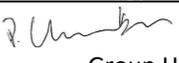

Dublin Airport - Noise Management Plan

May 2018



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Abbreviations

ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
DAP	Dublin Airport
EPA	Environmental Protection Agency
FCC	Fingal County Council
IAA	Irish Aviation Authority
ICAO	International Civil Aviation Organisation
NFTMS	Noise and Flight Track Monitoring System
NMT	Noise Monitoring Terminal
NPR	Noise preferential route

Definitions¹

A-Weighted	The A-weighting approximates the sensitivity of our ear to different frequencies (pitch) in the sound and helps to assess the relative loudness of various sounds.
L _{den}	(day-evening-night noise indicator) shall mean the noise indicator for overall annoyance (24 hours).
L _{day}	(day-noise indicator) shall mean the noise indicator for annoyance during the day period (07:00-19:00).
L _{evening}	(evening-noise indicator) shall mean the noise indicator for annoyance during the evening period (19:00-23:00).
L _{night}	(night-time noise indicator) shall mean the noise indicator for sleep disturbance (23:00 – 07:00).

¹ In line with EU Directive 2002/49 where applicable

1 Introduction

As an airport operator strongly rooted in the Fingal and North Dublin communities, Dublin Airport is committed to minimising the impact of noise on our neighbours and adjoining communities as we operate and develop our airport. The purpose of this document is to describe the management of noise associated with our activities, and set key performance indicators to be achieved and reported upon. It is important to note that this document is separate, and distinct from the Noise Action Plan, which is required under the Environmental Noise Directive and deals with aircraft noise only – refer to section 3 of this document for more detail.

Dublin Airport is a growing airport that serves as a major transport hub for millions of business and leisure travellers, a gateway for tourism and Foreign Direct Investment and a critical facilitator of connectivity for an island nation. Achieving the most appropriate balance between the growing airport while addressing the requirements of our nearest residential neighbours presents an ongoing challenge for Dublin Airport, as it does for all airports of its size. Noise emanating from an airport environment can result from a number of activities, namely:

1. Aircraft activity
2. Construction / infrastructure maintenance activity
3. Noise associated with ground based activities e.g. airside vehicles, etc.

Our approach to managing aircraft noise at the airport is aligned with the International Civil Aviation Organisation (ICAO) "Balanced Approach" to aircraft noise management. This approach incorporates four key elements for the management of noise at airports.

These are:

1. The reduction of noise at source (quieter aircraft);
2. Use of land planning and management;
3. Noise abatement operational procedures; and
4. Operating restrictions.

Note: The Balanced Approach is discussed in greater detail in a subsequent section.

In relation to noise associated with construction and ground based activities, we are committed to identifying and implementing control measures, and engaging with stakeholders on our plans and activities.

2 Dublin Airport Background Information

Dublin Airport is Ireland's biggest airport. It serves 191 destinations in 42² countries on five continents, and catered for almost 30 million passengers on both short and long-haul destinations in 2017. It is a major economic driver for Ireland, with 17,100 directly employed at the airport and a further 54,600 through airport related activities. Dublin Airport has two runways, the primary runway 10/28, and a crosswind runway, 16/34, as depicted by Figure 1 below.



Figure 1: Dublin Airport Runway Configuration

² Source: <https://www.dublinairport.com/latest-news/detail/record-january-at-dublin-airport-with-almost-2m-passengers>

2.1 Flight Paths

Flight paths are the designated routes aircraft follow under the direction of Air Traffic Control (ATC). Air traffic control in Ireland is delivered by the Irish Aviation Authority ATC (IAA – ATC). While flight paths are often shown as single lines on a map, it is not always possible for aircraft to fly exactly along that line. In practice, flight paths will vary either side of the route within a designated flight corridor.

IAA-ATC manages aircraft for landing or take-off along specific flight paths, as well as keeping aircraft at safe distances from each other in the air and on the ground. Safe movement of aircraft is a vital consideration in the development of flight paths.

The operation of an airport's runway system depends on a variety of factors such as weather conditions (especially wind direction, wind speed and factors which impact visibility) and the number of take-offs and landings.

2.2 Noise Preferential Routes (or Environmental Corridors)

Noise preferential routes (NPRs), also referred to as environmental corridors, are a type of flight path. Unless directed otherwise by IAA-ATC, all aircraft taking off from Dublin Airport are required to follow specific NPRs. To minimise impact, NPRs are designed to avoid overflight of built-up areas, where possible.

An NPR is a path or corridor (1.8km at its widest point) that aircraft follow from take-off until being directed by IAA-ATC onto their main air traffic routes, typically at 3,000 feet altitude above mean sea level. While aircraft aim to travel in the middle of this corridor, the precise path followed within the corridor may vary depending on factors including navigational equipment, the type and weight of aircraft and weather conditions (particularly winds that may cause drifting). Aircraft flying inside the NPR corridor are considered to be flying on-track.

For most aircraft operating from Dublin Airport, departures from all runways (except easterly departures on the existing 10/28 runway) must maintain course straight out for five nautical miles (1 nautical mile = 1,852 metres) after take-off before commencing a turn, unless

otherwise cleared by IAA-ATC. Easterly departures on the existing southern runway must maintain course straight out for five nautical miles before commencing a turn to the north, or to six nautical miles before commencing turn to the south. Once an aircraft reaches the end of the NPR, or at an altitude of 3,000 feet, IAA-ATC will turn it onto a more direct heading to its destination. IAA-ATC can turn aircraft off NPRs below 3,000 feet for safety reasons, for example to avoid storms.

Code A/B aircraft (vast majority of propeller aircraft and BAE146 type aircraft) are permitted to operate outside the NPR due to their lower noise emissions.

3 Strategic Noise Mapping and Planning

The Environmental Noise Directive (END), EC 2002/49/EC, was transposed into Irish law as Statutory Instrument, S.I. 140 of 2006, Environmental Noise Regulation 2006. The Directive requires Member States to prepare and publish, every five years, noise maps and noise management action plans. Strategic Noise Mapping and Planning involves multiple parties of which daa, designated as the noise mapping body for Dublin Airport, is just one. Responsibilities in this area include:

- i. Noise mapping performed by noise mapping bodies (including daa).
- ii. Local Authorities are responsible for producing Noise Action Plans.
- iii. The EPA has overall oversight of the noise mapping and planning process, and is responsible for reporting the results to the EU every five years.

Development of Noise Contours is a universally applied methodology of presenting the noise situation in the vicinity of airports. The contour closest to the noise source will have the highest number and indicates the highest exposure and those furthest away the lowest number and hence the lowest exposure. The following factors are assessed in determining noise contours:

- i. Runway location;
- ii. Arrival and departure routes;

- iii. Aircraft movements (number by aircraft type); and
- iv. The split of movements amongst the runways and routes and airport procedures.

Dublin Airport has produced Noise Contour Maps to meet the requirements of EU Directive 2002/49/EC and Statutory Instrument No. 140 of 2006, Environmental Noise Regulations 2006. The maps are also in line with the guidelines set down by the Environmental Protection Agency (EPA) which coordinates the project in Ireland. The European Directive 2002/49/EC on noise mapping requires noise contours to be generated using the L_{den} and L_{night} noise indices. (Refer to the definitions section for further detail).

The L_{den} unit is a L_{Aeq} for the whole 24-hour period but includes different weightings depending on when during the 24-hour period the noise occurs. If the noise occurs during the 12-hour day (07:00 – 19:00) there is no adjustment. If it occurs during the evening (19:00-23:00) a weighting of +5 dB(A) is added and if it is at night (23:00 – 07:00) a weighting of +10 dB(A) is added.

To compute the noise contours, each period is considered separately and a L_{Aeq} is determined for it. The weightings are then added to the evening L_{Aeq} and night L_{Aeq} , with each L_{Aeq} then added together, taking into account the period durations.

daa typically uses average contours (L_{Aeq}) contours for assessing the impact of new infrastructure such as runways.

- L_{Aeq} day noise contours cover a 16-hour period (7 am to 11 pm) over 92 days during the airport's busiest summer months.
- L_{Aeq} night noise contours cover an 8-hour period (11 pm to 7 am) over 92 days during the airport's busiest summer months.

This approach is in line with that used at many other European airports and is consistent with the metrics used in the conditions set out in An Bord Pleanála's grant of planning for North Runway.

Dublin Airport contours were developed for 2016 and L_{den} and L_{night} contours are presented in Appendices 1 and 2, with higher quality images available on the Dublin Airport Website: <https://www.dublinairport.com/about-us/-community-affairs/contour-maps>

4 Regulation 598/2014

In June 2016 Directive 2002/30/EC was repealed and replaced by Regulation 598/2014. Regulation 598/2014 establishes the rules and procedures for the introduction of noise related operating restrictions (if required) using the Balanced Approach.

The new Regulation reinforces the requirement for airports and competent authorities to apply the Balanced Approach when considering the introduction of noise related operating restrictions at airports. Such operating restrictions should only be introduced if the noise abatement objective of the airport cannot be met through the other Balanced Approach measures (reduction at source, Land-use Planning and Operating Procedures). The Regulations also introduce a more stringent definition for 'marginally compliant' ICAO Chapter 3 aircraft.

In January 2018, the Minister of Transport, Tourism and Sport announced that Fingal County Council would be designated as the Airport Noise Regulator for Dublin Airport pursuant to EU Regulation 598/2014. Enabling legislation is currently being prepared in this regard.

5 Noise management

The Dublin Airport noise management process is based on three key themes:

- i. *Manage*: continue to operate noise management schemes to achieve the quietest practicable aircraft operations on Noise Preferential Routes, and minimise noise from other activities such as construction;
- ii. *Monitor*: continue to monitor noise using best practicable methods; and
- iii. *Engage*: continue to meet with our neighbours and partners to involve, engage and inform, and continue to communicate with stakeholders.

Dublin Airport will continue to assess how to optimise the use of systems and procedures to ensure that noise in the community is minimised where possible. Dublin Airport utilises a number of techniques to mitigate the impact of noise on the wider community, in accordance with the Balanced Approach which are described in subsequent sections.

Dublin Airport will continually monitor the effectiveness of control measures associated with noise management, altering or improving these measures as and when required.

5.1 Aviation Noise: Proactive Control Measures

Strict rules govern all aspects of aircraft movements in the air and on the ground. The Irish Aviation Authority (IAA) is responsible for all aspects of flight movements and ensuring the highest levels of safety are achieved at Irish airports. Dublin Airport works closely with the IAA and airlines to constantly heighten awareness of noise abatement procedures in force at Dublin Airport. The Noise Abatement Procedures include the mandatory use of Noise Preferential Routes, which are designed to minimise noise over populated areas where possible. Operational procedures are in place for the use of the cross-wind runway and for engine testing on the ground.

As previously stated, the EU Directive 2002/30/EC has endorsed the International Civil Aviation Organisation (ICAO) concept of a “Balanced Approach” to aircraft noise management. The

National Aviation Policy (NAP) for Ireland published in 2015, states that Ireland will implement a 'Balanced Approach' to noise management at Irish Airports. The approach incorporates four key elements / pillars to the mitigation of noise levels at airports.

i. The reduction of noise at source (quieter aircraft)

This is mainly achieved by technological developments in aircraft design and as a result modern aircraft are quieter than their predecessors. Noise standards are developed by ICAO and enforced throughout the EU. The ICAO noise chapter certification defines the specific noise performance criteria which aircraft must achieve. Chapter 2 aircraft have been banned from operating within the EU since 2002. The vast majority of aircraft operating in the skies above the EU are now Chapter 3 or 4. Chapter 4 aircraft are 10dB quieter than Chapter 3. New noise standards are being developed constantly with the development of new technologies with Chapter 14 aircraft currently in development. Chapter 14 aircraft will be 7dB quieter than Chapter 4. In 2017 over 90% of aircraft using Dublin Airport met the Chapter 4 standard.

ii. Land-Use planning and management

Land-Use planning and management comprises working with our local authority to safeguard land use in the vicinity of the airport and ensure minimum impact on the local and future communities.

To date, Dublin Airport has benefitted from a far-sighted planning process that has kept the approaches to the runways largely clear from development and has limited noise exposure. This is achieved by reference to the established noise and public safety zones during statutory planning processes. Fingal County Council's County Development Plan 2017 - 2023³ defines 'inner' and 'outer' noise zones; the inner zone is identified to limit new residential development and other noise-sensitive areas, and the outer zone to control inappropriate development and require noise insulation where appropriate.

³ Source: <http://www.fingal.ie/planning-and-buildings/development-plans-and-consultations/fingaldevelopmentplan2017-2023/>

Figure 2 below depicts Dublin Airport location and associated surrounding areas. It is evident from the image that the approaches to the existing south and proposed north runway are generally rural in setting.

An insulation scheme has been introduced for houses located within the 2016 63dB L_{Aeq} contour. Another similar scheme, for houses that will be located within the 63dB L_{Aeq} contour when North Runway is fully operational, will also be implemented. A Voluntary Dwelling Purchase Scheme has been introduced for dwellings that will lie within the 69dB L_{Aeq} contour, when North Runway is operational.



Figure 2: Dublin Airport and local environs

iii. Noise abatement operational procedures

A number of noise abatement operational procedures are currently in place at Dublin Airport. These procedures ensure that aircraft are operated in a manner to reduce, as much as practicable, the noise in areas surrounding the airport. The complete current copy of the noise abatement procedures can be found at http://iaip.iaa.ie/iaip/IAIP_Frame_CD.htm under Dublin, EIDW AD2.21 on the Irish Aviation Authority web site. The noise abatement procedures are continuously monitored at Dublin Airport and where necessary proposals are made to the IAA to update them. Examples of such procedures are as follows:

- a) *Reverse thrust*: deceleration using an aircraft's engine exhaust is not permitted at night, unless required for safety reasons.

- b) *Preferential Runway Use*: Runways will be prioritised for noise abatement purposes between 2300 and 0600hrs, subject to the same wind calculation method and values as used between 0600 and 2300hrs.
- c) *Departure Procedures*: Specific rules apply to departing aircraft with respect to the track which they follow and locations beyond which they may commence turning. No take-off turn is permitted before the departure end of the runway.
- d) *Take-off climb procedures: noise abatement departure climb procedures.*

There are also strict conditions that govern high powered engine test runs that take place at Dublin Airport. Engine test runs are a normal part of the operations at Dublin Airport or indeed any airport. Engine test runs must be carried out after heavy maintenance takes place on an aircraft to comply with international safety regulations. While technological advances in aircraft engine design mean that modern aircraft have a lower noise impact than older aircraft we are very aware that noise impacts still exist and so there are strict controls on when engine test runs may be undertaken. Engine test runs are not permitted between 2000hrs and 0700hrs. All aircraft types may undertake testing between 0900 and 2000hrs, and only aircraft up to Code C may undertake engine testing between 0700 and 0900hrs. There has been a 12% reduction in the number of engine test runs undertaken at Dublin Airport in 2017 when compared to 2016.

iv. *Operating restrictions*

Operating restrictions are only to be applied after consideration of the other measures has been made. There are currently no operating restrictions in place at Dublin Airport.

It is anticipated that community engagement will be included in any future iteration of the Balanced Approach.

5.2 Monitoring

Dublin Airport has invested in a specialist noise monitoring system to ensure accurate, consistent and traceable information is continuously available. The Dublin Noise and Flight Track Monitoring System (NFTMS) comprises:

- i. 8 Noise Monitoring Terminals - 4 at approx. 6.5 km Start of Roll⁴ of each runway, 3 covering local areas, 1 on the airfield and one mobile unit (see figure 4 below for locations);
- ii. central hub; and
- iii. a feed from the radar system.

The NFTMS system records both the overall levels of noise and also identifies correlated noise events.

The noise monitors are set to record continuously, and trigger a noise event when the noise level exceeds a specific threshold level for a set time. The NFTMS then automatically correlates these noise events with aircraft movement data, assigning an aircraft movement to a noise event where applicable to give a set of correlated events. Use of a threshold is standard practice to reduce the number of non-aircraft events recorded by the NFTMS.

⁴ Start of Roll is where aircraft begins take-off run (where engines wind up). 6.5 km from Start of Roll is a location used during ICAO noise certification therefore airports use this specification for locating Noise Monitoring Terminals (NMTs).

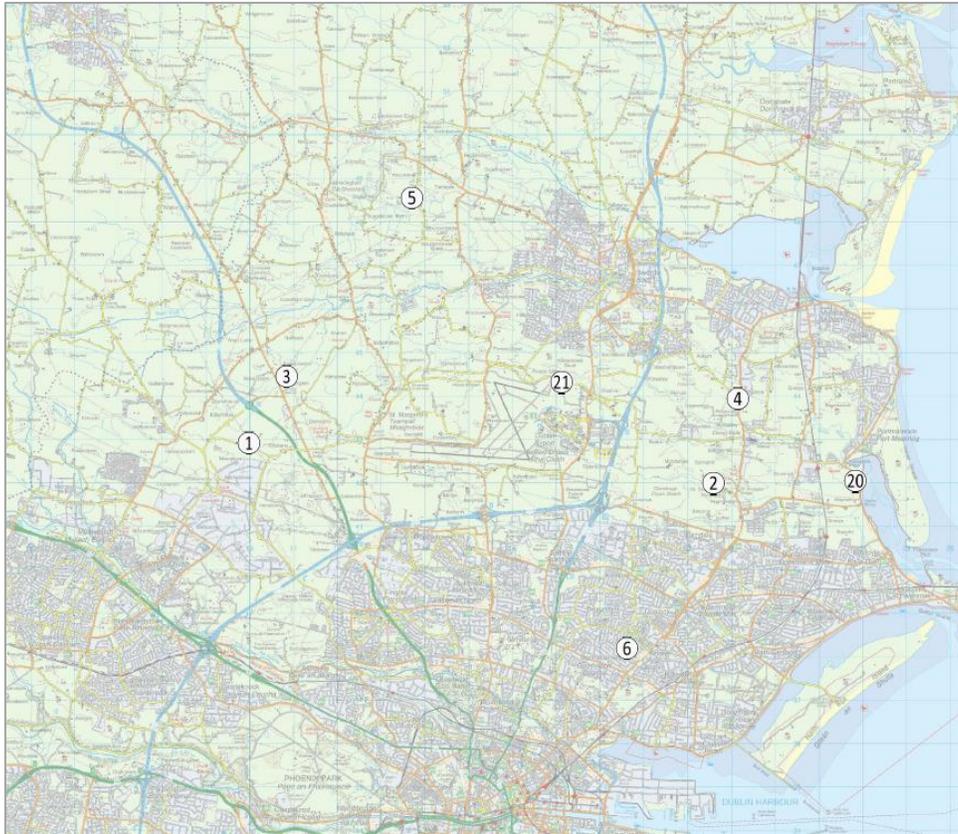


Figure 3: NFTMS Monitor Locations

- (NMT1) Bay Lane
 - (NMT2) St. Doolaghs
 - (NMT3) Bishopswood
 - (NMT4) Feltrim
 - (NMT5) Balcultry
 - (NMT6) Artane
 - **Additional**
 - (NMT20) Coast Road
 - (NMT21) Monitoring noise produced by aircraft on the ground at a location close to the airport
- N.B.** Numbering not sequential so there is no NMT7 to NMT19.

Dublin Airport publishes data from the NFTMS system bi-annually, with the reports available at the following link: <https://www.dublinairport.com/about-us/-community-affairs/airport-noise-noise-reports>

5.3 Engagement

Dublin Airport is committed to engaging with the local community in order to inform and discuss developments relevant to the airport. It should be noted that community engagement

is expected to form part of the next iteration of the Balanced Approach. Dublin Airport engages with the local community through a number of forums such as:

- i. Stakeholder working groups
- ii. Stakeholder engagement
- iii. Website (contact forms, contact details etc.)
- iv. Publishing of noise related information

Additionally, Dublin Airport is committed to working with the IAA to help minimise the effects of aircraft noise on communities surrounding Dublin Airport and reduce where possible the number of people effected. This is achieved through:

- i. Monitoring all aircraft track keeping in the vicinity of the airport.
- ii. Engaging with the IAA on aircraft noise issues.
- iii. Making proposals to the IAA on noise abatement procedures in order to improve aircraft track keeping.
- iv. Highlighting the awareness of the noise abatement procedures especially to airlines, handling agents and other companies operating at the airport.
- v. Producing of noise contour maps in accordance with the requirements of the Environmental Noise Directive and liaise with the Environmental Protection Agency (EPA), Fingal County Council (FCC) and other agencies on this issue.
- vi. Operating the Noise Complaint management system and examining complaint trends and producing monthly reports.
- vii. Disseminating information on noise issues to the local communities e.g. Dublin Airport Environmental Working Group, Community Liaison Group and to the general public.

5.4 Complaint Management

Complaint management is undertaken following the receipt of noise related complaints by Dublin Airport. We have put in place a detailed process for managing any noise complaint received. These complaints can be related to a number of activities, but are primarily related to the following:

- i. Aircraft operation
- ii. Construction / maintenance related activities
- iii. Concerns regarding the impact of future airport operations expected as a result of planned development

All noise related complaints received by Dublin Airport will be logged, assigned to the appropriate area for review, all the while keeping the stakeholder informed.

For aviation related complaints, please use the contact form at the following location:

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

5.5 Construction

Construction projects are assessed on a case by case basis by the assigned project team to determine the impact of noise associated with the project, and to implement and monitor any associated control measures.

6 Key performance indicators

This section sets out the parameters and measures by which Dublin Airport measures performance. The metrics will be reviewed annually to ensure Dublin Airport strives for continuous improvement.

KPI	Target
Percentage of noise related enquiries from the public responded to within defined deadlines: <ul style="list-style-type: none"> • Aviation related complaints– 28 working days • Construction noise related complaints – 5 working days 	95%

Table 1: Dublin Airport Key performance indicators: Noise Related Enquiries

Additionally, Dublin Airport will monitor and report on certain key noise abatement operational procedures involving other parties. These metrics will be reviewed at regular intervals and updated to ensure they promote improved performance. The metrics are set out below:

No.	KPI
1.	Preferential Runway Usage (% achieved per runway)
2.	Operation within the noise preferential route (environmental corridor) i.e. On Track / Off Track performance
3.	Number (absolute and %) of Engine Test Runs undertaken within allocated times.

Table 2: Dublin Airport Parameters: Third Party Operational Procedures

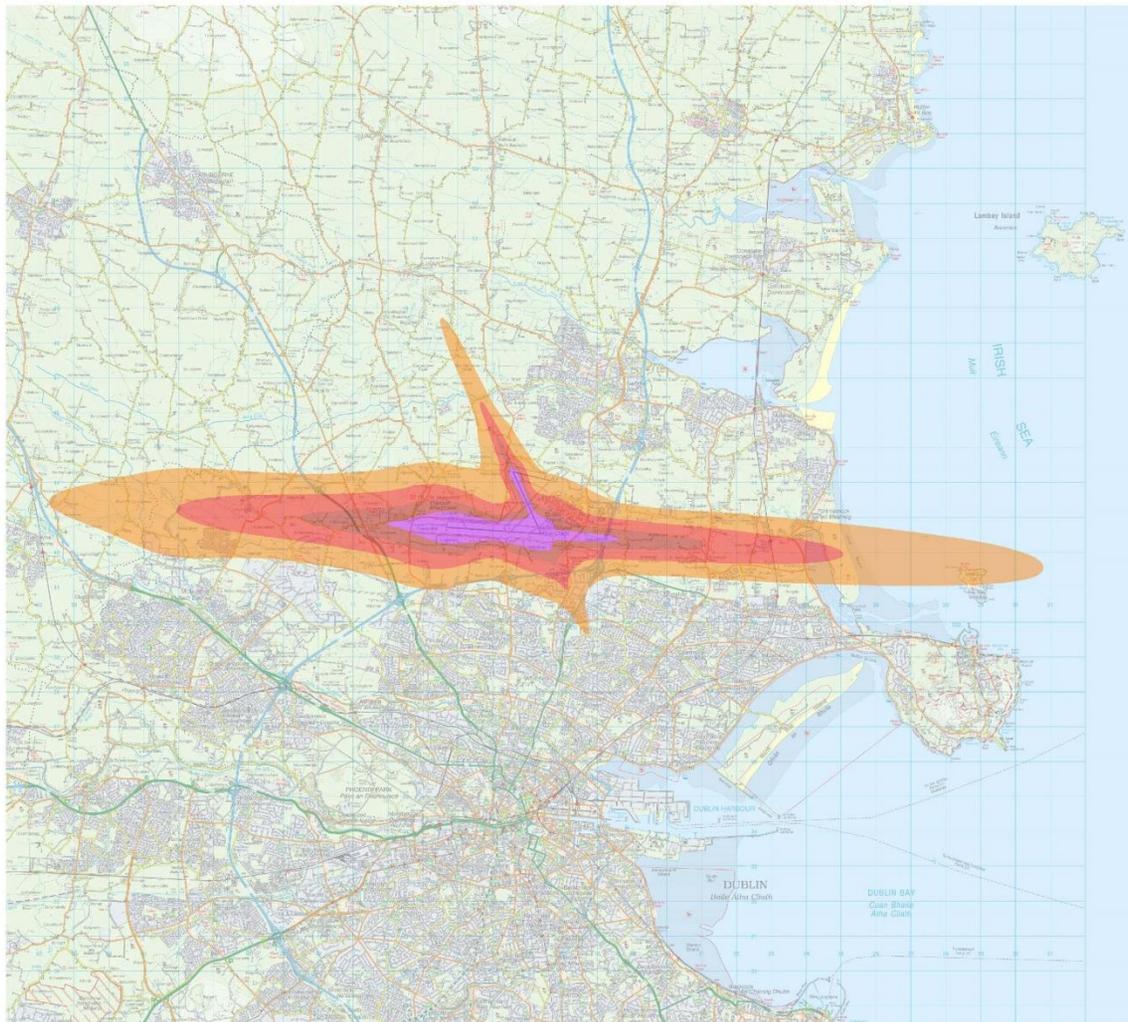
6.1 Reporting

Dublin Airport will publish reports on its delivery of services against the above Key Performance Indicators at regular intervals, with noise complaint reports published monthly. Half yearly reports will also be produced on the outputs of Dublin Airport's Noise Monitoring Terminals (NMTs) which will provide a summary of the aircraft noise measurements from these systems.

7 North Runway Project

As mentioned previously Dublin Airport is currently developing North Runway. More information on the project is available www.northrunway.ie.

Appendix 1: L_{den} noise contour map for the year 2016



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LEGEND:

- Noise Contours,
- 55 to 59 dB Lden
 - 60 to 64 dB Lden
 - 65 to 69 dB Lden
 - Greater than or equal to 70 dB Lden

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**Dublin Airport
Strategic Noise Mapping 2016**

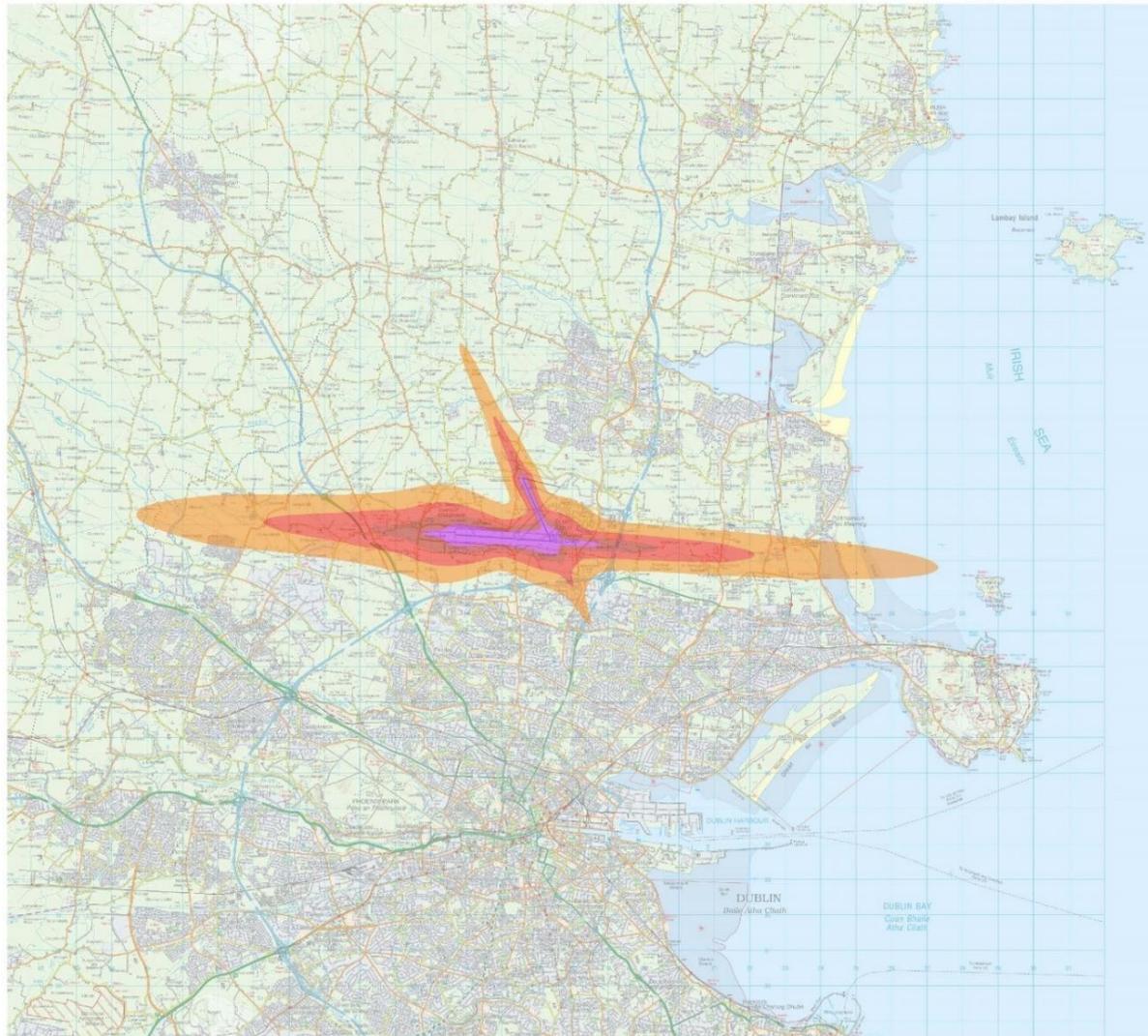
**Airborne Aircraft Noise Contours
Annual L_{den}**

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DATE: June 2017 **SCALE: 1:150000@A4**

FIGURE No: **A11036/01**

Appendix 2: L_{night} noise contour map for the year 2016



This drawing contains Ordnance Survey data © Crown Copyright and database right 2016.

LEGEND:

- Noise Contours,
- 50 to 54 dB L_{night}
- 55 to 59 dB L_{night}
- 60 to 64 dB L_{night}
- Greater than or equal to 65 dB L_{night}

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Dublin Airport
Strategic Noise Mapping 2016

Airborne Aircraft Noise Contours
Annual L_{night}

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