 2019

http://www.irishstatutebook.ie/eli/2019/act/12/enacted/en/index.html

REGULATION (EU) NO 598/2014

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014R0598

ICAO BALANCED APPROACH TO AIRCRAFT NOISE MANAGEMENT

https://www.icao.int/environmental-protection/Pages/noise.aspx

FINGAL COUNTY COUNCIL NOISE ACTION PLAN FOR DUBLIN AIRPORT 2019- 2023

https://www.fingal.ie/council/service/noise-action-plan-consultation

DAA AIRPORT NOISE MANAGEMENT PLAN 2018

https://www.dublinairport.com/docs/default-source/airport-noise/dublin-airport-noise-management-plan

AIRCRAFT NOISE COMPLAINTS

https://www.dublinairport.com/about-us/-community-affairs/noise-complaint

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