George Best Belfast City Airport - Environmental Noise Directive Round Three - Draft Noise Action Plan 2019-2024

March 2019

Table of Contents

1. Executive summary

1.1 Introduction

In 2002, the European Parliament agreed the Directive 2002/49/EC, commonly referred to as the Environmental Noise Directive ('END'), to enable a standardised assessment of environmental noise across Europe and set the framework for the future management and ongoing assessment of noise. END is implemented in Northern Ireland by the Environmental Noise Regulations (Northern Ireland) 2006 ('the 2006 Regulations'), which outline a number of stages to manage and, where necessary, improve environmental noise.

The first stage in the assessment of environmental noise in Northern Ireland ('Round 1') was completed in 2007 with the publication of strategic noise maps to show levels of environmental noise across the Belfast Agglomeration and in other defined areas in the province[1]. Noise Action Plans were subsequently developed by the designated Competent Authorities for the various noise sources covered under END.

George Best Belfast City Airport ('GBBCA') developed its first Noise Action Plan to cover the period 2008-2013 and, following a public consultation process, it was formally adopted by the Minister in June 2010 and submitted, in summary, to the European Commission.

As required under END, a second round ('Round 2') of strategic noise mapping was undertaken in 2012[2] and Noise Action Plans were developed based on the mapping results. A draft Round 2 Noise Action Plan for GBBCA covering the period 2013-2018 was prepared and a public consultation on this draft Plan took place between 14 June and 9 August 2013. On completion of this consultation, and following consideration of responses received, GBBCA's Noise Action Plan was finalised and was formally adopted by the Minister in January 2014 and submitted in summary to the European Commission thereafter. The status with respect to actions in the Round 2 Noise Action Plan is set out in Section 2.3.

Under the 2006 Regulations, a third round ('Round 3') of strategic noise maps was produced for GBBCA based on aircraft movements in 2016. These maps were formally adopted by the Department of Agriculture, Environment and Rural Affairs ('DAERA') ('the Department') and were published on DAERA's website in January 2018.

[1] END requires strategic noise maps to be produced for agglomerations with a population of more than 250,000 persons and a certain population density in 2007.

[2] END requires strategic noise maps to be produced for agglomerations with a population of more than 100,000 persons and a certain population density in 2012 and subsequent rounds. Further details on Round 1 and Round 2 Agglomerations can be found in the glossary in Appendix C of the Plan.

A draft Round 3 Noise Action Plan has now been prepared based on GBBCA's 2016 strategic noise maps and covers the period 2019-2024.

This Noise Action Plan summarises the extent of aircraft noise in the Belfast Agglomeration, measures already in place at GBBCA to prevent and reduce aircraft noise, and actions proposed over the next five years to continue to do so. Annex V of END sets out what action plans must include. This is detailed in Appendix A. The information presented below has been summarised from the main body of the Noise Action Plan for the purposes of complying with the 2006 Regulations in order to assist with EU reporting requirements.

END defines environmental noise as "unwanted or harmful outdoor sound created by human activities, including noise from road, rail, airports and from industrial sites"[3]. The extent to which noise affects people depends on its nature, intensity, duration, the activity being undertaken by the individual at the time of exposure and the individual's sensitivity. The effects of noise are also dependent on the quality of the sound and the individual's attitude towards it.

Noise has the potential to affect health in a variety of ways. Auditory effects occur as a direct impact of the noise (i.e. noise of sufficient intensity to physically damage the hearing organelles). Such risks are more commonly associated with occupational health or prolonged exposure to loud music. The Airport does not present any direct auditory risk to local communities, and occupational and passenger risk is well addressed through existing operational procedures.

Non-auditory health effects associated with exposure to environmental noise can include annoyance, sleep disturbance, impacts on academic performance, and subject to the exposure level and type, can lead to hypertension, which is a risk factor for cardiovascular disease[4]. The health effects that may result from aircraft noise that are considered within this Noise Action Plan are annoyance, sleep disturbance and academic performance, as these impacts are supported by the most reliable research, are immediate and typically precede the less well understood cardiovascular and psychological health effects[5]. This Action Plan is thereby designed to prevent and reduce noise impacts in order to protect health and to contribute positively to the quality of life and wellbeing of neighbouring communities.

[3] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:189:0012:0025:EN:PDF [Accessed 14 June 2018]
[4] ERCD Report 0907, 2010. *Environmental Noise and Health: A Review,* [online] Available at: https://publicapps.caa.co.uk/docs/33/ERCD0907.pdf [Accessed 14 June 2018]
[5] *Ibid.*

1.2 A description of the agglomeration, the major roads, the major railways or major airports and other noise sources taken into account

GBBCA is owned by 3i Infrastructure Fund. It is a regional airport serving a range of destinations, mainly in Great Britain with some European routes. Situated on the south shore of Belfast Lough adjacent to the A2, one of the main arterial routes into the city, GBBCA is a key strategic gateway to the province. In 2016, GBBCA catered for over 2.6 million passengers, representing approximately 35% of the air traffic to and from Northern Ireland.

The agglomeration under consideration in this Noise Action Plan is the *Belfast Agglomeration*. Covering an area of approximately 209 km^2, the Belfast Agglomeration encompasses Belfast and parts of the Lisburn and Castlereagh, Antrim and Newtownabbey, Mid and East Antrim, and Ards and North Down council areas. Noise sources identified within the Belfast Agglomeration include roads, railways, industry and GBBCA.

This Noise Action Plan relates solely to aircraft noise. The other elements of the Agglomeration Action Plan are road, rail and industrial noise for which separate action plans are being developed by their respective Competent Authorities. Descriptions of the major roads, major railways, major airports and other noise sources outside the Belfast Agglomeration are contained within these action plans as required under END[6].

1.3 The authority responsible

The 2006 Regulations state that the *Competent Authority*[7] for drawing up action plans for *Major Airports*[8] and other airports that are to be mapped is the relevant airport operator. For this Action Plan, the Competent Authority is George Best Belfast City Airport.

1.4 The legal context

1.4.1 International

The International Civil Aviation Organisation ('ICAO') is the United Nation's body that oversees the worldwide civil aviation industry. At an international level, ICAO sets standards and regulations for environmental protection. ICAO has adopted a set of

[6] For further details refer to: https://www.daera-ni.gov.uk/articles/noise [Accessed 25 July 2018]

[7] The other Competent Authorities as per the 2006 Regulations are the Department of Agriculture, Environment and Rural Affairs (for industrial sources within agglomerations), the Department for Infrastructure (for major roads and all roads within agglomerations), the Northern Ireland Transport Holding Company (Translink) (for major railways and railways within agglomerations) and airport operators (Belfast International Airport).

[8] A 'major airport' is defined in END as "a civil airport, designated by the Member State, which has more than 50,000 movements per year (a movement being a take-off or a landing), excluding those purely for training purposes on light aircraft".

principles and guidance constituting the so-called *Balanced Approach*[9] to aircraft noise management. This encourages ICAO Contracting States to mitigate aviation noise through selection, at a local level, the optimum and most cost-effective combination of four key measures, which are:

1. reducing noise at source (from use of quieter aircraft);
2. making best use of land (plan and manage the land surrounding airports);
3. introducing operational noise abatement procedures (by using specific runways, routes or procedures); and
4. imposing noise-related operating restrictions (such as a night-time operating ban or the phasing out of noisier aircraft).

ICAO has also set standards for aircraft noise certification, which are contained in Volume 1 of Annex 16 to the Convention on Civil Aviation. This document sets out maximum acceptable noise levels for different aircraft during take-off and landing, categorised as Chapter 2, 3, 4 and 14.

1.4.2 European

EU Member States must comply with published regulations and directives. Those significant to this Noise Action Plan are as follows:

Directive 2002/49/EC (END)[10] requires Member States to produce strategic noise maps for the main sources of environmental noise, i.e. major roads, major railways, major airports and agglomerations. Action plans are to be produced based on the results of the strategic noise mapping.

Regulation 598/2014[11] repealed Directive 2002/30/EC in 2014 and establishes rules and procedures for the introduction of noise-related operating restrictions. It maintains previous requirements such as the adoption of the ICAO balanced approach.

1.4.3 National

END is implemented in Northern Ireland by the 2006 Regulations, which outline a number of stages to manage and, where necessary, improve environmental noise.

The ***Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003***[12], provide designated airports with additional powers to introduce operating restrictions.

[9] https://www.icao.int/environmental-protection/Pages/noise.aspx [Accessed 14 June 2018]
[10] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:189:0012:0025:EN:PDF [Accessed 14 June 2018]
[11] https://publications.europa.eu/en/publication-detail/-/publication/b6947ca7-f1f6-11e3-8cd4-01aa75ed71a1/language-en [Accessed 29 August 2018]
[12] http://www.legislation.gov.uk/uksi/2003/1742/made [Accessed 14 June 2018]

UK government policy on aviation, including the management of noise, is set out in the ***Aviation Policy Framework*** **('APF')**[13]. The APF considers the 57 dB $L_{Aeq,16h}$ contour as *"the average level of daytime aircraft noise marking the approximate onset of significant community annoyance"*[14]. However, the government acknowledges that: *"this does not mean that all people within this contour will experience significant adverse effects from aircraft noise. Nor does it mean that no-one outside of this contour will consider themselves annoyed by aircraft noise"*[15].

In addition, the APF expects airport operators: *"to offer households exposed to levels of noise of 69 dB $L_{Aeq,16h}$ or more, assistance with the costs of moving"* and; *"to offer acoustic insulation to noise-sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63 dB $L_{Aeq,16h}$ or more. Where acoustic insulation cannot provide an appropriate or cost-effective solution, alternative mitigation measures should be offered"*[16].

Where airport operators are considering developments which result in an increase in noise, the APF expects, as a minimum, airport operators, *"to offer financial assistance towards acoustic insulation to residential properties which experience an increase in noise of 3dB or more which leaves them exposed to levels of noise of 63 dB $L_{Aeq,16h}$ or more"*[17].

Although the APF remains the current national aviation policy document, in October 2017 the Department for Transport ('DfT') published its ***Consultation Response on UK Airspace Policy***[18] which included a review of criteria and metrics for assessing aircraft noise. It states that *"the policies set out within this document provide an update to some of the policies on aviation noise contained within the APF, and should be viewed as the current government policy"*[19]. The key proposals include:

- the creation of an Independent Commission on Civil Aviation Noise (ICCAN) as an advisory non-departmental public body;
- the removal of the 3-dB minimum change requirement for financial assistance towards acoustic insulation to residential properties moved into the 63 dB $L_{Aeq,16h}$ level or above; and
- the acknowledgement that a level of 54 dB $L_{Aeq,16h}$ now corresponds to the onset of significant community annoyance and replaces the 57 dB $L_{Aeq,16h}$ level in the APF

[13] Department for Transport (DfT), 2013. *Aviation Policy Framework*, [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/153776/aviation-policy-framework.pdf [Accessed 14 June 2018]
[14] *Ibid.*, p.58
[15] *Ibid.,* p.58
[16] *Ibid.*, p.63
[17] *Ibid.*, p.63
[18] DfT, 2017a. *Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace*, [online] Available at: https://www.gov.uk/government/publications/uk-airspace-policy-a-framework-for-the-design-and-use-of-airspace [Accessed 31 May 2018]
[19] *Ibid.*, p.7

and that some adverse effects of annoyance can now be seen to occur down to 51 dB $L_{Aeq,16h}$.

The Government also intends to develop aviation noise policy further through the Aviation Strategy consultation on sustainable growth planned for 2018.

Sustainable Aviation (SA)[20] is a long-term strategy which sets out the collective approach of UK aviation to tackling the challenge of ensuring a sustainable future for the aviation industry. SA was launched in 2005 and brings together the main players from UK airlines, airports, manufacturers and air navigation service providers. Signatories to the strategy (including GBBCA) are committed to collectively delivering significant reductions in carbon dioxide emissions, nitrogen oxide emissions and aircraft noise.

1.4.4 Regional / Local

Under the ***Airports (Northern Ireland) Order 1994 ('the 1994 Order')***[21], the Department for Regional Development (now Department for Infrastructure ('DfI')) has the power to direct airport authorities to take action for limiting noise and vibration or mitigating their impact. The 1994 Order also makes a provision for GBBCA to provide facilities for consultation with its stakeholders.

The Noise Policy Statement for Northern Ireland (NPSNI)[22] published in September 2014 is designed to provide clarity regarding current policies and practices to enable noise management decisions to be made in the wider context, at the most appropriate levels, in a timely and cost-effective manner. The NPSNI sets out 3 objectives which are underpinned by the principles of sustainable development:

1. Avoid or mitigate significant adverse impacts on health and quality of life;
2. Mitigate and minimise adverse impacts on heath and quality of life; and
3. Where possible, contribute to the improvement of health and quality of life.

A ***Planning Agreement*** between GBBCA and the Department of the Environment (DoE), last revised in October 2008, contains several obligations and restrictions on the operations at GBBCA. GBBCA has submitted a request to DoE[23] to vary the terms of its Planning Agreement under Article 40A(1)(a) of the Planning (NI) Order 1991. GBBCA has requested the removal of the Seats for Sale restriction[24] from the Agreement and the introduction of a noise contour control cap and other noise control

[20] http://www.sustainableaviation.co.uk [Accessed 14 June 2018]
[21] http://www.legislation.gov.uk/nisi/1994/426/contents/made [Accessed 14 June 2018]
[22] Department of the Environment, 2014. *Noise Policy Statement for Northern Ireland*, [online] Available at:https://www.daera-ni.gov.uk/sites/default/files/publications/doe/noise-policy-statement-ni.PDF [Accessed 31 May 2018]
[23] Planning now sits with the Department for Infrastructure (DfI).
[24] No more than 2 million seats on scheduled flights to be offered for sale **from** the Airport in any period of 12 months.

measures. A Public Inquiry into the Airport's proposals and responses to them was held in May 2015. The Planning Appeals Commission issued its report in October 2015 which recommended the removal of the Seats for Sale restriction, the introduction of a noise control contour of 5.2km^2 at 57dB $L_{Aeq,16h}$ as well as some additional noise control measures. The process to amend the Planning Agreement in line with these recommendations is ongoing.

On 1 November 2018, the Department for Infrastructure (DfI) published **Guidance and Administrative Framework for Monitoring of Delayed Aircraft after 9.30pm at George Best Belfast City (GBBCA)**[25]. This provides guidance on the meaning of exceptional circumstances for use by its staff and an administrative framework including operating procedures for analysing data, record keeping and recording reasons for decisions.

The ***Aeronautical Information Publication (AIP)*** for GBBCA[26] contains information about the aerodrome for aircrew. It includes relevant noise restrictions, such as those on engine ground running and aircraft types, preferred runways for arrivals and departures, as well as the Airport's noise abatement procedures.

Noise Mapping and Action Planning Technical Guidance – Noise from Airports[27] was published on 18 February 2013 to assist with the implementation of Round 1 action plans, interpretation of Round 2 strategic noise maps and the preparation of Round 2 action plans.

The Policy Guidance on the Identification, Designation and Management of Quiet Areas[28], which was published in September 2016, provides criteria and a methodology for the identification and designation of Quiet Areas.

1.5 Any limit values in place in accordance with Article 5

Currently, there are no noise limit values set under END for the UK nor do the 2006 Regulations set any limit values.

---

[25] Department for Infrastructure (DfI), 2018. *Guidance and Administrative Framework for Monitoring of Delayed Aircraft after 9.30pm at George Best Belfast City (GBBCA)*, [online] Available at: https://www.planningni.gov.uk/index/news/guidance_and_administrative_framework_for_monitoring_of_late_flights_november_2018.pdf [Accessed 26 March 2019]

[26] EGAC Belfast/City, [online] Available at: http://www.nats-uk.ead-it.com/public/index.php%3Foption=com_content&task=blogcategory&id=6&Itemid=13.html [Accessed 4 May 2018]

[27] Department of the Environment (DoE), 2013. *Noise Mapping and Action Planning Technical Guidance – Noise from Airports*, [online] Available at: https://www.daera-ni.gov.uk/sites/default/files/publications/daera/Airports%20Noise%20Mapping%20and%20Action%20Plan%20Technical%20Guidance%202013.PDF [Accessed 14 June 2018]

[28] DoE, 2016. *Policy Guidance on the Identification, Designation and Management of Quiet Areas Environmental Noise (Northern Ireland) Regulations 2006*, [online] Available at: https://www.daera-ni.gov.uk/publications/guidance-quiet-areas [Accessed 14 June 2018]

As stated above, the APF sets out thresholds at which it expects airport operators to offer households assistance with the costs of moving (69 dB $L_{Aeq,16h}$ or more) and to offer acoustic insulation to households and noise sensitive buildings (63 dB $L_{Aeq,16h}$ or more).

GBBCA is designated as a Competent Authority under the ***Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003*** and has used the powers granted by the Regulations to prohibit the noisiest aircraft types.

A Planning Agreement between GBBCA and DfI, last revised in October 2008, contains several obligations and restrictions on GBBCA's operations which are detailed in Section 5.5 of the Action Plan.

1.6 Summary of the results of the noise mapping

The results of the noise mapping for GBBCA are set out in Tables 4 and 5 of the Action Plan. These tables detail the areas of, and the number of dwellings and population within, the contours for each noise band, inside the Belfast Agglomeration for Round 3 and a comparison against Round 2 mapping results.

There has been a reduction in the size of the area within all bands between Round 2 and Round 3 with the exception of 65-69dB L_{night} contour band. However, this contour band does not extend beyond the airfield boundary. There has also been a reduction in the number of dwellings, and the population, falling within all noise contour bands between Round 2 and Round 3.

1.7 An evaluation of the estimated number of people exposed to noise

Total areas of noise contours within the Belfast Agglomeration for GBBCA:

L_{den} 50-54 dB = 11.25 km^2; L_{den} 55-59 dB = 4.28 km^2; L_{den} >60 dB = 1.94 km^2.
L_{night} 45-49 dB = 3.47 km^2; L_{night} >50 dB = 1.58 km^2.

Total dwellings exposed in noise contours within the Belfast Agglomeration for GBBCA:

L_{den} 50-54 dB = 12,723; L_{den} 55-59 dB = 5,663; L_{den} >60 dB = 6.
L_{night} 45-49 dB = 4,300; L_{night} >50 dB = 0.

Total population living within dwellings exposed in noise contours within the Belfast Agglomeration for GBBCA:

L_{den} 50-54 dB = 28,609; L_{den} 55-59 dB = 12,155; L_{den} >60 dB = 68.
L_{night} 45-49 dB = 9,182; L_{night} >50 dB = 0.

1.8 Identification of problems and situations that need to be improved

1.8.1 Noise Management Areas

The 2013 guidance sets out a methodology for the detailed assessment of strategic noise maps and the identification of action planning priorities. This methodology should be used to identify Important Areas which are then investigated to determine whether they should be identified as Candidate Noise Management Areas (CNMAs). According to the 2013 guidance, CNMAs are *"areas identified by high levels of environmental noise and the aim is to reduce, where possible, noise in such areas by making them formal Noise Management Areas"*[29].

The methodology is as follows: airport operators should use the $L_{Aeq,16h}$ indicator for prioritisation and should identify the total population affected by noise levels of more than 50dB $L_{Aeq,16h}$. From this, airport operators should identify where the top 1% of the population affected by the highest noise levels is located based on the results of the strategic noise mapping. These areas (referred to as Important Areas) should then be targeted by airport operators for further investigation[30].In preparing this Noise Action Plan and in the assessment of Important Areas, GBBCA has taken into consideration the current noise management measures in place (8.2.5.1), GBBCA's Corporate Responsibility (CR) programme (8.2.5.2), noise complaints received by GBBCA (8.2.5.3), community attitudes to aircraft noise (8.2.5.4), the regulatory and policy framework for controlling environmental noise relevant to the Airport's operations and any limit values in place (8.2.5.5).

On consideration of: 1) the reduction in noise exposure between Round 2 and Round 3; 2) the noise reduction measures and controls in place to help reduce noise for people exposed to noise levels within and well below noise exposure relating to the top 1%; 3) community attitudes towards the noise environment resulting from GBBCA, including those from the top 1%; and 4) the regulatory/policy framework in place, designation of Important Areas as Candidate Noise Management Areas is not appropriate. However, this position will be kept under review taking into account the noise levels experienced in these areas (determined by the annual summer noise contours) and / or changes to UK aviation policy and having regard to any subsequent change to Environmental Noise Directive guidance issued by the Department.

GBBCA will continue to implement its existing noise management programme and will take further actions detailed in Section 9 to prevent and reduce noise for people exposed to noise levels within and well below noise exposure relating to the top 1% and any potential effects on health and wellbeing in addition to the Airport's ongoing CR programme geared towards supporting neighbouring communities. GBBCA will

[29] DoE 2013, *Op. cit.,* p.21
[30] *Ibid.*

keep under review the effectiveness of its current noise management measures in relation to Important Areas presented in Figure 2. Where relevant, any further practicable and cost-effective noise reduction measures will be recommended and presented to the Forum for consultation within the period covered by this Action Plan.

GBBCA recognises that people do not experience noise in an average manner and will also give consideration to the need to employ any alternative measures (in line with industry best practice set out by Sustainable Aviation[31]) which may better reflect how aircraft noise is experienced in different localities.

1.8.2 Quiet Areas

The methodology for the identification and designation of Quiet Areas is set out in the 2016 policy guidance on the identification, designation and management of quiet areas. Filters (criteria) are applied to open spaces within the Belfast Agglomeration to identify Candidate Quiet Areas. The criteria are:
1. Land Type Filter: Publicly available parks and open space within an agglomeration;
2. Noise Level Filter: Noise level less than 55 L_{den}; and
3. Minimum Area Filter: Minimum area of 5 hectares.

As noise maps indicate modelled noise levels (not measured levels) and as land use can change, district councils are given the opportunity, if they consider it necessary, to visit Candidate Quiet Areas, once they have been identified using the above criteria, to consider the appropriateness of an area for designation as a Quiet Area.

To date, three Quiet Areas have been designated based on the 2016 guidance, which are: Conor Park/Stricklands Glen in Bangor; Bashfordlands in Carrickfergus; and Carnmoney Hill Upper in Newtownabbey.

Bashfordlands and Carnmoney Hill are not under the flight path of GBBCA and do not fall within the GBBCA's 50dB noise contour. Conor Park/Strictlands Glen is under the flight path for departures on Runway 04 and arrivals on Runway 22. However, given the altitude of aircraft at this point, the area does not fall within GBBCA's 50dB noise contour. Therefore, no specific actions relating to these Quiet Areas are proposed at this time.

[31] Sustainable Aviation strategy and associated Noise Roadmap: Sustainable Aviation, 2013. *The SA Noise Road-Map: A Blueprint for Managing Noise from Aviation Sources to 2050*, [online] Available at: http://www.sustainableaviation.co.uk/wp-content/uploads/2015/09/SA-Noise-Road-Map-Report.pdf [Accessed 14 June 2018]

1.9 A record of the public consultations organised in accordance with Article 8(7)

In accordance with Article 8(7) of END, GBBCA carried out a public consultation exercise on its draft Round 3 Noise Action Plan. The formal public consultation took place between 3 September and 26 October 2018. A detailed review of all consultation responses has been undertaken. A summary of the comments received and GBBCA's response to these comments is set out in Appendix H.

1.10 Any noise-reduction measures already in force and any projects in preparation

GBBCA has in force a range of measures designed to prevent and reduce noise, its associated potential health effects, and to engage with and support neighbouring communities. These measures will help reduce noise for people exposed to noise levels within and well below noise exposure relating to the top 1% (presented in Figure 2). Some of these measures are stipulated in the Airport's Planning Agreement. These measures are detailed in Section 8.2.5.1 as well as how they are managed by GBBCA. Additional voluntary noise management measures are also set out. The measures may be summarised under the following headings:

2008 Planning Agreement Measures

These include:

- Restricted operating hours;
- A limit on the number of flights per annum;
- Restriction on noisier aircraft types;
- Belfast Lough bias;
- Annual noise contour reporting requirement;
- An indicative noise contour to be agreed in line with the recommendations of Examination in Public (EiP) which reported in 2006[32];
- Installation and operation of an integrated noise and track keeping system;
- Seats for Sale restriction[33].

Voluntary Measures

Preventing and reducing air noise:

- Penalty system on flights after 21:30 hours;
- Noise abatement procedures for arriving and departing aircraft.

[32] GBBCA has submitted a request to vary the terms of its Planning Agreement under Article 40A(1)(a) of the Planning (NI) Order 1991. GBBCA has requested the removal of the Seats for Sale restriction from the Agreement and the introduction of a noise contour control cap and other noise control measures. A Public Inquiry into the Airport's proposals and the responses to them was held in May 2015 and the Planning Appeals Commission issued its report in October 2015, which recommended the removal of the Seats for Sale restriction, the introduction of a noise control contour of 5.2km2 at 57 dB LAeq,16h and some additional noise control measures. The process to amend the Planning Agreement in line with these recommendations is ongoing. This Action Plan will be reviewed and revised, if necessary, to reflect any significant changes arising once this request has been determined.

[33] Refer to section 1.4.4.

Noise monitoring and reporting:

- Monitoring and reporting on track keeping performance;
- Publication of flight statistics and noise related data on the GBBCA website and provision to the Airport Consultative Committee (The George Best Belfast City Airport Forum – 'the Forum').

Preventing and reducing ground noise:

- Provision of Fixed Electrical Ground Power;
- Restrictions on the timing and location of engine testing.

Corporate Responsibility programme

GBBCA also has a comprehensive CR programme in place which is geared towards making a positive impact in its community and to be a key contributor to economic and social development in the region. Initiatives are set out in Section 8.2.5.2 of the Action Plan but can be summarised under the following headings:

- **Community Fund:** from penalties on flights outside scheduled operating hours. Since the inception of the fund in 2009, GBBCA has supported over 150 local community groups to the value of £360,000. Over 90 projects to the value of £225,000 have been supported since January 2014, when the previous Noise Action Plan was published.
- **Supporting education**: as part of its CR programme, GBBCA has sought to foster sustainable partnerships with educational bodies at a local and regional level and support programmes such as *Adopt a School*, *Time to Read*, *Engineers Week and STEM*[34]. GBBCA reached approximately 2,200 pupils across 61 schools with its educational initiatives in 2016-2017 (to end February).
- **Employment and skills development:** through the Airport's comprehensive programme of work experience, tailored work placements, High Flyers Apprenticeship Scheme, and Creative Leadership programme. To date, GBBCA has achieved 100% success rate for former High Flyers securing employment, many with the Airport directly as trainee Airport Fire Fighters.
- **Supporting health and wellbeing**: through the Community Fund and wider CR programme and partnering with local charities such as NI Transplant Association and Inspire Wellbeing**.**
- **Stakeholder engagement:** through the Forum, airport tours, one-to-one meetings and political briefings.
- **Communication on noise issues:** through responding to individual noise concerns, communicating key information relating to noise to stakeholders, including local community groups, through the Community Newsletter and via Social Media.

[34] For more information on these programmes, please refer to Section 8.2.5.2 of the Action Plan.

Over 2,600 salaried hours are dedicated to CR initiatives each year which represents a 30% increase in hours invested in CR since publication of the Round 2 Noise Action Plan. The time dedicated to CR initiatives equates to a circa £46,000 investment[35].

GBBCA is committed to continuing its CR programme, and through listening to the needs of the local community, adapting the programme so that it will continue to address the issues that are most pressing and relevant, particularly in relation to education, employment, health and wellbeing. The CR programme is reviewed yearly for this purpose.

1.11 Actions which the Competent Authorities intend to take in the next five years, including any measures to preserve Quiet Areas

Table 14 sets out the actions GBBCA intends to take in the next five years.

1.12 Long-term strategy

As stated previously, GBBCA has submitted a request to vary the terms of its Planning Agreement under Article 40A(1)(a) of the Planning (NI) Order 1991. This Action Plan will be reviewed and revised, if necessary, to reflect any significant changes required once this request is determined.

This Action Plan will also be reviewed, and updated if necessary, following any major development which affects the noise situation or the designation of further Quiet Areas by the Department, and at least every five years after it is approved.

GBBCA will continue to adhere to UK government policy as set out in the APF and other legislative requirements which may be introduced and will adopt any revised standards or limit values set for the industry by the UK government. The Action Plan will be reviewed in light of any significant policy changes.

GBBCA will also continue to be actively involved in the work of the Northern Ireland Environmental Noise Directive Steering Group (NIENDSG) to assess, prioritise and agree what actions are necessary.

GBBCA will continue to implement its existing noise management programme and will take further actions detailed in Section 9 of the Plan to prevent and reduce noise and any potential effects on health and wellbeing in addition to the Airport's ongoing CR programme geared towards supporting neighbouring communities.

[35] Based on an average salary.

1.13 Financial information: budgets, cost-effectiveness assessment, cost-benefit assessment

GBBCA is committed to the future costs, estimated at approximately £165,000 per year, for noise management and in support of this Action Plan.

1.14 Provisions envisaged for evaluating the implementation and the results of the Action Plan

To monitor and assess the Airport's effectiveness with regards to this Action Plan, several performance indicators/evaluation metrics are set out in Table 14. GBBCA's performance against these indicators/metrics will be regularly reviewed internally and a report on progress will be provided to the Forum on an annual basis.

The annual report of noise contours as required under GBBCA's Planning Agreement will give an indication of any change in population exposure due to noise from GBBCA over the duration of this Action Plan. GBBCA will continue to record and evaluate noise complaints received and will undertake a further Community Attitudes Survey before the next Noise Action Plan is prepared. In addition, the results of future rounds of noise mapping will be used to assess the impact of the noise management actions set out.

1.15 Estimates in terms of the reduction of the number of people affected

It is not possible to quantify the exact number of people who already benefit from the noise management programme which is currently in place at GBBCA, but it is likely to be significant. With respect to any future noise management measures, the estimation of any potential reduction in terms of the number of people affected will form part of the evaluation process.

2. Introduction

2.1 Purpose

This Action Plan is prepared pursuant to the European Parliament and Council Directive for the assessment and management of environmental noise 2002/49/EC referred to as the Environmental Noise Directive ('END') and the Environmental Noise Regulations (Northern Ireland) 2006 ('the 2006 Regulations'). The purpose of the Action Plan is to describe how George Best Belfast City Airport ('GBBCA') as the designated Competent Authority intends to prevent and reduce noise arising from its aircraft operations within the Belfast Agglomeration[36], in line with the requirements of END and the 2006 Regulations.

It is one of a set of five action plans, the others being:

- The Roads Noise Action Plan
- The Railways Noise Action Plan
- The Industrial Noise Action Plan
- The Belfast International Airport Noise Action Plan

This is the third action plan to be produced by GBBCA under END and 2006 Regulations. It covers the period 2019-2024 and is based on the results of strategic noise mapping of aircraft operating at GBBCA in 2016 under the terms of the 2006 Regulations.

Annex V of the END sets out what action plans must include. This is detailed in Appendix A.

2.2 Requirement for noise action planning

END deals with noise from roads, rail, air traffic, industry and in agglomerations. The aim of END is to define a common approach intended to avoid, prevent or reduce on a prioritised basis, the harmful effects due to exposure to environmental noise.

The three main objectives of END are:

- To determine exposure to environmental noise, through noise mapping;
- To ensure information on environmental noise and its effects is made available to the public; and
- To prepare action plans based upon the noise mapping results, to prevent and reduce environmental noise where necessary, where exposure levels can induce harmful effects on human health and to preserve environmental noise quality where it is good.

[36] For the definition of Agglomeration, see glossary in Appendix C.

END is implemented in Northern Ireland by the 2006 Regulations and applies to environmental noise levels in built-up areas, in public parks or in other quiet areas in agglomerations, and other noise-sensitive buildings and areas. The 2006 Regulations apply to noise from road, railway and airport sources, as well as industrial noise. The 2006 Regulations do not apply to noise that is caused by the person exposed to the noise, noise from domestic activities, noise created by neighbours, noise at workplaces, or noise inside means of transport or due to military activities in military areas.

2.3 Current status of END implementation

The 2006 Regulations outline several stages to manage, and where necessary, improve environmental noise. The stages to date are set out in Table 1 below.

Table 1: END stages

Stage	Detail	Due /Completion Date
1	Produce the first round of strategic noise maps for major roads, rail, airports and agglomerations	31 March 2007
2	Competent Authorities to draw up first round action plans to manage noise	30 April 2008 (18 July 2008 for industry and consolidated plans)
3	Produce the second round of strategic noise maps for major roads, rail, airports and agglomerations	31 March 2012
4	Competent Authorities to draw up second round action plans to manage noise	30 April 2013 *(extended by the Department until 18 July 2013)*[37]
5	Produce the third round of strategic noise maps for major roads, rail, airports and agglomerations	31 March 2018
6	Competent Authorities to update, review, and if necessary, revise, action plans to manage noise	At least every five years after the date on which an action plan is adopted or approved

The first round ('Round 1') of strategic noise maps for GBBCA were produced based on aircraft movements in 2006. These maps were adopted by the then Department of

[37] Agreed informally with the Department.

the Environment, now Department of Agriculture, Environment and Rural Affairs ('the Department') and published on the Northern Ireland Noise website[38] in 2007.

The Department published guidance in accordance with the 2006 Regulations for the purpose of identification of priorities for action plans in June 2008. This allowed the process of preparing draft Round 1 action plans and the subsequent public consultation on these plans to take place. On completion of this consultation, GBBCA's Noise Action Plan was finalised and was adopted formally by the Minister in June 2010 and submitted, in summary, to the European Commission. The Round 1 Noise Action Plan covered a five-year period from 2008 to 2013.

Under the 2006 Regulations, a second round ('Round 2') of strategic noise maps were produced for GBBCA based on aircraft movements in 2011. These maps were formally adopted by the Department and were published on the Northern Ireland Noise website in 2012.

On 18 February 2013, the Department issued *Noise Mapping and Action Planning Technical Guidance – Noise from Airports*[39] ('the 2013 guidance') to assist with the implementation of Round 1 action plans, interpretation of Round 2 strategic noise maps and the preparation of Round 2 action plans.

A Round 2 draft Noise Action Plan was prepared based on GBBCA's 2011 strategic noise maps and having regard to the 2013 guidance issued by the Department. This draft Action Plan was subject to a formal public consultation between 14 June and 9 August 2013. On completion of this consultation, GBBCA's Noise Action Plan was finalised and was adopted formally by the Minister in January 2014 and submitted, in summary, to the European Commission. The Round 2 Noise Action Plan covered a five-year period from 2013 to 2018.

Under the 2006 Regulations, a third round ('Round 3') of strategic noise maps were produced for GBBCA based on aircraft movements in 2016. These maps were formally adopted by the Department and were published on the Department's website in January 2018.

A Round 3 draft Noise Action Plan has now been prepared based on GBBCA's 2016 strategic noise maps. In preparing this Action Plan, GBBCA has given regard to the 2013 guidance issued by the Department.

The 2006 Regulations also require Member States to 'preserve environmental noise quality where it is good' through the identification and protection of designated Quiet Areas within agglomerations. As there is no prescriptive definition of what constitutes

[38] Now published on the Department's own website: https://www.daera-ni.gov.uk/services/noise-maps
[39] DoE, 2013, *Op. cit.*

a Quiet Area, the Department developed criteria and a methodology for the identification and designation of Quiet Areas based on an extension of established good practice across the UK and Europe and following a public consultation including key stakeholders in Northern Ireland. The *Policy Guidance on the Identification, Designation and Management of Quiet Areas*[40] was published in September 2016. This guidance lists three quiet areas that were designated by the Minister on 20 September 2016 and explains how these areas are protected. The three areas are:

1. Conor Park/Strictlands Glen, Bangor West
2. Bashfordlands, Carrickfergus
3. Carnmoney Hill – Upper, Newtownabbey

At the same time, the Department also launched a consultation on the designation of Lagan Meadows as a Quiet Area on 19 October 2016. The outcome of this consultation has not been determined.

2.4 Status of Round 2 Noise Action Plan

A summary of the status of actions in the Round 2 Action Plan is provided in Appendix G. GBBCA has reported on progress with regard to actions set out in this Action Plan to the Airport Forum on a yearly basis. In addition, GBBCA committed to take the following actions:

- Work with the NIENDSG to assess the noise maps and other available data to set criteria for designation of Noise Management Areas and Quiet Areas.

Status: The criteria for the designation of Noise Management Areas has been determined and is set out in the 2013 guidance. ***Complete***

As noted above, criteria for the determination of Quiet Areas was subsequently determined and set out in the 2016 guidance. ***Complete***

- Prior to next round of action planning for END, GBBCA will repeat the Community Attitude Survey. The results of the survey will be evaluated and compared with the results of earlier surveys to detect trends in attitudes towards aircraft noise.

Status: as set out in Section 8.2.5.4, a Community Attitudes Survey was carried out in the first quarter of 2018. ***Complete***

[40] DoE, 2016, *Op. cit.*

2.5 Scope of the Noise Action Plan

END requires that action plans are designed to manage noise issues and effects at places near a major airport and for places near any airport within any relevant Agglomeration which is defined as having more than 100,000 inhabitants (for Round 2 and subsequent rounds thereafter).

2.6 Effects of noise

END defines environmental noise as *"unwanted or harmful outdoor sound created by human activities, including noise from road, rail, airports and from industrial sites"*[41].

The extent to which noise affects people depends on its nature, intensity, duration, the activity being undertaken by the individual at the time of exposure and the individual's sensitivity. The effects of noise are also dependent on the quality of the sound and the individual's attitude towards it. A sound that one person may find relaxing, such as rain against a window, may irritate another.

Noise has the potential to affect health in a variety of ways. Auditory effects occur as a direct impact of the noise, (i.e. noise of sufficient intensity to physically damage the hearing organelles). Such risks are more commonly associated with occupational health or prolonged exposure to loud music. The Airport does not present any direct auditory risk to local communities, and occupational and passenger risk is well addressed through existing operational procedures.

Non-auditory health effects associated with exposure to environmental noise can include annoyance, sleep disturbance, and impacts on academic performance, and subject to the exposure level and type, can lead to hypertension, which is a risk factor for cardiovascular disease.

The health effects that may result from aircraft noise that are considered within this Noise Action Plan are annoyance, sleep disturbance and academic performance, as these impacts are supported by the most reliable research, are immediate, and typically precede the less well understood cardiovascular and psychological health effects[42]. This Action Plan is thereby designed to prevent and reduce noise impacts in order to protect health and to contribute positively to the quality of life and wellbeing of neighbouring communities.

[41] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:189:0012:0025:EN:PDF [Accessed 14 June 2018]
[42] ERCD Report 0907, 2010. *Environmental Noise and Health: A Review,* [online] Available at: https://publicapps.caa.co.uk/docs/33/ERCD0907.pdf [Accessed 14 June 2018]

2.7 Action Plan layout

Section 3 of this Action Plan provides a description of GBBCA and the agglomeration under consideration. Section 4 outlines the authority responsible. Section 5 contains information on the regulatory and policy framework including any limit values in place. Section 6 summarises the findings of the noise mapping process. Section 7 outlines the public consultation process. Section 8 gives details of the action planning process. Section 9 outlines the actions GBBCA intends to take to prevent and reduce noise over the duration of the Action Plan. Section 10 sets out GBBCA's long term strategy. Section 11 details the financial information available. Section 12 sets out the provisions envisaged for evaluating the implementation and the results of the Action Plan and Section 13 provides an estimate of the reduction in the number of people affected as a result of this Action Plan.

3. Characteristics

3.1 Belfast Agglomeration

The agglomeration under consideration in this Action Plan is defined by the Department as being the Belfast Metropolitan Urban Area (the 'Belfast Agglomeration'). The Belfast Agglomeration has a population of 597,419 covering an area of approximately 209 km^2 [43]. This represents a 4% increase in population and a 5.5% increase in area on Round 2, and reflects both changes in the definition of the Agglomeration following the 2011 census, and creation of new housing developments on the edge of Belfast since 2011.

The Belfast Agglomeration encompasses Belfast and parts of the Lisburn and Castlereagh, Antrim and Newtownabbey, Mid and East Antrim, and Ards and North Down council areas. Noise sources identified within the Belfast Agglomeration include roads, railways, industry and GBBCA. Figure 1 shows the extent of the Agglomeration and the location of GBBCA within it.

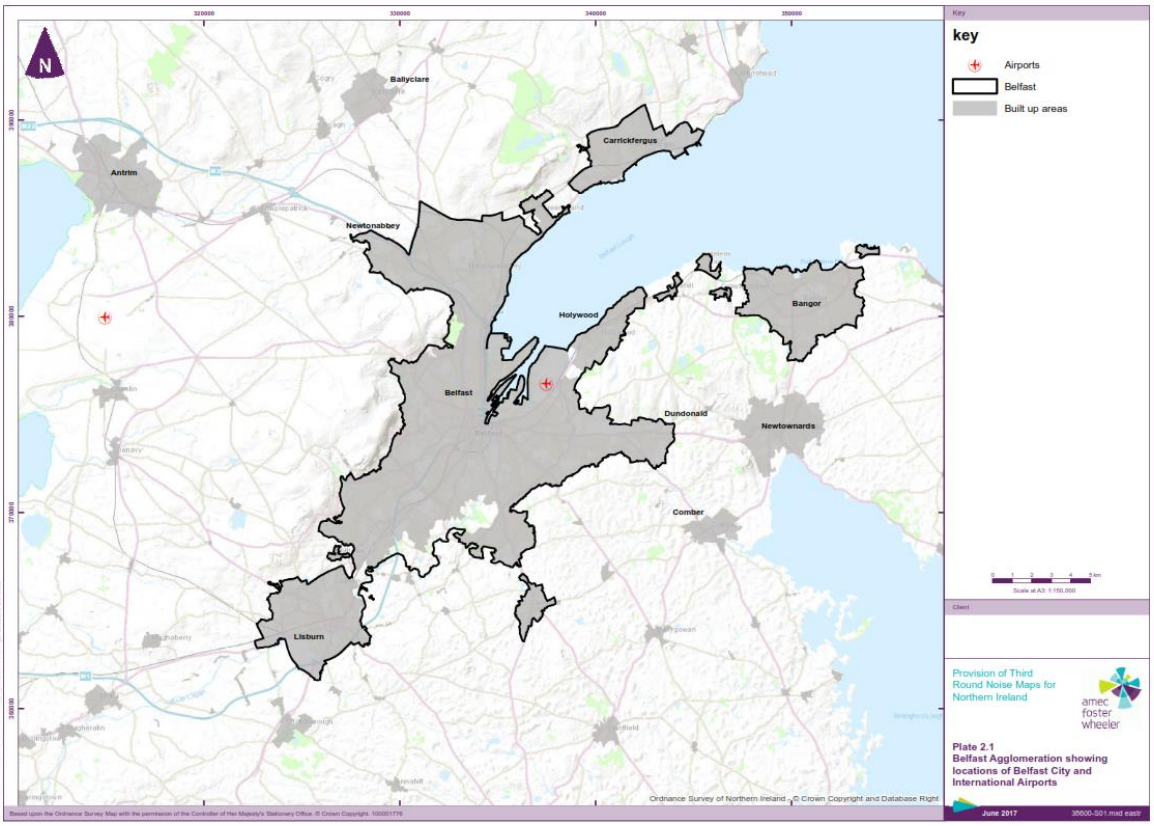
Descriptions of the major roads, major railways, major airports and other noise sources outside the Belfast Agglomeration are contained in other relevant action plans referred to previously.

[43] Amec Foster Wheeler Environment & Infrastructure UK Limited, 2017. *Noise Mapping and Action Planning Contract Round 3 3D Propagation Model Report – Final* [online] Available at: https://www.daera-ni.gov.uk/sites/default/files/publications/daera/END%20R3%20GroundModel_FINAL.pdf [Accessed 26 April 2018]

3.2 Airport description

GBBCA is owned by 3i Infrastructure Fund. It is a regional airport serving a range of destinations, mainly in Great Britain with some European routes. Situated on the south shore of Belfast Lough adjacent to the A2, one of the main arterial routes into the city, GBBCA is a key strategic gateway to the province. In 2016, GBBCA catered for over 2.6 million passengers, representing approximately 35% of the air traffic to and from Northern Ireland.

Figure 1: The Belfast Agglomeration and the location of GBBCA



In 2016, GBBCA catered for 42,534 aircraft movements which represents an almost 1.5% increase in movements compared to 2011, upon which Round 2 strategic noise mapping was based. A breakdown of the main types of aircraft operating at GBBCA in 2016 is provided in Table 2.

Table 2: Breakdown of 2016 movements by aircraft type

Aircraft Type	Number of Movements	% of Total Movements
Airbus A319/320	8,101	19%
Embraer 75/95	1,121	3%
Dash Q8-400	29,001	68%
Let 410	2,106	5%
Private/Other	2,205	5%

Although not meeting the threshold to be defined as a *Major Airport* under the END (i.e. having movements of 50,000 per year, excluding training on light aircraft), noise mapping has to be undertaken for GBBCA as it falls within the Belfast Agglomeration.

The runway at GBBCA is aligned in a north-easterly to south-westerly direction at 040/220 degrees. There is housing to the south and east of the Airport (towards Belfast city centre) but the Airport is surrounded to the north and west by Belfast Lough and the Belfast Harbour industrial estate.

Scheduled opening hours at GBBCA are 06:30 hours to 21:30 hours with extensions for delayed aircraft permissible from 21:31 hours to 23:59 hours, in exceptional circumstances.

4. The authority responsible

The 2006 Regulations state that the *Competent Authority*[44] for drawing up Action Plans for Major Airports and other airports that were mapped is the relevant airport operator. For this Action Plan, the Competent Authority is George Best Belfast City Airport. The relevant contact details for GBBCA in relation to this plan are as follows:

Environment Department
George Best Belfast City Airport
Sydenham Bypass
Belfast
BT3 9JH
Tel: (028) 9093 9093
Email: environment@bca.aero

The Northern Ireland Environmental Noise Directive Steering Group ('NIENDSG') was set up by the Department in 2005 to provide input into the development of the strategic noise maps for Northern Ireland and subsequent Action Plans. This group is made up of representatives from each Competent Authority including:

- Department for Infrastructure
- Translink
- George Best Belfast City Airport
- Belfast International Airport
- The Department of Agriculture, Environment and Rural Affairs

[44] The other Competent Authorities as per the 2006 Regulations are the Department of Agriculture, Environment and Rural Affairs (for industrial sources within agglomerations), the Department for Infrastructure (for major roads and all roads within agglomerations), the Northern Ireland Transport Holding Company (Translink) (for major railways and railways within agglomerations) and airport operators (Belfast International Airport).

5. The regulatory and policy framework

5.1 International

The International Civil Aviation Organisation ('ICAO') is the United Nation's body that oversees the worldwide civil aviation industry. At an international level, ICAO sets standards and regulations for environmental protection. ICAO has adopted a set of principles and guidance constituting the so-called ***Balanced Approach***[45] to aircraft noise management, which encourages ICAO Contracting States to:

- Mitigate aviation noise through selection at a local level, the optimum combination of four key measures:
  1. Reducing noise at source (from use of quieter aircraft),
  2. Making best use of land (plan and manage the land surrounding airports),
  3. Introducing operational noise abatement procedures (by using specific runways, routes or procedures),
  4. Imposing noise-related operating restrictions (such as a night time operating ban or phasing out of noisier aircraft);
- Select the most cost-effective range of measures;
- Not introduce noise-related operating restrictions unless the authority is in a position, on the basis of studies and consultations, to determine whether a noise problem exists and having determined that an operating restriction is a cost-effective way of dealing with the problem.

ICAO has also set standards for aircraft noise certification which are contained in Volume 1 of Annex 16 to the Convention on Civil Aviation. This document sets maximum acceptable noise levels for different aircraft during take-off and landing, categorised as Chapter 2, 3, 4 and 14. Chapter 2 aircraft have been prevented from operating within the EU since 2002, unless they are granted specific exemption, and therefore the vast majority of aircraft fall within Chapter 3, 4 and 14 parameters. These aircraft are quieter than Chapter 2 aircraft. Chapter 4 standards have applied to all new aircraft manufactured since 2006. These aircraft must meet a standard of being 10 dB quieter than Chapter 3 aircraft. Chapter 14 was adopted by the ICAO in 2014. This represents an increase in stringency of 7 dB compared with Chapter 4 and applies to new aircraft submitted for certification after 31 December 2017.

In its ***Guidelines for Community Noise***[46] the World Health Organisation makes several recommendations for noise levels in specific environments to avoid certain health effects occurring. However, in practice, in town centres and densely populated residential areas, ambient noise levels will generally be at, or above, these levels.

[45] https://www.icao.int/environmental-protection/Pages/noise.aspx [Accessed 14 June 2018]
[46] Berglund, B., Lindvall, T. & Schwela, D., 2000. *Guidelines for Community Noise.* London: World Health Organisation.

According to a report by the Health Protection Agency (HPA)[47], 50% of the UK population lives in areas where daytime sound levels exceed those recommended in the WHO Guidelines for Community Noise.

In its ***Night Noise Guidelines for Europe*** the World Health Organisation[48] makes recommendations for noise levels during the night-time period to protect human health. Similarly, the HPA have reported that two-thirds of the UK populations live in areas where the night-time guidelines recommended by the WHO are exceeded[49].

5.2 European

EU Member States must comply with published regulations and directives. Those significant to this Action Plan are as follows:

Directive 2002/49/EC[50] relating to the assessment and management of environmental noise, referred to as the ***Environmental Noise Directive*** ('END'), requires Member States to produce strategic noise maps for the main sources of environmental noise, i.e. major roads, major railways, major airports and industry. END also requires strategic noise maps to be produced for agglomerations with a population of more than 250,000 persons and a certain population density in 2007 and those with a population of more than 100,000 persons and a certain population density[51] in 2012 and subsequent rounds. Action plans must be produced based on the results of the noise mapping.

Directive 2006/93/EC[52] replaced Directive 92/14/EEC and banned the use of Chapter 2 aircraft in the EU from 1st April 2002.

Regulation 598/2014[53] repealed Directive 2002/30/EC in 2014 and establishes rules and procedures for the introduction of noise-related operating restrictions. It maintains previous requirements such as the adoption of ICAO's balanced approach.

[47] Moorhouse, A., 2010. *Environmental Noise and Health in the UK A report by the Ad Hoc Expert Group on Noise and Health.* Health Protection Agency, [online] Available at: http://webarchive.nationalarchives.gov.uk/20140714120950/http://www.hpa.org.uk/noise [Accessed 14 June 2018]
[48] World Health Organisation, 2009. *Night Noise Guidelines for Europe*, [online] Available at: http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf [Accessed 14 June 2018]
[49] Moorhouse, A., 2010, *Op. cit.*
[50] For further information see the European Commission Environmental Noise Directive website: http://ec.europa.eu/environment/noise/directive_en.htm [Accessed 14 June 2018]
[51] In the Regulations, the population density used is equal to or greater than 500 people per km^2.
[52] https://publications.europa.eu/en/publication-detail/-/publication/35c76c9e-5fa6-46eb-82f0-d08d320f9ed8/language-en [Accessed 29 August 2018]
[53] https://publications.europa.eu/en/publication-detail/-/publication/b6947ca7-f1f6-11e3-8cd4-01aa75ed71a1/language-en [Accessed 29 August 2018]

5.3 National

The ***Civil Aviation Act 2012***[54] placed a new duty on the Civil Aviation Authority (CAA) to make information about the environmental performance of the aviation sector available to the general public and measures taken to limit adverse environmental effects. Following a public consultation launched in May 2013, The CAA published its policy for carrying out its information duties under this Act in January 2014[55].

Directive 2002/49/EC is implemented in Northern Ireland by the ***Environmental Noise Regulations (Northern Ireland) 2006 ('the 2006 Regulations')***[56]. The 2006 Regulations require the Competent Authorities to produce an Action Plan in 2008, 2013 and every five years thereafter, based on the results of the noise mapping. The 2006 Regulations also require the noise maps to be reviewed and revised, if necessary, from time to time and whenever a major development occurs affecting the existing noise situation. The 2006 Regulations do not apply to noise caused by the person exposed to the noise, noise from domestic activities, noise created by neighbours[57], noise at work places[58], noise inside means of transport or noise due to military activities in military areas.

The ***Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003***[59] provide designated airports with additional powers to introduce operating restrictions. Using the power granted to it by these Regulations, GBBCA has prohibited the operation of those aircraft types which are only 'marginally compliant'[60] with ICAO's Chapter 3 noise certification standard.

Powers relating to how noise is managed at individual airports and to set noise controls at airports, as well as controls set through the planning system, are devolved in relation to Northern Ireland. Specific proposals, such as the implementation of EU Regulation 598/2014 on ICAO's balanced approach will therefore be for the Devolved Administrations.

The UK government's policy on aviation, including the management of noise, is set out in the ***Aviation Policy Framework*** **('APF')**[61]. The APF was published on 22 March 2013

[54] http://www.legislation.gov.uk/ukpga/2012/19/contents/enacted [Accessed 29 August 2018]
[55] The Civil Aviation Authority, 2014. *CAP 1143 The Civil Aviation Authority's policy for carrying out its information duties under the Civil Aviation Act 2012,* [online] Available at: http://publicapps.caa.co.uk/docs/33/CAP%201143%20Jan%2014.pdf [Accessed 27 August 2018]
[56] http://www.legislation.gov.uk/nisr/2006/387/contents/made [Accessed 14 June 2018]
[57] The Noise Act 1996 gives district councils in Northern Ireland, specific powers to deal with noise at night from domestic premises. Noise from domestic activities is also controlled under the Clean Neighbourhoods and Environment Act (Northern Ireland) 2011.
[58] Noise at work is governed by the Control of Noise at Work Regulations (Northern Ireland) 2006.
[59] http://www.legislation.gov.uk/uksi/2003/1742/regulation/2/made [Accessed 14 June 2018]
[60] Aircraft that meet the Chapter 3 noise certification standard by a margin of 5 dB or less: http://europa.eu/rapid/press-release_IP-01-1683_en.htm [Accessed 29 August 2018]
[61] DfT, 2013, *Op. cit.*

following a two-year process involving an extensive scoping exercise and public consultation on a draft version of the framework.

The APF sets out the government's high-level objectives for the aviation sector and the policies to achieve these objectives. The APF replaced the 2003 ***Future of Air Transport - White Paper***[62], more generally known as the *Air Transport White Paper* ('ATWP'). The APF includes the government's overall policy objective on noise[63] and a number of measures to reduce and mitigate noise.

The APF considers the 57 dB $L_{Aeq,16h}$ contour as *"the average level of daytime aircraft noise marking the approximate onset of significant community annoyance"*[64]. However, the government acknowledges that *"this does not mean that all people within this contour will experience significant adverse effects from aircraft noise. Nor does it mean that no-one outside of this contour will consider themselves annoyed by aircraft noise"*[65].

In addition, the APF expects airport operators: *"to offer households exposed to levels of noise of 69 dB $L_{Aeq,16h}$ or more, assistance with the costs of moving"*[66] and; *"to offer acoustic insulation to noise-sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63 dB $L_{Aeq,16h}$ or more. Where acoustic insulation cannot provide an appropriate or cost-effective solution, alternative mitigation measures should be offered"*[67].

Where airport operators are considering developments which will result in an increase in noise, the APF expects, as a minimum, airport operators *"to offer financial assistance towards acoustic insulation to residential properties which experience an increase in noise of 3 dB or more which leaves them exposed to levels of noise of 63 dB $L_{Aeq,16h}$ or more"*[68].

Although the APF remains the current national aviation policy document, in October 2017 the DfT reported on the outcome of consultations regarding changes to UK airspace which included a review of criteria and metrics for assessing aircraft noise. The response states that *"the policies set out within this document provide an update to some of the policies on aviation noise contained within the APF, and should be viewed as the current government policy"*[69]. Proposals include:

---

[62] DfT, 2003. *The Future of Air Transport*. Norwich: The Stationery Office.
[63] The government's overall objective on noise is *"to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise"* (DfT, 2013, p.57).
[64] DfT, 2013*, Op. cit.*, p.58
[65] *Ibid.,* p.58
[66] *Ibid.*, p.63
[67] *Ibid.*, p.63
[68] *Ibid.*, p.63
[69] DfT, 2017a, p.7

- The creation of an Independent Commission on Civil Aviation Noise (ICCAN) as an advisory non-departmental public body;
- The removal of the 3-dB minimum change requirement for financial assistance towards acoustic insulation to residential properties moved into the 63 dB $L_{Aeq,16h}$ level or above; and
- The acknowledgement that a level of 54 dB $L_{Aeq,16h}$ now corresponds to the onset of significant community annoyance and replaces the 57 dB $L_{Aeq,16h}$ level in the APF and that some adverse effects of annoyance can now be seen to occur down to 51 dB $L_{Aeq,16h}$.

The UK government also intends to develop aviation noise policy further through a new Aviation Strategy, which following a series of consultations, is aimed to be published in early 2019[70].

To support the delivery of the aviation policy, the CAA issued new guidance for changing UK airspace (***CAP 1616***)[71] in December 2017. This guidance sets out the framework for the stages of the process and activities involved, from the conception of the need for a change to the airspace design, to consulting and engaging with those potentially impacted, assessing the impacts of different design options from a safety, operational and environmental perspective, to the ultimate regulatory decision. Additionally, if the change is approved, this guidance covers implementation and subsequent review of that change.

Sustainable Aviation (SA)[72] is a long-term strategy which sets out the collective approach of UK aviation to tackling the challenge of ensuring a sustainable future for the aviation industry. SA was launched in 2005 and brings together the main players from UK airlines, airports, manufacturers and air navigation service providers. Signatories to the strategy are committed to collectively delivering significant reductions in carbon dioxide emissions, nitrogen oxide emissions and aircraft noise. GBBCA became a signatory to the strategy in 2005.

In April 2013, SA published a Noise Road-Map which was updated in 2015[73].This document is a blueprint for managing noise from aviation sources to 2050. It sets out the aviation industry's expert view of how UK aviation can continue to develop in a sustainable fashion. It shows that, as well as meeting people's increasing aspiration to fly, and helping the economy flourish through increased connectivity and trade, the aviation industry can also make major improvements in reducing the noise of flying

[70] For further details see: https://aviationstrategy.campaign.gov.uk/ [Accessed 29 August 2018]
[71] Civil Aviation Authority, 2017. *Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements,* [online] Available at: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8127 [Accessed 31 May 2018]
[72] http://www.sustainableaviation.co.uk/ [Accessed 14 June 2018]
[73] Sustainable Aviation, 2015. *The SA Noise Road-Map: A Blueprint for Managing Noise from Aviation Sources to 2050,* [online] Available at: http://www.sustainableaviation.co.uk/wp-content/uploads/2015/09/SA-Noise-Road-Map-Report.pdf [Accessed 14 June 2018]

owing to the development and introduction of quieter aircraft, better operational procedures and controls on how land around airports is developed. Furthermore, this can be achieved while passenger numbers are expected to more than double by 2050, and with air freight expected to increase more than seven-fold over the same period.

In their latest progress report on its long-term strategy[74], SA notes in relation to noise that they have made good progress against their commitments in the 2013 Road-Map. However, these improvements have not always been reflected in community perceptions. Therefore, to further understand concerns of communities, SA has commissioned independent research and will publish a discussion paper in 2018 on the findings to identify the most effective solutions to manage the impact of aircraft noise.

5.4 Regional / Local

Under the ***Airports (Northern Ireland) Order 1994 ('the 1994 Order')[75]***, the former Department for Regional Development (now Department for Infrastructure (DFI)) has a power to direct airport authorities to take action for limiting noise and vibration or mitigating their effect and as such, has a role to play in relation to civil aircraft noise at airports in Northern Ireland. The 1994 Order also makes a provision for airports to provide facilities for consultation with its stakeholders on any matter concerning the management or administration of the Airport which affects their interests. GBBCA set up the George Best Belfast City Airport Forum ('the Forum') in line with this provision.

The Noise Policy Statement for Northern Ireland (NPSNI)[76] published in September 2014 is designed to provide clarity regarding current policies and practices to enable noise management decisions to be made in the wider context, at the most appropriate levels, in a timely and cost-effective manner. The NPSNI sets out 3 objectives which are underpinned by the principles of sustainable development:

4. Avoid or mitigate significant adverse impacts on health and quality of life;
5. Mitigate and minimise adverse impacts on heath and quality of life; and
6. Where possible, contribute to the improvement of health and quality of life.

By setting out these clear policy aims, the NPSNI provides the necessary clarity and direction to enable decisions to be made regarding what is an acceptable noise burden to place on society, and the overarching objective to support healthy communities.

[74]Sustainable Aviation, 2017. *Progress Report 2015-2017*, [online] Available at: http://www.sustainableaviation.co.uk/wp-content/uploads/2018/06/SA-Progress-report-2015-17-1.pdf [Accessed 24 July 2018]
[75] http://www.legislation.gov.uk/nisi/1994/426/part/III?view=plain [Accessed 14 June 2018]
[76] Department of the Environment, 2014. *Noise Policy Statement for Northern Ireland*, [online] Available at:https://www.daera-ni.gov.uk/sites/default/files/publications/doe/noise-policy-statement-ni.PDF [Accessed 31 May 2018]

If a proposed development is likely to be a source of noise, its location and measures regarding the level or timing of noise emissions may be controlled through the planning system. A ***Planning Agreement*** is in force between GBBCA and DfI.

GBBCA has submitted a request to vary the terms of its Planning Agreement under Article 40A(1)(a) of the Planning (NI) Order 1991. GBBCA has requested the removal of the Seats for Sale restriction[77] from the Agreement and the introduction of a noise contour control cap and other noise control measures. A Public Inquiry into the Airport's proposals and the responses to them was held in May 2015 and the Planning Appeals Commission issued its report in October 2015, which recommended the removal of the Seats for Sale restriction, the introduction of a noise control contour of 5.2km^2 at 57 dB $L_{Aeq,16h}$ and some additional noise control measures. The process to amend the Planning Agreement in line with these recommendations is ongoing. This Action Plan will be reviewed and revised, if necessary, to reflect any significant changes arising once this request has been determined.

On 1 February 2018, DfI received an Investigation Report from the Northern Ireland Public Services Ombudsman into a complaint regarding delayed flights after 9.30pm at GBBCA. In response to this report, on 1 November 2018, DfI published **Guidance and Administrative Framework for Monitoring of Delayed Aircraft after 9.30pm at George Best Belfast City (GBBCA)**[78]. This provides guidance on the meaning of exceptional circumstances for use by its staff and an administrative framework, including operating procedures for analysing data, record keeping and recording reasons for decisions.

The ***Aeronautical Information Publication (AIP)*** for GBBCA[79] contains information about the aerodrome for aircrew. It includes relevant noise restrictions, such as those on the timing of engine ground runs and aircraft types and preferred runways for arrivals and departures. It also sets out the Airport's noise abatement procedures (detailed further in Section 8.2.5.1).

A list of the current regulations and policy for controlling noise in Northern Ireland, as well as local and national sustainable development plans, policies and strategies considered during the action planning process, is contained in Appendix B.

[77] No more than 2 million seats on scheduled flights to be offered for sale **from** the Airport in any period of 12 months.
[78] Department for Infrastructure, 2018. *Guidance and Administrative Framework for Monitoring of Delayed Aircraft after 9.30pm at George Best Belfast City (GBBCA)*, [online] Available at: https://www.planningni.gov.uk/index/news/guidance_and_administrative_framework_for_monitoring_of_late_flights_november_2018.pdf [Accessed 26 March 2019]
[79] EGAC Belfast/City, [online] Available at: http://www.nats-uk.ead-it.com/public/index.php%3Foption=com_content&task=blogcategory&id=19&Itemid=74.html [Accessed 4 May 2018]

5.5 Any limit values in place

Currently there are no noise limit values set under END for the UK nor do the 2006 Regulations set any limit values.

As stated above, the APF sets out thresholds above which it expects airport operators to offer households assistance with the costs of moving (69 dB $L_{Aeq,16h}$ or higher) and to offer acoustic insulation to households and noise sensitive buildings (63 dB $L_{Aeq,16h}$ or higher).

GBBCA is designated as a Competent Authority under the ***Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003*** and has used the powers granted by the Regulations to prohibit the noisiest aircraft types.
A Planning Agreement between GBBCA and DfI, last revised in October 2008, contains several obligations and restrictions on the operations at GBBCA. These are:

- Flights can only be scheduled to operate between 06:30 hours and 21:30 hours. Delayed aircraft may be permitted to operate between 21:31 hours and 23:59 hours in exceptional circumstances.
- No more than 48,000 air traffic movements[80] are permitted in any period of 12 months.
- Only those aircraft types that comply with the certified noise limits as laid down in Chapter 3 of Annex 16 of the standards adopted by the ICAO Council (and not marginally compliant with these limits) are allowed to operate.
- No more than 2 million seats on scheduled flights to be offered for sale from the Airport in any period of 12 months.
- To maintain a bias in favour of approaches and climb-outs over Belfast Lough and maximise approaches and climb-outs over Belfast Lough.
- Prepare annually, noise contours for 57, 60 and 63 dB $L_{Aeq,16h}$ for the summer 92-day period[81] and include in the case of the 57 dB $L_{Aeq,16h}$, contour both the area covered and the population living within it.
- Agree an indicative noise control contour in line with the recommendations of the Examination in Public (EiP) which reported in August 2006.
- Install and operate an integrated noise and track keeping system.

As stated in section 5.4, GBBCA has submitted a request to vary the terms of its Planning Agreement under Article 40A(1)(a) of the Planning (NI) Order 1991. GBBCA has requested the removal of the Seats for Sale restriction[82] from the Agreement and the introduction of a noise contour control cap and other noise control measures. A Public Inquiry into the Airport's proposals and the responses to them was held in May 2015 and the Planning Appeals Commission issued its report in October 2015, which

[80] 'Air traffic movements' means landings or take-offs of all aircraft (except diverted aircraft).
[81] 16 June-15 September.
[82] No more than 2 million seats on scheduled flights to be offered for sale **from** the Airport in any period of 12 months.

recommended the removal of the Seats for Sale restriction, the introduction of a noise control contour of 5.2km^2 at 57 dB $L_{Aeq,16h}$ and some additional noise control measures. The process to amend the Planning Agreement in line with these recommendations is ongoing. This Plan will be reviewed and revised, if necessary, to reflect any significant changes arising once this request has been determined.

6. Summary of the results of the noise mapping

6.1 Round 3 noise mapping process

Strategic noise maps were prepared by Wood Environment & Infrastructure UK (formerly Amec Foster Wheeler) ('Wood') on behalf of GBBCA[83] and were based on aircraft movements during the calendar year of 2016 using the prediction methodology Integrated Noise Model (INM) Version 7.0d. The development of the airport noise model required several data inputs, those which relate directly to the Airport, and those which relate to air traffic movements. The data inputs to the noise model are set out in Tables F.1 and F.2 of Appendix F respectively.

The noise mapping stages were as follows:

- Stage 1: confirm the methods to be used for mapping and definitions;
- Stage 2: review Round 2 mapping extents and approaches to identify material areas of consistency;
- Stage 3: confirm the Round 3 mapping extents;
- Stage 4: capture Round 3 data inputs and develop datasets against defined noise model schema;
- Stage 5: develop finalised noise model and attributed emission datasets;
- Stage 6: noise calculations;
- Stage 7: post processing, analysis and quality assurance and identify material changes.

Following the assessment of noise levels, analysis was undertaken using datasets (GIS dataset and Residential Population Location Dataset) developed to present dwelling and population locations.

Noise maps were presented as noise contours for several indicators relating to the average noise level in decibels (dB) over specific periods of time – as follows:

- L_{day} – annual average daytime noise level (07:00-19:00 hours);

[83] Amec Foster Wheeler, now Wood Environment & Infrastructure UK Limited ('Wood') were commissioned by the Department of Agriculture, Environment and Rural Affairs to prepare noise maps on behalf of all the Northern Ireland Competent Authorities. This ensured that mapping was undertaken in a consistent manner. As part of the commission, Wood have prepared noise maps, all associated population exposure data and supplementary reports as required under the 2006 Regulations and the Directive.

- $L_{evening}$ – annual average evening noise level (19:00-23:00 hours);
- L_{night} – annual night-time noise level (23:00-07:00 hours);
- L_{den} – annual average 24-hour noise level (day-evening-night) but with evening values weighted by 5 dB(A) and the night values weighted by 10 dB(A).

The maps were also produced for $L_{Aeq,16h}$ (07:00-23:00 hours) as this is the primary indicator used by UK airports when mapping aircraft noise[84].

It is important to highlight the difference between how the annual $L_{Aeq,16h}$ noise contours are calculated for END purposes, and the $L_{Aeq,16h}$ noise contours which are prepared annually for GBBCA in line with the Airport's Planning Agreement[85]. As shown in Table 3, the primary difference between the two is that the Planning Agreement contours only take into account flights in the summer 92-day period (16 June-15 September) and are based on the average modal split over the 92 days. Furthermore, all flights are included regardless of whether they occur outside the 07:00-23:00 period. END contours take into account all flights in the year but only those occurring during the 07:00-23:00 period. They are based on the average modal split over the whole year.

Table 3: Comparison between END and Planning Agreement $L_{Aeq,16h}$ contours

$L_{Aeq,16h}$ contours	END	Planning Agreement
Reporting period:	Annual	Summer 92-day period (16 June-15 Sept)
Flights included:	Flights between 07:00-23:00	All flights (irrespective of time)
Modal Split[86]:	Average over year	Average over summer 92-day period

Consequently, the END and Planning Agreement contours for the $L_{Aeq,16h}$ indicator cannot be directly compared. The thresholds set out in the APF in terms of $L_{Aeq,16h}$ are also based on the summer 92-day period.

Noise maps for GBBCA and consolidated noise maps for all noise sources within the Belfast Agglomeration can be found in Appendices D and E.

The results of the strategic noise mapping process help to provide an understanding of:

- Where environmental noise is located;
- The approximate magnitude of noise levels within the assessment area; and

[84] DoE, 2013, *Op. cit.*
[85] e.g. Bickerdike Allen Partners, 2016. *Belfast City Airport Airborne Aircraft Contours.* November 2016.
[86] See glossary in Appendix C.

- The approximate number of people exposed to various levels of environmental noise.

There are limitations with strategic noise maps as the noise levels represented by the maps do not necessarily correspond to the noise level which would be experienced at any given point on a given day but reflect the long-term average. However, as the noise maps for GBBCA have been validated using actual noise measurements and flight information from the Airport's Noise and Track Monitoring System (detailed further in Section 8.2.4) they do provide a good indication of the overall exposure of the population to environmental noise.

6.2 Area exposed to GBBCA noise bands

The results of the area analysis of the noise contours for the various noise bands are set out in Table 4 (in terms of km^2).

Table 4: Area exposed to GBBCA noise bands

L_{den}			L_{night}			$L_{Aeq,16h}$		
Noise Band dB	**R2 2011 (km^2)**	**R3 2016 (km^2)**	**Noise Band dB**	**R2 2011 (km^2)**	**R3 2016 (km^2)**	**Noise Band dB**	**R2 2011 (km^2)**	**R3 2016 (km^2)**
50-54	18.05	11.25	45-49	4.27	3.47	50-54	15.78	9.72
55-59	5.88	4.28	50-54	1.27	0.90	55-59	5.23	3.43
60-64	1.92	1.24	55-59	0.39	0.34	60-64	1.65	0.94
65-69	0.54	0.37	60-64	0.21	0.19	65-69	0.48	0.30
70-74	0.23	0.18	65-69	0.09	0.12	70-74	0.21	0.16
>75	0.16	0.15	>70	0.04	0.03	>75	0.14	0.11

6.3 Commentary on the results of the area analysis

The area exposed to aircraft noise follows the north-east to south-west orientation of the runway. As arriving aircraft approach the airfield along the line of the 'extended runway centreline', while departing aircraft follow the noise abatement tracks (as described in Section 8.2.5.1), the shape of the contours is not entirely symmetrical. Contours to the north-east of the airfield are slightly to the north of the runway centreline owing to departing aircraft following the required 6-degree left turn after take-off over Belfast Lough. Contours to the south-west of the airfield are slightly to the south of the runway centreline as almost all traffic departing over the city executes a left turn to get on track to its destination.

It can also be noted that the contours exhibit bulges around the runway ends. This is due to the additional engine thrust required at an aircraft's 'start-of-roll' (i.e. when it commences moving along the runway prior to take-off).

There has been a reduction in the size of the area within all bands between Round 2 and Round 3 with the exception of 65-69dB L_{night} contour band. However, this contour band does not extend beyond the airfield boundary.

6.4 An evaluation of the estimated number of dwellings and population exposed to noise

Annex VI of END requires the estimated number of people living in dwellings that are exposed to noise to be calculated for the various indicators mapped. A number of datasets were used in the population exposure assessment including detailed building polygons recorded in OSNI large scale mapping, an OSNI Pointer dataset which provides details of the function of individual buildings across Northern Ireland, Geographical boundary file for the 4,537 Small Areas (SAs) which were introduced in Northern Ireland after the 2011 Census, and 2015 estimates of population for the 4,537 census SAs provided by the Northern Ireland Statistics and Research Agency (NISRA). An estimate of the number of people per dwelling was generated by calculating the number of residential addresses in each of the 4,537 SAs and dividing this value by the estimate of 2015 population in the census area[87].

The results of the dwelling and population exposure assessments for GBBCA are set out in Tables 5 and 6. These tables show the number of dwellings and population within the contours for the various noise bands in Round 3 and a comparison against Round 2.

Table 5: Dwellings exposed to GBBCA noise bands

L_{den}				L_{night}			$L_{Aeq,16h}$	
Noise Band dB	**R2 2011**	**R3 2016**	**Noise Band dB**	**R2 2011**	**R3 2016**	**Noise Band dB**	**R2 2011**	**R3 2016**
50-54	17,536	12,723	45-49	6,828	4,300	50-54	16,417	11,639
55-59	9,085	5,663	50-54	569	0	55-59	8,157	3,836
60-64	1,339	6	55-59	0	0	60-64	752	0
65-69	0	0	60-64	0	0	65-69	0	0
≥70	0	0	≥65	0	0	≥70	0	0

[87] As stated in Amec Foster Wheeler (Op. cit., p.25) there are several factors that influence the final exposure analysis including *"improvements in the calculation of populations for buildings with multiple dwellings; differences in the age of the OSNI building, LPS Pointer and NISRA population datasets used in the analysis; changes and improvements in the OS Pointer address dataset since Round Two; and the remaining limitations of the OSNI Pointer address dataset"*. Further details are set out in Section 6.3 of the report.

Table 6: Population exposed to GBBCA noise bands

L_{den}			L_{night}			$L_{Aeq,16h}$		
Noise Band dB	**R2 2011**	**R3 2016**	**Noise Band dB**	**R2 2011**	**R3 2016**	**Noise Band dB**	**R2 2011**	**R3 2016**
50-54	38,151	28,609	45-49	13,159	9,182	50-54	34,883	25,959
55-59	17,391	12,155	50-54	1,098	0	55-59	15,545	8,389
60-64	2,720	68	55-59	0	0	60-64	1,527	0
65-69	0	0	60-64	0	0	65-69	0	0
≥70	0	0	≥65	0	0	≥70	0	0

As shown in the above tables, there has been a reduction in both the number of dwellings and the population falling within all noise contour bands between Round 2 and Round 3.

6.5 Commentary on the results of population analysis

As shown in Table 6, there is no population exposed to noise levels of 65 L_{den} or above due to GBBCA. There are 68 residents exposed to 60-64 L_{den}, 12,155 residents exposed to 55-59 L_{den} and 28,609 exposed to 50-54 L_{den} due to GBBCA.

The restricted operating hours at the Airport also mean that no population is exposed to L_{night} levels of 50 dB or above due to GBBCA.

6.6 Comparison between Round 2 and Round 3 results

There are several data inputs into noise contour modelling and changes to these inputs can result in both increases and decreases in air noise exposure levels and in turn the noise contours and associated population exposure statistics. Consequently, when comparing the results of the Round 2 (2011) and Round 3 (2016) noise contouring exercises, it is necessary to examine how changes in the various data inputs could affect the overall results. Several changes to key inputs have been identified – as follows:

- INM[88] version used (INM version 7.0b was used for Round 2 while INM version 7.0d was used for Round 3);
- Use of aircraft emission adjustments as taken from the BAP validation report[89];
- Changes in modal split[90], aircraft fleet mix or aircraft movement numbers;
- Changes to population within the area under consideration; and
- Variations in modelled airspace around the Airport and the dispersion of aircraft.

[88] Federal Aviation Administration (FAA) prediction methodology, the Integrated Noise Model.
[89] Bickerdike Allen Partners, *Op. cit.*
[90] See glossary, Appendix C.

The above changes were examined in more detail by Wood to identify if the effect of any of the changes were considered to have significantly influenced the size of contours/population exposed to aircraft noise from GBBCA between mapping rounds. The key factors are outlined in further detail below.

Aircraft emission adjustments

There has been a change in verification adjustments to INM's standard aircraft noise emissions resulting in changes in adjustments to movements for some aircraft as well as changes to aircraft substitutions for those aircraft not listed in INM.

Changes in modal split

As shown in Table 7, the model split for Round 3 which is based on actual use figures for 2016 has around 11% more activity occurring on Runway 04. This means that when comparing the noise contours and population statistics, dwellings to the south-east of the airport were exposed to less aircraft departure noise during 2016 than during 2011.

Table 7: change in modal split between Round 2 and Round 3

	Runway 04	Runway 22
Round 2 Modal Split	20.8%	79.2%
Round 3 Modal Split	32.2%	67.8%
Change in modal split	**+11.4%**	**-11.4%**

Changes in aircraft movements

There has been an increase in the number, and changes to the timing, of aircraft movements in the Round 3 mapping period compared with Round 2. As shown in Table 8, there have been increases in movements, however the main increase was in the day period. This does not have such an impact on L_{den} as compared with changes in the evening and night-time periods, where weightings of +5dB and +10dB respectively are applied to the L_{eve} and L_{night} noise levels.

Table 8: Change in annual average movements between Round 2 and Round 3

Round of Mapping	Day (07:00 -19:00 hrs)	Evening (19:00 -23:00 hrs)	Night (23:00-07:00 hrs)
Round 2	92.7	19.3	2.4
Round 3	104.6	21.7	3.3
Change	**+11.9**	**+2.4**	**+0.9**

Changes in aircraft fleet mix

Changes in fleet mix between Round 2 and Round 3 are shown in Table 9. The second most frequent aircraft operating in Round 2, the Boeing 737-300, has been replaced by the Airbus A320 in Round 3. The A320 is a quieter aircraft than the B737-300 and this has had an influence on the reduction of contour size despite there being a greater proportion of A320 aircraft operating. Furthermore, the Dash 8 Q400 makes up a

larger proportion of aircraft movements in Round 3, which is considered a relatively quiet aircraft.

Table 9: Change in fleet mix between Round 2 and Round 3

Round 2 (2011)		Round 3 (2016)	
Aircraft	**No. movements**	**Aircraft**	**No. movements**
Dash 8 Q400	22,457	Dash 8 Q400	29,001
Boeing 737-300	4,943	Airbus 320	5,441
EMBRAER 190/195	4,747	EMBRAER 170/175	1,031
Airbus A319	3,615	Airbus A319	2,660
LET L-410	2,368	LET L-410	2,106
Misc. other	3,811	Misc. other	2,295
Total	**41,941**	**Total**	**42,534**

The impact of these data and modelling changes has been a reduction in the size of the contours for all END indicators in Round 3 (with the exception of 65-69dB L_{night} contour band). when compared with Round 2, despite an increase in movements.

6.7 Noise sensitive premises

In accordance with the 2013 guidance[91], in Round 2, the Airport identified the number of noise sensitive premises within the $L_{Aeq,16h}$ contours for the various noise bands. Noise sensitive premises have not been specified in the 2013 guidance but GBBCA has applied DEFRA guidance for airport operators in England[92], and has assessed schools and colleges, hospitals and hospices. The relative exposure of education and health facilities was assessed by Wood using the following steps:

1. Education and health buildings within Belfast were extracted from the OSNI large scale mapping datasets;
2. A maximum $L_{Aeq,16h}$ and L_{night} noise level was then assigned to each of these buildings; and
3. OSNI Pointer address information was assigned to the education and health buildings (where available).

A spreadsheet of education and health buildings within the 50dB $L_{Aeq,16h}$ noise contour was provided by Wood. This data was then reviewed by GBBCA in order to:

- Validate the status of the education and health facilities (whether still in operation);
- Group buildings of the same facilities together; and
- Confirm facilities location as determined by Wood.

[91] DoE, 2013, *Op. cit.*

[92] Department for Environment, Food and Rural Affairs (DERFA), 2009. *Guidance for Airport Operators to produce airport noise action plans under the terms of the Environmental Noise (England) Regulations 2006 (as amended)*, [online] Available at:http://webarchive.nationalarchives.gov.uk/20130403171039/http://archive.defra.gov.uk/environment/quality/noise/environment/documents/actionplan/airport-operators.pdf [Accessed 14 June 2018]

GBBCA consulted a range of sources to validate education and health facilities including the Education Authority's databases for schools, the Department for Employment and Learning website for colleges, the Northern Ireland Health and Social Care website for hospitals and various hospice websites. Following this, a list of schools, colleges, hospitals and hospices was provided to Wood for re-assessment and re-mapping within the noise contours in order to assign a maximum $L_{Aeq,16h}$ and L_{night} noise level.

For Round 3, GBBCA reviewed the various data sources for education and health facilities[93] and provided an update on postcodes for facilities to Wood. Wood then carried out an assessment and mapping of these facilities within the Round 3 contours for $L_{Aeq,16h}$ and L_{night}. The results of the noise sensitive premises assessment are set out in Table 10.

Table 10: Noise sensitive premises exposed to GBBCA noise

Noise Band dB $L_{Aeq,16h}$	Schools / Colleges	Hospitals & hospices	Noise Band dB L_{night} [94]	Hospitals & hospices
50-54	7	0	45-49	0
55-59	6	0	50-54	0
≥60	0	0	≥55	0
Total	**13**	**0**	**Total**	**0**

The noise premises assessment identified that there are 13 schools / colleges exposed to 50 dB $L_{Aeq,16h}$ or greater due to GBBCA in Round 3 compared to 34 in Round 2. As with Round 2, there are no schools / colleges exposed to 63 dB $L_{Aeq,16h}$ or above due to GBBCA, which is the threshold at which the APF expects airport operators to provide acoustic insulation for noise sensitive buildings.

The noise mapping exercise identified no hospitals or hospices exposed to 50 dB $L_{Aeq,16h}$ or above or 45 dB L_{night} or above due to GBBCA.

Although not of a level to qualify for noise insulation, and despite a reduction in the number of schools and colleges exposed to noise, GBBCA remains committed to its community and assisting and supporting the needs of local schools and other educational institutions through its CR programme. Details of this support are set out in Section 8.2.5.2 of the Action Plan and are reviewed and refined by GBBCA on an annual basis outside of the Noise Action Plan to better respond to the relative needs and circumstance of the schools the Airport supports.

[93] Education Authority Belfast and Dundonald offices, Health and Social Care Trusts Belfast & South Eastern and hospice locations in Belfast and North Down.

[94] This metric is not relevant for schools and colleges as it relates only to the night-time period 23:00-07:00 when schools and colleges are closed.

7. Public consultations

In accordance with Article 8(7) of END, GBBCA will carried out a public consultation exercise on its draft Noise Action Plan. The formal public consultation took place between 3 September and 26 October 2018.

The consultation document and contact details were published on the Airport's website and public advertisements regarding the consultation were placed in the Belfast Telegraph and the Irish News on 7 and 10 September 2018 respectively.

GBBCA also consulted with its Airport Consultative Committee (the Forum) on its draft Noise Action Plan at a special meeting to be convened on 10 October 2018.

A total of 34 responses were received to the consultation from the following:

- Belfast City Council ('BCC')
- Department for Infrastructure (Air and Seaports Branch) ('Dfl')
- Belfast City Airport Watch ('BCAW')
- Old Stranmillis Residents Association ('OSRA')
- Lower Woodstock Community association ('LWCA') – endorsed BCAW response
- 6 individuals, North Down (BT18, BT19) – 2 specifically endorsed BCAW response
- 8 individuals, South Belfast (BT7, BT8, BT9)
- 10 individuals, East Belfast (BT4, BT5, BT6)
- 4 individuals (location not specified)
- Academic in Public Health, Belfast ('APH')

A detailed review of all consultation responses has been undertaken. A summary of the comments received and GBBCA's response to these comments is set out in Appendix H.

8. Action planning process

8.1 Key stages of the action planning process

The action planning process includes several key stages – as follows:
1. Analysis of the strategic noise maps;
2. Application of noise assessment criteria to identify Important Areas and Candidate Quiet Areas;
3. Validation of noise levels experienced in Important Areas;
4. Identification of Candidate Noise Management Areas;
5. Identification of Formal Noise Management Areas and Quiet Areas;
    5.1 review of possible prevention and mitigation measures,

5.2 cost benefit analysis,
5.3 selection of most appropriate mitigation measures.

8.2 Identification of problems and situations to be improved

8.2.1 Analysis of the strategic noise maps

Analysis of the strategic noise maps (as discussed in Section 6) aimed to identify the number of people in dwellings affected by the noise levels from GBBCA, was undertaken to inform the scope of this Action Plan.

8.2.2 Noise assessment criteria

The methodology for the detailed assessment of the strategic noise maps to inform the identification of priorities for action plans is set out in the 2013 guidance. This methodology should be used to identify Important Areas which then are investigated to determine whether they should be identified as Candidate Noise Management Areas (CNMAs). According to the 2013 guidance, CNMAs are *"areas identified by high levels of environmental noise and the aim is to reduce, where possible, noise in such areas by making them formal Noise Management Areas"*[95].

The methodology is as follows: airport operators should use the $L_{Aeq,16h}$ indicator for prioritisation and should identify the total population affected by noise levels of more than 50dB $L_{Aeq,16h}$ From this, airport operators should identify where the top 1% of the population affected by the highest noise levels is located based on the results of the strategic noise mapping. These areas (referred to as Important Areas) should then be targeted by airport operators for further investigation[96].

The methodology for the identification and designation of Quiet Areas is set out in the 2016 policy guidance on the identification, designation and management of quiet areas. Filters (criteria) are applied to open spaces within the Belfast agglomeration. The criteria are:
1. Land Type Filter - Publicly available parks and open space within an agglomeration;
2. Noise Level Filter - Noise level less than 55 L_{den}; and
3. Minimum Area Filter - Minimum area of 5 hectares.

This methodology should be used to identify Candidate Quiet Areas. However, as noise maps indicate modelled noise levels (not measured levels) and as land use can change, district councils are given the opportunity, if they consider it necessary, to visit Candidate Quiet Areas and consider the appropriateness of an area for designation. In addition, Candidate Quiet Areas will be subject to a public consultation prior to designation. Once formally designated, district councils are required to manage the

[95] DoE, 2013, *Op. cit.,* p.21
[96] *Ibid.*

local noise environment within Quiet Areas to avoid increases in noise from any source.

8.2.3 Identification of Important Areas

As a first step to identifying where the top 1% of population exposed to greater than 50dB $L_{Aeq,16h}$ due to noise from GBBCA is located, exposure assessments were undertaken for individual dwellings in 1dB intervals. The results of this assessment are set out in Table 11.

Table 11: Dwellings and population exposed at each 1dB from GBBCA noise

Min dB	Max dB	R2 2011		R3 2016	
		Dwellings	Population	Dwellings	Population
50	51	3,433	7,880	3,474	7,659
51	52	4,209	8,968	2,369	5,621
52	53	4,289	8,629	1,970	4,281
53	54	2,286	4,938	2,025	4,641
54	55	2,203	4,475	1,801	3,755
55	56	2,550	4,905	1,403	3,200
56	57	1,799	3,499	1,224	2,755
57	58	1,533	2,787	8,88	1,670
58	59	1,228	2,365	319	702
59	60	1,038	1,970	2	59[97]
60	61	560	1,166	0	0
61	62	175	328	0	0
Total		**25,303**[98]	**51,910**	**15,475**	**34,343**

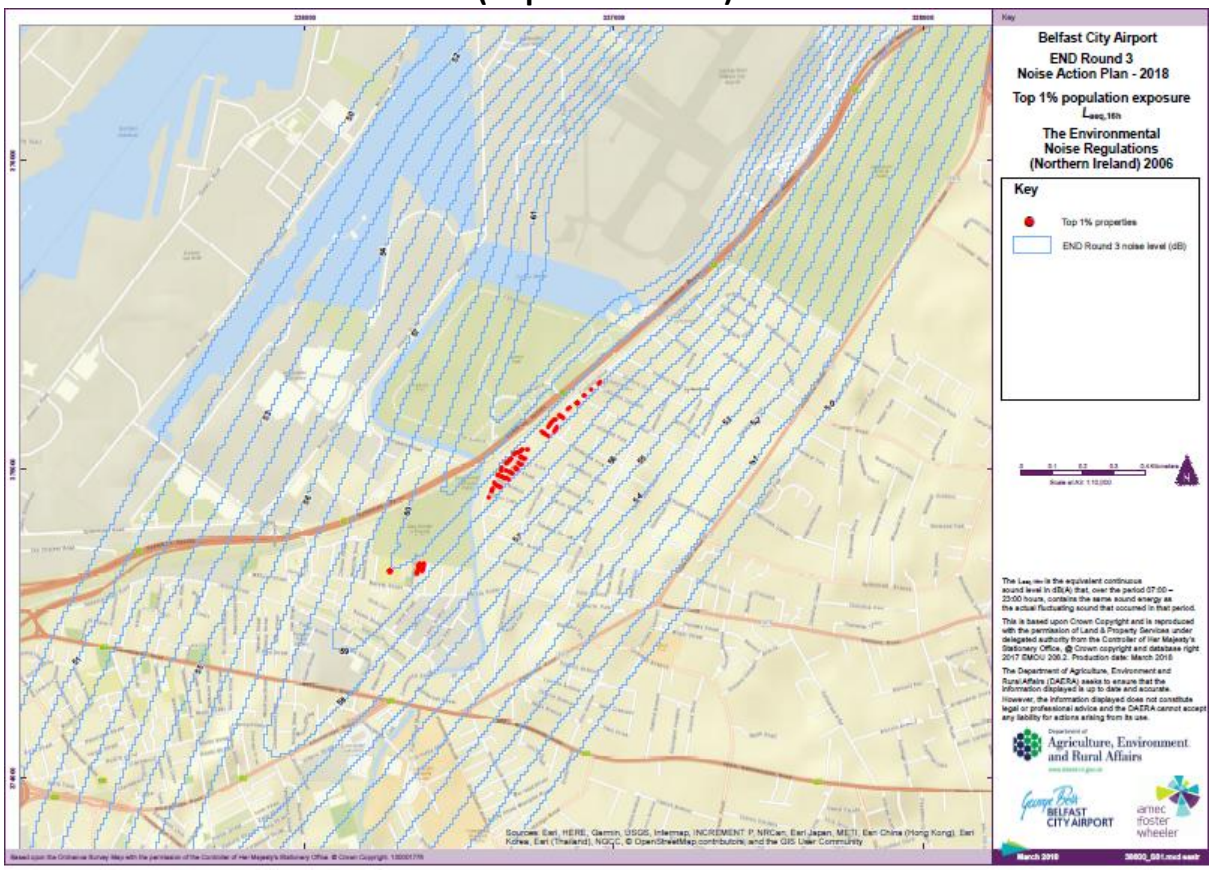
Based on the numbers above, it is estimated that the top 1% of population exposed to the highest noise levels above 50dB $L_{Aeq,16h}$ equates to 343 people or approximately 155 dwellings, compared to 520 people or 250 dwellings in Round 2. This includes dwellings exposed to between 59-60 dB (2 dwellings) and some dwellings exposed to between 58-59 dB (153 dwellings).

Dwellings above 58dB are located towards the south-western end of the Airport next to the A2/Sydenham Bypass in the areas of Sydenham and Ballymacarrett as shown in Figure 2.

[97] According to Wood, the reason for the high occupancy rate of the 2 dwellings within this contour band is due to the location of one large building (dwelling) containing multiple individual residential apartments.

[98] According to Wood, the analysis has highlighted a small number of buildings within the 50 dB $L_{Aeq,16h}$ contour located on/near the airport boundary which are unlikely to be residential properties and thus have been removed. The removal of these buildings means that the outputs of the 1db analysis will differ slightly from the numbers reported in Tables 5 and 6 within this Plan.

Figure 2: Location of Top 1% of Population Exposed to Highest Noise Levels (Important Areas)



8.2.4 Validation of Noise Exposure in Important Areas

Having identified the areas containing the top 1% of the population most affected by noise, the 2013 guidance advises airport operators to confirm that the noise levels indicated by the strategic noise maps are experienced in those areas.

Validation of the strategic noise mapping process is possible due to the availability of the following information:

- Actual aircraft movement, aircraft type and modal split data from the Airport's flight database;
- Actual aircraft dispersion information from the Airport's track-keeping system; and
- Aircraft noise emission measurements taken from the Airport's permanent noise monitoring terminal (NMTs). These are located at Nettlefield Primary School (approximately 4.5 km from the start of roll location of Runway 22 at the city end) and at Kinnegar Army Camp (approximately 3.9km from the start-of-roll location of Runway 04 at the lough end). Both locations are within the 50dB $L_{Aeq,16h}$ noise contour.

Validation exercises were carried out by Wood to check the dispersion and noise level assumptions of individual aircraft as a way of checking the accuracy of the strategic noise modelling and mapping.

Furthermore, Wood compared the $L_{Aeq,16h}$ outputs with those prepared for the 2015 and 2016 summer 92-day period by Bickerdike Allen Partners[99] for GBBCA. When comparing the 57dB $L_{Aeq,16h}$ contour for the annual (END) period and the summer 92-day period, for example, it was found that while the BAP contour was marginally longer in both northeast and southwest directions, however, the shape and size of the contours, in general, were broadly similar.

Based on the information available to GBBCA, noise exposure levels within Important Areas are therefore considered to be representative of the top 1%.

8.2.5 Assessment of Important Areas

Once Important Areas have been identified, the 2013 guidance requires the airport operator to assess the extent to which noise needs to be reduced in these areas and prioritise the areas most in need of protection through designation as formal Noise Management Areas[100]. Furthermore, the 2013 guidance states that *"when contemplating implementing noise mitigation measures in a particular area, the acceptability of the current noise level in that area should be considered. If the noise levels are not deemed acceptable further action to reduce the noise should be considered as part of the action planning process"*[101].

GBBCA already has in place a range of noise reduction measures and controls which help reduce noise for people exposed to noise levels at and well below the noise exposure relating to the top 1% (Important Areas). These measures are set out in section 8.2.5.1.

In its assessment of Important Areas, GBBCA has taken into account the following:

- Reduction in noise exposure between Round 2 and Round 3 (6.5 and 6.6);
- Noise reduction measures already in force and projects in preparation (8.2.5.1);
- GBBCA's Corporate Responsibility programme (8.2.5.2);
- Noise related complaints received by GBBCA (8.2.5.3);
- Results from the 2003, 2013 and 2017 Community Attitudes Surveys commissioned by GBBCA (8.2.5.4); and
- The relevant regulatory and policy framework and any limit values in place, as detailed previously (8.2.5.5).

[99] Bickerdike Allen Partners, *Op. cit.*
[100] DoE, 2013, *Op. cit.*
[101] *Ibid.*, p.14

8.2.5.1 Noise reduction measures already in force and projects in preparation

GBBCA has in force several measures designed to prevent and reduce noise, its associated potential health effects and to engage with and support neighbouring communities. These measures will help reduce noise for people exposed to levels within and well below noise exposure relating to the top 1% (presented in Figure 2). Some of these measures are stipulated in the Airport's Planning Agreement. These measures are listed below as well as how they are managed by GBBCA. Additional voluntary measures are also set out.

2008 Planning Agreement Measures

Restricted operating hours
Flights may only be scheduled to operate between 06.30 hours and 21.30 hours.
Delayed aircraft may be permitted to operate between 21.31 hours and 23:59 hours in exceptional circumstances.
No scheduled flights will be permitted between 21.31 hours and 06.29 hours.

Any airline seeking to operate between 21:31 hours and 23:59 hours, must submit a request for an *extension* to the Airport Duty Manager for approval. The Airport maintains a log of extensions to the opening hours and supplies a copy of this log to DfI on a regular basis.

GBBCA makes particular efforts to manage the number of delays after 23:00 hours, as this represents the commencement of the night-time period in the industry[102]. Delays after 23:00 hours accounted for less than 4% of delays outside scheduled operating hours over the past 5 years.

Movement limit
No more than 48,000 air traffic movements are permitted in any period of 12 months.

GBBCA maintains a record of all air traffic movements and details are published on GBBCA's website and reported to the Forum at each meeting.

Restricted aircraft types
In respect of jet aircraft only those air traffic movements that comply with the certified noise limits as laid down in Chapter 3 of Annex 16 of the standards adopted by the International Civil Aviation Organisation Council.

[102] The night period is the 8-hour period from 23:00 hours to 07:00 hours local time. However, the night quota period is the 6.5-hour period from 23:30 hours to 06:00 local time. See: DfT, 2017b, p.35. *Night Flying Restrictions at Heathrow, Gatwick and Stansted Decision Document*, [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627890/night-flight-restrictions-at-heathrow-gatwick-and-stansted-decision-document.pdf [Accessed 14 June 2018]

Using the powers contained within The Aerodrome (Noise Restrictions) (Rules and Procedures) Regulations 2003, GBBCA has prohibited the use of those aircraft types that are only 'marginally compliant' with the ICAO's Chapter 3 standard. The prohibition of marginally compliant aircraft was incorporated into the Airport's Noise Management System in 2004. GBBCA staff are responsible for ensuring adherence to the prohibition and the conditions under which exemptions are granted.

At present, most of scheduled flights at GBBCA are made by aircraft that meet the more stringent 'Chapter 4' noise standard. Such flights include those by:

- Airbus A319
- Airbus A320
- Embraer 170/175
- Dash 8 Q400

Note that in some cases aircraft might be shown as certified to Chapter 3 despite the aircraft meeting the Chapter 4 standards. This arises because when the aircraft type was certified Chapter 4 did not exist. Chapters 3 and 4 are only applicable to jet aircraft and larger propeller aircraft.

Belfast Lough bias

To maintain a bias in favour of approaches and climb-outs over Belfast Lough and to use all reasonable endeavours to maximise the use of approaches and climb-outs over the Lough.

The Belfast Lough bias will benefit population under the flight path at the city end of GBBCA, in particular, people living in close proximity to the Airport, including the top 1%. It is the responsibility of Air Traffic Control to ensure that flights operate over Belfast Lough, where possible, taking into account the operating environment including weather conditions and prevailing traffic. Wind speed and wind direction are major factors in determining the direction of flights as aircraft must take off and land by flying into the wind. For this reason, operating flights over Belfast Lough is not always feasible. For example, when the wind is coming from a southerly or westerly direction, most aircraft will usually be required to depart over Belfast city. Conversely, when the wind is coming from a northerly or easterly direction, most aircraft will be required to depart over Belfast Lough. The ultimate decision on runway direction lies with the aircraft captain for safety reasons. GBBCA records data on aircraft movements over Belfast Lough to monitor compliance with this obligation.

Annual noise contour reporting

Produce annually, noise contours at 57, 60 and 63 dB $L_{Aeq,16h}$ based on summer 92-day period, and include in the case of the 57 $L_{Aeq,16h}$ contour both the area covered and the population living within it.

Independent noise specialists, Bickerdike Allen Partners (BAP), prepare an annual *Noise Contour Report* on behalf of GBBCA using actual noise data recorded by the Airport's NMTs. This report quantifies and maps the area within the contours for the various noise levels (57, 60 & 63 dB $L_{Aeq,16h}$) as well as the population exposed at each level. The report is lodged with the DfI as well as with Forum members for scrutiny purposes.

Since the installation of the NTMS at GBBCA, actual noise data (available since June 2008) as opposed to aircraft manufacturer certified data has been used to validate the annual noise contours produced.

Indicative noise contour

An indicative control contour shall be agreed with DoE (Planning) in line with the recommendations of EiP.

In its request to vary the terms of its Planning Agreement, GBBCA has requested the removal of the Seats for Sale restriction from the Agreement and the introduction of a noise contour control cap in place of an indicative contour. The noise contour control cap will place a limit on the size of the noise footprint of the Airport. It will be set in terms of a maximum allowable area (in km^2) of the 57 dB $L_{Aeq,16h}$ contour.

Noise and track keeping system

Install and operate an integrated noise and track keeping system.

The airport installed a Noise and Track Monitoring System (NTMS) consisting of two main aspects: active noise monitors (installed June 2008 and January 2009) and a track keeping system (completed August 2009). The location of the fixed NMTs was guided by expert advice from BAP and agreed with the DoE and the Department for Regional Development (now DfI), in consultation with the Forum. The NTMS monitors and records the noise levels from aircraft movements and the tracks flown by them.

The noise data are primarily used to validate the contours in the annual *Noise Contour Report* and track keeping data to check airline adherence to noise abatement procedures and to investigate individual noise complaints.

Voluntary Measures

Preventing and reducing air noise

Penalty system for flights after 21:30 hours

GBBCA has in place a voluntary penalty system on all flights arriving into or departing from the Airport after 21:30 hours in order to discourage delays beyond this time. The

Airport imposes substantial penalties on airlines requesting extensions to reflect the cost to the Airport of remaining open after 21:30 hours.

Noise abatement procedures

GBBCA has in force a series of noise abatement procedures for both arriving and departing traffic. These are designed to reduce noise disturbance on the local community while ensuring the safe and efficient management of air traffic at GBBCA. These procedures can be summarised as follows:

- **Runway 22 – arriving traffic [arriving over Belfast Lough]**

Aircraft are to cross the North Down coast at an altitude not below 2,500 feet before establishing on the final approach track at 5 nautical miles from the runway threshold, descending at an angle of 3 degrees.

- **Runway 22 – departing traffic [departing over Belfast city]**

i) Propeller aircraft up to 13,000 kilos Maximum Take-off Weight [MTOW] are to climb to an altitude of 1,500 feet before commencing a turn.
ii) Propeller aircraft greater than 13,000 kilos MTOW are to climb to an altitude of 2,000 feet before commencing a turn.
iii) All jet-propelled aircraft are to climb to an altitude of 3,000 feet before commencing a turn.

- **Runway 04 – arriving traffic [arriving over Belfast city]**

Aircraft are to establish on the final approach track no later than 5 nautical miles from the threshold at an altitude of 1,500 feet, descending to the runway threshold at an angle of 3 degrees.

- **Runway 04 – departing traffic [departing over Belfast Lough]**

On achieving 500 feet, all departing aircraft are required to turn left onto a track of 033 degrees (M) and not to undertake a subsequent right turn until:
i) Propeller aircraft up to 13,000 kilos MTOW climb to an altitude of 1,500 feet.
ii) Propeller aircraft greater than 13,000 kilos MTOW climb to an altitude of 2,000 feet.
iii) All jet-propelled aircraft climb to an altitude of 3,000 feet.

These are published procedures in GBBCA's AIP. They are also verbally reinforced to aircrew by Air Traffic Control. The effect of these measures is to localise noise disturbance from arriving aircraft to those areas under the 'extended runway centreline' of the flight track, made necessary by the need for aircraft to be stabilised on the approach track approximately 5 miles from the runway to ensure a safe landing. For departing aircraft, these measures will assist in minimising the noise impact.

Noise monitoring and reporting

Monitoring and reporting on track keeping performance

GBBCA's NTMS, enables automatic detection of non-conformances with the Airport's noise abatement procedures and provides a reporting tool for non-conformances. GBBCA provides its airlines with regular reports on conformance with noise abatement procedures and has set a target of 95% conformance in line with other UK airports.

Public reporting

GBBCA monitors and records data in relation to passenger volumes, aircraft movements, flights after 21:30 hours, and the percentage of flights over Belfast Lough, and publishes this information on the Airport's website on a rolling three-month basis. GBBCA also publishes the following information on its website:

- Details of the noise management programme;
- How to contact GBBCA with concerns about noise and GBBCA's policy for responding to concerns;
- Criteria and application form for the Community Fund;
- Details of the Forum and meeting minutes; and
- Contact details for any queries or concerns relating to noise or other environmental issues.

Preventing and reducing ground noise

Measures to prevent and reduce ground noise will specifically benefit those people living in close proximity to the Airport, including those living in the top 1% presented in Figure 2.

Fixed Electrical Ground Power

To minimise the impact of ground noise, GBBCA has installed Fixed Electrical Ground Power (FEGP) on all 10 aircraft stands in front of the terminal which provides aircraft with a silent electrical supply. Airlines are encouraged to use FEGP whenever possible. The Airport also restricts the use of diesel-powered Ground Power Units (GPU) where there is a serviceable FEGP available on stand, unless:

- An aircraft is parked in a non-standard position (into wind/no tow-bar) and the FEGP will not reach the connection point on the aircraft; or
- An aircraft type is not compatible with the FEGP system at GBBCA, or has a temporary technical fault preventing the use of FEGP.

Restrictions on engine testing

There are procedures in place surrounding the timing and location of aircraft ground engine running. All engine ground runs shall be subject to prior approval by the Airfield Operations Department and all engine ground runs are prohibited between 22:30 hours and 06:00 hours. Engine ground runs at GBBCA are restricted on the apron at

engine idle setting for short periods of time only. All other engine runs, including high powered engine runs, can only take place on the north side of the airfield away from residential areas.

GBBCA's noise management policy and procedures are contained within the Airport's Environmental Management System which is certified to BS8555:2003 Phase 5 (as of November 2017). In particular, regulations and operating procedures relating to the management of noise are defined and disseminated through a number of Noise Management Instructions and enforced by various GBBCA departmental Managers, Air Traffic Control and Airfield Operations Department.

8.2.5.2 Corporate Responsibility programme

Running parallel to and complementing the Noise Action Plan, is GBBCA's Corporate Responsibility (CR) programme. GBBCA's CR policy sets out a clear commitment to make a positive contribution in the community in which it operates, to protect the environment and to be a key contributor to the economic and social development of the region. GBBCA aims to enrich and support the local community, with an emphasis on supporting young people through strengthening relationships with schools and helping young people realise their aspirations through capacity building and skills development. Each year, GBBCA develops a CR Action Plan to deliver its CR objectives. This provides the framework for planning, delivering and evaluating its CR programme. It is developed for involvement by the whole management team, organised and co-ordinated by the CR Department and fully supported by the Board of Directors.

Community Fund

The Community Fund was launched in February 2009 with the aim of supporting the local community while discouraging delays beyond 21:30 hours. The Community Fund is used to support a variety of worthwhile projects in communities within East Belfast (including Important Areas as identified in Section 8.2.3 and presented in Figure 2), North Down and the greater Belfast area.

The agreed penalty system for Community Fund purposes is as follows: £50 for flights after 21:30 hours, £100 for flights after 22:00 hours, £300 for flights after 22:30 hours and £600 for flights after 23:00 hours. There is also an additional £200 for each delayed flight over 600 per annum. There are also 'extension charges' levied on airlines for the airfield to remain open beyond scheduled operating hours.

A formal application process and approval criteria is in place for the Community Fund and there is a dedicated committee which meets regularly to review applications and award funding. The committee also engages directly with local community groups to identify projects that can benefit from the Community Fund.

Since the inception of the fund in 2009, GBBCA has supported over 150 local community groups to the value of £360,000. This includes over 90 projects to the value of £225,000 supported since January 2014, when the previous Action Plan was published.

Supporting education

Although not at a level to qualify for noise insulation, there are a number of schools and other educational institutions that fall within the noise footprint of GBBCA as identified within Section 6.7 of this Action Plan. GBBCA remains committed to assisting and supporting the needs of local schools and other educational institutions. GBBCA has created sustainable partnerships with educational bodies on a local and regional level with the ambition of raising the confidence and achievements of young people. Initiatives include:

Business in the Community's 'Adopt a School' programme

'Adopt a School' is an initiative aimed at enhancing links between the business and education sectors. Utilising the expertise of the business community to help enrich the education system in Northern Ireland, participating schools will be helped to become more efficient and business-like.[103] Since publication of the Round 2 Noise Action Plan, GBBCA has taken on a further 3 adopted schools bringing the total number of schools supported to 6 schools located within the airport's neighbouring communities of Belfast and North Down. The adopted schools are Victoria Park, St Joseph's, Mitchell House (Special Needs School), Cregagh, St Malachy's and Seaview. Specific engagement strategies are agreed with each principal at the beginning of the school term and can include Airport sponsorship of special walks and prize giving events, facilitation of airport site visits and choirs performing in the terminal building. In addition, GBBCA seeks to enable the schools to benefit from Community Fund projects. Some examples of this have been Cinemagic's Under 12's programme, MAC artistic workshops, Action on Hearing Loss workshops, and field trips to the Ulster Museum, RSPB Window on Wildlife and the Ulster Folk and Transport Museum.

Time to Read

'Time to Read' is a volunteering initiative, developed by Business in the Community and supported by the Department of Education. It aims to improve literacy, foster a love of reading and build the confidence and social skills of children at Key Stage 2 in local primary schools[104]. Over 400 salaried hours have been dedicated by GBBCA to the programme over the duration of the Round 2 Noise Action Plan.

[104] https://www.bitcni.org.uk/programmes/time-to-read/ [Accessed 27 August 2018]

School visits
GBBCA supports approximately 20 school visits per year accounting for over 160 salaried hours.

Engineers Week
During Engineers Week, GBBCA has facilitated visits from post-primary students and has raised awareness of the opportunities for career development in the engineering and aviation sectors.

Ad-hoc Engagement
GBBCA regularly engages with post-primary and third-level institutions, such as Queen's University Belfast, Belfast Metropolitan College, University of Ulster, and South East Regional College, to provide industry related information to curriculum-based projects or short-term work placements to facilitate applied learning.

Community Fund
To further its impact, over the duration of the Round 2 Noise Action Plan, GBBCA also provided funding for educational initiatives and equipment such as:

- Breakfast clubs at **Cregagh PS** and **Euston PS**;
- An eco-garden at **St Comgall's PS**;
- School kit bags for the **Forge Integrated Forest School Project**, a multi-sensory child led approach project to outdoor play and learning;
- An outdoor classroom polytunnel at **St. Michaels PS**;
- **Take Ten** computer software at **St. Kevin's PS** to support children who require assistance with their mental health and wellbeing or the ability to regulate their emotions;
- Interactive play zones at **Gilnahirk PS**;
- An outdoor classroom with auditorium seating at **Cavehill PS**;
- Sensory room equipment for children with autism or additional needs at **Solas**;
- Equipment for a safe and practical outdoor learning area at **Mitchell House School**;
- **Creative Child** programme by **Young at Art** for schools and nurseries throughout East Belfast;
- Outdoor staging area at **Strandtown PS** to provide a safe space for pupils who for various reasons are overwhelmed in the playground;
- An enhanced growing area and greenhouse at **Nettlefield PS**.

GBBCA reached approximately 2,200 pupils across 61 schools with its educational initiatives in the period 2016-2017 (to end February).

<u>Supporting employment and skills development</u>

GBBCA is conscious of the challenge faced by young people in securing employment in today's economic climate, and how income and employment is a key determinant of

health, wellbeing and quality of life. GBBCA has a comprehensive programme in place to support employment and skills development in neighbouring communities.

Work experience programme
Annually, GBBCA offers 55-60 young people from schools both within the local community and across Northern Ireland, a 3-day work placement providing 20 hours of meaningful experience across a variety of departments during the summer months.

Tailored work placements
GBBCA provides several longer-term placements. GBBCA recently hosted an eight-week placement for a young member of the Orchardville Society and an undergraduate student from the University of Ulster for a 12-month HR placement. GBBCA also regularly hosts a postgraduate student from Queen's University Belfast for an 8-week environmental placement.

High Flyers Apprenticeship Scheme
Launched in 2013, this scheme provides participants aged 16-24 years with up to two years of work experience across a vast range of disciplines including Human Resources, Customer Service, Fire Fighting, Hospitality, Catering and Retail. The placements are supported by training at the Airport in the areas of CV and job application writing and interview skills. Apprentices are provided with a National Vocational Qualification (NVQ) and the opportunity to continue study or seek employment. To date, GBBCA has achieved 100% success in former High Flyers securing full-time employment – many with the Airport directly as trainee Airport Fire Fighters.

Creative Leadership programme
Launched in 2017, by GBBCA in partnership with Cinemagic, the Creative Leadership programme is aimed at inspiring and motivating 22 young people to develop their confidence, increase their awareness of mental health issues and explore their talents. Participants meet over 18-months to take part in workshops, talks and practical challenges exploring different art forms including film, television, creative writing and music.

Mentoring
GBBCA's senior management team has provided mentoring to students from Ashfield High Boys' School.

Community Fund
GBBCA supports a range of organisations focusing on supporting skills development and raising the aspirations of young people. For example, GBBCA has supported:

- **Cinemagic:** whose vision is to nurture young people with a passion for cinema by not only boosting their enjoyment of film, but also making them aware of job opportunities in this dynamic industry. Projects supported include **Reel Voices'**

project which afforded 1000+ young people creative opportunities with the added bonus of helping to create/produce the children's feature film '**A Christmas Star**', the 2016 Cinemagic Film & Television Festival offering young people (up to age 25) opportunities to experience the creative industries and the **Mental Health Awareness Project**. In October 2016, ahead of World Mental Health Day and to coincide with the launch of the 2016 Cinemagic International Film and Television Festival, Cinemagic premiered short films created by pupils from across Belfast focusing on the issues of mental health and wellbeing. The films were aired to an audience in Belfast's W5.

- **Our Lady and St Patricks College 'Floreo' project:** aimed at building resilience/mindfulness skills with Year-11 students.
- **Oh Yeah Music Centre 'Belfast Urban Affinity' project**: to include and inspire young people who would not have access to music, with an opportunity to produce and perform their own work.
- Dreamscheme **'Young Leaders' programme**: aimed at cultivating a sustainable youth leadership culture for 16-18-year olds living in Braniel, Belvoir and Breda estates – areas noted for high social deprivation and poor educational attainment.
- **Cregagh Primary School 'Improving Educational Outcomes' project**: which helps children and their parents with literacy.
- **Voluntary Arts Ireland 'Take Off'** project: which aims to encourage young people to volunteer, contribute to their community, get involved in civic life and to move into employment and/or start a business.
- **St. Oliver Plunkett Football Club** project: to support 6 young people, not in education or employment, to gain an accredited IFA Level 1 coaching award.
- **Now Group:** for a creative project for local people and artists to work alongside people with disabilities to develop skills which will increase their employability.
- **Leonard Cheshire 'My Belfast, My Perspective'** photography project: to provide early intervention and support in developing skills to maximise future opportunities for young people aged 20yrs+ who have disabilities.
- **East Belfast Mission 'Celebrating Success: Stepping Stone'** project over 3 years working with approximately 400 people, of all ages and backgrounds, who are unemployed or economically inactive to give them the skills, confidence and qualifications they need to get into the workplace. GBBCA is supporting the graduation events celebrating the success of the programme's participants.

<u>Supporting health and wellbeing</u>

GBBCA is committed to supporting the health and wellbeing of its staff and local community through its CR programme. Over the duration of the Round 2 Noise Action Plan, GBBCA has supported a range of initiatives including:

Charity Partnerships

NI Transplant Association was appointed GBBCA's 2015 Charity Partner. The Northern

Ireland Transplant Association's aim is to increase organ donation through the Organ Donor Register and raise funds for and support those affected by organ transplants[105].

Inspire was appointed as GBBCA's 2016-18 Charity Partner. Inspire is a charity and social enterprise whose aim is wellbeing for all. They deliver mental health, learning/intellectual disability, autism, addiction and workplace wellbeing services across the island of Ireland[106]. Through this partnership, GBBCA has delivered a number of initiatives to date, including: short mindfulness sessions at the Airport for anxious flyers and wider airport community; establishing in the airport an Inspiration Point providing information and promoting Inspire's vision; and *'Time to Talk'* staff coffee morning.

Community Fund

GBBCA has supported a range of organisations with health & wellbeing projects through its Community Fund including:

- **Bangor 10K:** GBBCA partnered with North Down Athletic Club and Ards and North Down Borough Council to support the race for three years from 2017.
- **Mary Peters Trust Podium Programme:** in association with GBBCA, it provided workshops for young athletes with the aim of providing skills and expertise to assist with their personal and professional development.
- **SOS BUS NI:** helping to fund 3 Alcohol Recovery Centres across Greater Belfast.
- **East Belfast Community Development Agency's Suicide Awareness Programme**: GBBCA hosted a workshop at the Airport aimed at local employers interested in promoting good mental health and suicide prevention in the workplace.
- **Belfast Giants' 'Giant Fliers'**: providing an educational healthy eating / lifestyle programme for Key Stage 2 pupils in schools across Belfast.
- **Abbeyfield & Wesley:** support for a **dementia friendly garden** for East Belfast benefitting residents, visitors and wider community.
- **Northern Ireland Chest Heart & Stroke Schools Programme, 'Chesters Challenge':** aimed at helping young people live a healthy lifestyle and reducing their risk of chest, heart, and stroke illness. Up to 700 primary school are estimated to benefit from this project.

In total, over 2,600 salaried hours are dedicated to CR initiatives each year, which amounts to approximately a 30% increase in hours dedicated to CR since publication of the previous Noise Action Plan and equates to a circa £46,000 investment[107]. GBBCA is committed to continuing its CR programme and by listening to the needs of the local community, for example, through the Forum, to adapting the programme so that it will continue to address the issues that are most pressing, particularly in relation to education, employment, health and wellbeing.

[105] For more information visit: http://nitransplant.org/ [Accessed 28 August 2018]
[106] For more information visit: https://www.inspirewellbeing.org/ [Accessed 21 August 2018]
[107] based on an average salary.

Stakeholder engagement

Being aware of the environment in which it operates and its responsibility to the local community, GBBCA has developed various methods to engage with its stakeholders, including local residents.

The George Best Belfast City Airport Forum

As required under the Airports (Northern Ireland) Order 1994, and under the Airports (Designation) (Facilities for Consultation) Order (Northern Ireland) 1997, GBBCA established the George Best Belfast City Airport Forum ('the Forum') to discuss those matters concerning the development and operation of the Airport that impact on airport users and the neighbouring community. The first meeting was held on 25 March 1993. Meeting with airport management three times per year, the purpose of the Forum is to enable GBBCA to exchange information and ideas with those groups which have an interest in matters concerning the Airport and to allow the views of interested parties to be raised and taken into account by GBBCA.

The Forum comprises an independent Chairperson and Deputy Chairperson and representatives from local councils, community groups from East Belfast, South Belfast, and North Down, airline base captains, business and economic interests, NI Consumer Council, Belfast Harbour Commissioners, Department for Infrastructure and Department of Agriculture, Environment and Rural Affairs.

The following reports are prepared for the Forum and are circulated in advance of meetings:

- A historical summary of aircraft movements after 21:30 hours;
- A breakdown of aircraft movements after 21:30 hours by time-band and airline;
- The percentage of flights over Belfast Lough;
- Aircraft movements after 23:00 hours;
- Aircraft movements by aircraft type;
- A summary of noise complaints by type and area;
- A summary of CR activity.

The Forum also has an Environmental Sub Group to enable more detailed consideration of environmental matters, for example, scrutinising the annual Noise Contour Report. The Environmental Sub Group meets three times per year in advance of full Forum meetings. The Chairperson of the Environmental Sub Group is responsible for reporting outcomes from the meeting to the Forum.

Airport tours/one-to-one meetings/political breakfasts

GBBCA regularly facilitates airport tours for local schools, community groups and political representatives on request. GBBCA also hosts political breakfasts to brief local politicians on issues that may be affecting their local constituents.

Communication on Noise Issues

Noise Complaint Handling System

GBBCA maintains a noise complaint handling system. Complainants may lodge complaints via e-mail, letter, a dedicated noise complaint hotline, the airport website or social media. All complaints are centrally logged on a database and investigated by the Environment Department. Complainants receive a response containing details of the investigation carried out. Where investigations reveal a failure to follow procedures, these are reported to the organisation / department in question, and complainants are advised of this action. A summary report of complaints is reported to the Forum at each meeting.

Community News

GBBCA's community newsletter reaches 50-65,000 readers and contains information on those issues deemed to be of most importance to neighbouring communities, for instance, how to make a noise complaint and details on how to apply for Community Funding.

CR Brochure

GBBCA's CR Brochure (first published in 2016) highlights its CR strategy and initiatives across its People, Environment, Community and Education workstreams.

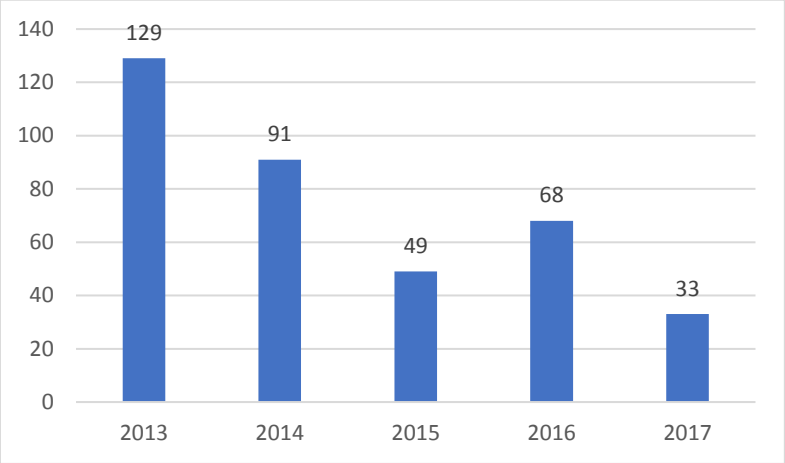
Social media

In addition to its website, GBBCA is active across social media (Facebook, Twitter, Instagram, Linked-In and YouTube) where it engages with a large local demographic. Members of the public can provide comments/post concerns (including those in relation to noise) and GBBCA will either respond to them directly, via the platform, or offline depending on the nature and complexity of the comment/concern in question.

8.2.5.3 Analysis of noise complaints received by GBBCA

Figure 3 shows that the number of noise complaints received by GBBCA fluctuates year on year. However, the overall number of complaints received, on average, has not increased considerably over the duration of the Round 2 Noise Action Plan and is showing an overall downward trend.

Figure 3: Noise complaints received by GBBCA



Furthermore, the number of noise complaints received by GBBCA is relatively low in comparison to the number of complaints received by Belfast City Council for all noise sources (industrial, commercial and leisure premises, domestic, construction, transport and noise in the street) which average over 6,000 per year[108]. Table 12 shows the main areas where complaints regarding aircraft noise from GBBCA arise.

Table 12: Top areas where noise complaints arise

Year	2013		2014		2015		2016		2017	
Area	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Seahill / Cultra / Marino	14	11%	11	12%	19	39%	20	29%	7	21%
Holywood	27	21%	1	1%	6	12%	2	3%	1	3%
Kinnegar	1	1%	10	11%	5	10%	0	0%	0	0%
Sydenham / Ballymacarrett	22	17%	1	1%	1	2%	7	10%	2	6%
Beersbridge / Albertbridge	5	4%	2	2%	0	0%	0	0%	0	0%
Ravenhill / Cregagh / Castlereagh	6	5%	4	4%	1	2%	2	3%	0	0%
Ormeau / Annadale	25	19%	35	38%	3	6%	17	25%	9	27%
Stranmillis / Malone	10	8%	9	10%	3	6%	15	22%	5	15%
G'wally / C'duff / N'breda / K'breda / Rosetta / Four Winds	2	2%	5	5%	6	12%	2	3%	3	9%
Other	17	13%	13	14%	5	10%	3	4%	6	18%
Total	**129**	**100%**	**91**	**100%**	**49**	**100%**	**68**	**100%**	**33**	**100%**

Table 12 shows that the number of noise related complaints arising from the Sydenham and Ballymacarrett areas (which encompass the top 1% as presented in Figure 2) has reduced since 2013.

[108] Noise complaint statistics for Northern Ireland 2013-2017: https://www.daera-ni.gov.uk/topics/protect-environment/air-and-environmental-issues [Accessed 1 May 2018]

8.2.5.4 Analysis of results from the GBBCA Community Attitudes Survey

In line with the commitment set out in the Round 2 Noise Action Plan, GBBCA has commissioned a Community Attitudes Survey to follow up on similar surveys carried out in 2003 and 2013. The purpose of the 2018 survey was to assess how attitudes have changed since 2013, to evaluate the effectiveness of the Round 2 Noise Action Plan and inform future developments. For consistency, the 2003 and 2013 survey methodology was closely replicated to enable like-for-like comparisons to be made between surveys. The 2018 survey was issued to 5,000 randomly selected households in the postcode areas covering south and east Belfast and North Down, which are overflown by aircraft to/from GBBCA, and Enniskillen and Antrim town as control areas, which are not overflown by aircraft operating at GBBCA.

The survey was conducted by an independent research consultant, SYSTRA[109] between 22 February and 5 March 2018 The response rate to the 2018 Community Attitudes Survey was 5.5% which represented a reduction in the response rate to the 2013 survey which was 8%. This is in line with industry evidence of the public's reduced willingness to participate in postal surveys. However, the survey was undertaken during a period which coincided with extreme weather conditions across Northern Ireland, which may have also adversely affected the participating sample size according to SYSTRA. The achieved sample size means 95% Confidence Intervals of no more than ± 6% for all reported findings.[110].

One of the objectives of the survey was to ascertain the degree to which respondents felt that aircraft noise has an adverse effect on their quality of life. Of the 17 indicators which were used in the surveys, including such things as 'feeling of personal security', 'street cleanliness' and 'neighbourhood air quality', aircraft noise was rated one of the least important factors to the quality of life of the respondents in all surveys (second lowest factor). Noise from aircraft remained less of a cause of dissatisfaction than many of the other quality of life factors, with 62% of respondents being 'very satisfied' or 'satisfied' a slight drop from 69% in 2013, however, an increase from 56% in 2003. 12% of respondents indicated that they were 'dissatisfied' or 'very dissatisfied' with aircraft noise representing an increase from 8% in the 2013 survey but a decrease from 15% in 2003.

While the number of respondents noticing aircraft noise either 'all the time' or 'often' was slightly higher in the 2018 survey compared to the 2013 survey (17% vs. 15%), it was still significantly lower than in the 2003 survey (24%). 59% of participants in the 2018 survey responded that they 'never' or 'rarely' notice noise from aircraft (down from 62% in 2013, however, up from 46% in 2003).

[109] Formerly MVA Consultancy.

[110] That is, if 50% of the sample reported that they considered aircraft to be noisy then we could be 95% certain that between 44% and 56% of the population consider aircraft to be noisy. This is considered sufficient for the survey purpose.

Noise from aircraft was found to be 'very' or 'extremely' disturbing or annoying by 8% of respondents to the 2018 survey. While this represents an increase in disturbance of 3% on 2013, it is 3% lower than reported by participants in the 2003 survey. 83% of participants in the 2018 survey responded that they were either 'not at all' or 'slightly' bothered, disturbed or annoyed by aircraft noise whilst in their home over the past 12 months or so (decreasing 7% on 2013, however still 4% above 2003).

8.2.5.5 Consideration of the legal/policy framework and any limit values in place

In preparing this Noise Action Plan and in its assessment of Important Areas, GBBCA has considered the relevant regulatory and policy framework and any limit values in place. GBBCA acknowledges that the noise exposure for the top 1% of people exposed to the highest noise levels from GBBCA is above the level marking the approximate onset of significant community annoyance as per the APF. Significantly, however, GBBCA has identified that the top 1% of the population affected by the highest noise levels from GBBCA falls below the threshold in the APF for airport operators to offer assistance to households with the cost of relocation or the provision acoustic insulation to households or other noise sensitive buildings. The level of noise exposure of the top 1% has also reduced in comparison to the Round 2 (from <62dB to < 60db).

8.2.6. Identification of Candidate Noise Management Areas

On consideration of: 1) the noise reduction measures and controls in place to help reduce noise for people exposed to noise levels within and well below noise exposure relating to the top 1%; 2) community attitudes towards the noise environment resulting from GBBCA, including those from the top 1%; and 3) the regulatory /policy framework in place, designation of Important Areas as Candidate Noise Management Areas is not appropriate. However, this position will be kept under review taking into account noise levels experienced in these areas (determined by the annual summer noise contours) and/or changes to UK aviation policy and having regard to any subsequent change to Environmental Noise Directive guidance issued by the Department.

GBBCA will continue to implement its existing noise management programme and will take further actions detailed in Section 9 to prevent and reduce noise for people exposed to noise levels within and well below noise exposure relating to the top 1% and any potential effects on health and wellbeing in addition to the Airport's ongoing CR programme geared to supporting neighbouring communities. GBBCA will keep under review the effectiveness of its current noise management measures in relation to Important Areas presented in Figure 2. Where relevant, any further practicable and cost-effective noise reduction measures will be recommended and presented to the Forum for consultation within the period covered by this Action Plan.

GBBCA recognises that people do not experience noise in an averaged manner and will also consider the need to employ any alternative measures (in line with industry best practice as set out by Sustainable Aviation[111]) which may better reflect how aircraft noise is experienced in different localities so that it can seek to better support its local community through its noise management and wider CR programme.

8.3 Identification of Quiet Areas

Through application of the criteria in the 2016 guidance (in draft form), DAERA identified a number of Candidate Quiet Areas which were subject to public consultation between 21 September and 16 November 2015. Three areas were formally designated within the 2016 guidance which was published on 20 September 2016. These were:

- Conor Park/Stricklands Glen, Bangor West;
- Bashfordlands, Carrickfergus; and
- Carnmoney Hill – Upper, Newtownabbey.

Bashfordlands and Carnmoney Hill are not under the flight path of GBBCA and do not fall within GBBCA's 50 dB $L_{Aeq, 16h}$ noise contour. Conor Park/Stricklands Glen is under the flight path for departures on Runway 04 and arrivals on Runway 22, however, given the altitude of aircraft at this point, the area also does not fall within GBBCA's 50 dB $L_{Aeq, 16h}$ noise contour. Therefore, no specific actions relating to these Quiet Areas are proposed at this time.

DAERA launched a further consultation on the designation of Lagan Meadows as a Quiet Area. The consultation ran between 21 September and 19 October 2016. GBBCA awaits the outcome of this consultation.

8.4 Action planning programme of work

The action planning programme of work is set out in Table 13.

[111] Sustainable Aviation strategy and associated Noise Roadmap: SA, *Op. cit.*

Table 13: Action planning programme of work

	Action	Estimated Completion Date
1	Analysis of the strategic noise maps	Completed
2	Application of the Noise Assessment Criteria (Identification of top 1% affected)	Completed
3	Validation of noise exposure in Important Areas	Completed
4	Identification of Candidate Noise Management Areas	Assessment carried out and none identified at present
5	Review of noise levels experienced in Important Areas and/or changes to UK aviation policy/END guidance issued by the Department that will affect the determination in respect of Candidate Noise Management Areas, and review the effectiveness of current noise management measures in relation to Important Areas	2019-2024
6	Assessment of the costs and benefits of any potential noise mitigation measures in respect of any Candidate Noise Management Areas identified	As required
7	Review Noise Action Plan following the designation of further Quiet Areas	As required
8	Review Noise Action Plan following any major developments which affect the existing noise situation	As required

9. Actions which the Competent Authorities intend to take in the next five years, including measures to preserve Quiet Areas

Table 14 sets out the actions GBBCA intends to take over the duration of this Noise Action Plan in order to prevent and reduce noise and any potential effects on health and wellbeing in addition to the Airport's ongoing CR programme geared towards supporting neighbouring communities.

Those measures highlighted in green in the table show mandatory actions required in the Airport's current Planning Agreement or other legislation.

Table 14: Actions GBBCA intends to take over the duration of the Noise Action Plan

No	Action	Timescales	Target (where relevant)	Performance indicator / evaluation metric	People Affected	Enforcement Authority (where relevant)
	Preventing & reducing air noise					
1	GBBCA will continue to maintain restricted operating hours 06:30-21:30 with extensions granted up to 23:59 in exceptional circumstances	Ongoing	N/A	No. of flights outside scheduled operating hours as % of total flights	Residents and noise sensitive premises within L_{eve} and L_{night} contours	DfI
2	GBBCA will continue to maintain a bias of flights over Belfast Lough and seek to maximise flights over Belfast Lough where it is safe and feasible to do so	Ongoing	+50% of flights operating over Belfast Lough	% of flights operating over Belfast Lough on a monthly basis	Residents and noise sensitive premises to south-west of airfield	DfI
3	GBBCA will continue to seek adherence by airlines to its published noise abatement procedures	Ongoing	95% adherence per month	% adherence by airline on monthly basis	Residents and noise sensitive premises outside GBBCA flight paths	GBBCA
4	GBBCA will continue to investigate the feasibility of introducing a (RNAV) Standard Instrument Departure for Runway 04 to enhance track keeping performance by airlines	Mid-2020	Report to Environmental Sub Group	N/A	To be determined	GBBCA
5	GBBCA will progress with its request to vary its Planning Agreement to introduce a noise contour control cap and additional noise management measures	Ongoing	N/A	Planning request approved, and proposals implemented	To be determined	GBBCA to agree with DfI

	Action	Timescales	Target (where relevant)	Performance indicator / evaluation metric	People Affected	Enforcement Authority (where relevant)
6	GBBCA will implement a noise compensation scheme in alignment with the APF	If applicable	N/A	Future residents or noise sensitive premises falling within 63 dB $L_{Aeq,16h}$ as per annual summer 92-day contours	Any future residents or noise sensitive premises within 63dB $L_{Aeq,16h}$	DfI
7	GBBCA will introduce the requirement for all arrivals to use Continuous Descent Approaches at the airport, subject to the constraints of safety and the operational performance requirements of the individual aircraft and consistent with flight safety	End-2019	N/A	Implementation and adherence to CDA thereafter	Residents and noise sensitive premises under the flight path above 1,800 feet	GBBCA
8	GBBCA will continue to review its current noise management measures and undertake further assessments on the noise environment, where necessary, in consultation with the Forum. GBBCA will consider, in particular, the operational noise mitigation opportunities set out in the *SA Noise Road-Map*	Ongoing	N/A	N/A	To be determined	GBBCA
	Noise monitoring & reporting					
9	GBBCA will continue to operate and maintain its Noise & Track Monitoring System	Ongoing	N/A	N/A	N/A	DfI
10	GBBCA will continue to prepare reports on airline adherence to its published noise abatement procedures for the Forum	Ongoing	3 times per year	Track keeping report to Forum	N/A	

	Action	Timescales	Target (where relevant)	Performance indicator / evaluation metric	People Affected	Enforcement Authority (where relevant)
11	GBBCA will continue to produce flight statistics /noise complaint reports for the Forum	Ongoing	3 times per year	Flight statistics and analysis of noise complaints reports to Forum	N/A	
12	GBBCA will continue to publish flight and noise related statistics on GBBCA website	Ongoing	Monthly	Up to date flight and noise related statistics on GBBCA website	N/A	
13	GBBCA will continue to commission independent noise specialists to prepare its annual summer contours to evaluate the noise climate	Ongoing	N/A	Annual Noise Contour Report submitted to DfI and to Forum	N/A	DfI
	Preventing & reducing ground noise					
14	GBBCA will continue to enforce restrictions on engine ground running and prohibit engine ground runs between 22:30 and 06:00 hours	Ongoing	N/A	Number of complaints relating to ground noise	Residents and noise sensitive premises within immediate vicinity of airfield (predicted)[112]	GBBCA

[112] Ground noise has not been assessed as part of the noise mapping process.

	Action	Timescales	Target (where relevant)	Performance indicator / evaluation metric	People Affected	Enforcement Authority (where relevant)
15	GBBCA will ensure the availability of fixed electrical ground power (FEGP) at all taxi-in/push-out stands, maintain the FEGP in good working order and restore promptly when out of service	Ongoing	Rolling 12-month average: 90% monthly availability	Rolling 12-month average: % monthly availability Number of complaints relating to ground noise	Residents and noise sensitive premises within immediate vicinity of airfield (predicted)	
	Corporate Responsibility					
16	GBBCA will continue to support local schools and community projects to offset noise impact through the Community Fund and its ongoing CR programme	Ongoing	N/A	Number of projects supported, and funds donated	N/A	
	Communication on noise issues					
17	GBBCA will continue to distribute its Community Newsletter to local residents with information on noise related matters	Ongoing	At least annually	Community Newsletter distributed	N/A	
18	GBBCA will continue to operate a noise complaint handling system and to respond to individuals within target timescales	Ongoing	Initial response within 5 working days Investigated response within 15 working days	Number of noise complaints received and timescales for response	N/A	

10. Long term strategy

As stated previously, GBBCA has submitted a request to DfI to vary the terms of its Planning Agreement under Article 40A(1)(a) of the Planning (NI) Order 1991. This Action Plan will be reviewed and revised, if necessary, to reflect any significant changes required once this request is determined.

This Action Plan will also be reviewed, and updated if necessary, following any major development which affects the noise situation or the designation of further Quiet Areas by the Department, and at least every five years after it is approved.

GBBCA will continue to adhere to UK government policy as set out in the APF and will adopt any revised standards or limit values set for the industry by the UK government. The Action Plan will be reviewed in light of any significant policy changes.

GBBCA will continue to be actively involved in the work of the NIENDSG to assess, prioritise and agree what actions are necessary.

It is anticipated that throughout the 5-year period of the Action Plan, additional studies to assess further the impact of aircraft noise and its mitigation may be required. GBBCA is committed to working with the Department and the NIENDSG to identify and undertake such studies as are deemed appropriate and cost effective.

As stated previously, GBBCA will continue to implement its existing noise management programme and will take further actions detailed in Section 9 in addition to the Airport's ongoing CR programme in order to protect health and to contribute positively to the quality of life and wellbeing of neighbouring communities.

11. Financial information: budgets, cost-effectiveness assessment, cost-benefit assessment

GBBCA is committed to the future costs, estimated at approximately £165,000 per year, for noise management and in support of this Action Plan. This figure includes costs associated with the operation and support of the NTMS, administration (Forum, noise complaint handling, reporting and communications), production of the annual Noise Contour Report, IT support for noise statistics and estimated Community Fund contributions.

12. Provisions envisaged for evaluating the implementation and the results of the Action Plan

To monitor and assess the Airport's effectiveness with regards to this Action Plan, several performance indicators/evaluation metrics are set out in Table 11.

Performance against these indicators/metrics will be regularly reviewed internally and a progress report delivered to the Forum on an annual basis.

The following indicators will also be used to assess the noise climate over the duration of this Action Plan:

Annual Noise Contour Report

As stated previously, under the terms of the Airport's Planning Agreement, noise contours based on the $L_{Aeq,16h}$ measure are produced annually for the summer 92-day period and the estimated population exposure within each noise contour calculated. While the summer contours are not the same as the END contours (as among other things, they are based on different time periods – see Table 3), they will nevertheless give an indication of the extent of variation in noise contours and population exposure from year to year. They may be used, therefore, as an evaluation of the implementation and results of the Action Plan.

Community Attitude Survey

Prior to the next round of action planning for END, GBBCA will repeat the Community Attitude Survey. The results of the survey will be evaluated and compared with the results of earlier surveys to detect trends in attitudes towards aircraft noise. Emerging trends from the surveys will be used to evaluate the implementation and results of the Action Plan and, along with the noise maps from the next mapping round, will form the basis for the next round of action planning.

Noise complaints received by GBBCA

GBBCA will continue to record, investigate and evaluate noise related complaints for the purposes of assessing the noise impact due to GBBCA operations, in particular, the impact on Important Areas and Quiet Areas.

Review of noise maps

The results of future rounds of noise mapping will be used to assess the impact of the noise management actions set out.

13. Estimates in terms of the reduction of the number of people affected

It is not possible to quantify the exact number of people who already benefit from the noise management programme which is currently in place at GBBCA, but it is likely to be significant, particularly given the reduction in air noise contours. With respect to any future noise management measures, the estimation of any potential reduction in terms of the number of people affected will form part of the evaluation process.

14. Appendices

Appendix A: Annex V of the Directive

Annex V of the Directive requires that Action Plans must include the elements detailed in Table A.1 below. The location of these elements within the plan is given for ease of reference.

Table A.1

No	Description	Location in Plan
1	A description of the agglomeration, the major roads, major railways or major airports and other noise sources taken into account	Section 3
2	The authority responsible	Section 4
3	The legal context	Section 5
4	Any limit values in place in accordance with Article 5	Section 5.5
5	A summary of the results of the noise mapping	Section 6
6	An evaluation of the estimated number of people exposed to noise	Section 6.4
7	Identification of problems and situations that need to be improved	Section 8.2
8	A record of the public consultations organised in accordance with Article 8(7)	Section 7
9	Any noise-reduction measures already in force and any projects in preparation	Section 8.2.5.1
10	Actions which the Competent Authorities intend to take in the next five years, including any measures to preserve Quiet Areas	Section 9
11	Long-term strategy	Section 10
12	Financial information (if available): budgets, cost-effectiveness assessment, cost-benefit assessment	Section 11
13	Provisions envisaged for evaluating the implementation and the results of the action plan	Section 12
14	Estimates in terms of the reduction of the number of people affected (annoyed, sleep-disturbed, or other)	Section 13

Appendix B: Regulatory and policy framework relating to environmental noise

List of current regulations and policy for controlling environmental noise in Northern Ireland

Air Navigation Order 2005
Air Navigation (Environmental Standards) Order 2002
The Airports (NI) Order 1994 Aeroplane Noise Regulations 1999
Land Acquisition and Compensation (Northern Ireland) Order 1973
Pollution Control and Local Government (NI) Order 1978
Pollution Prevention and Control Regulations (Northern Ireland) 2003
Noise Insulation Regulations (NI) 1995
Aeroplane Noise Regulations 1999
Aeroplane Noise (Amendment) Regulations 1999
Air Navigation (General) Regulations 1999
The Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003
The Environmental Assessment of Plans and Programmes Regulations (NI) 2004
The Civil Aviation Act 2006 (as amended)
The Civil Aviation Act 2012
The Environmental Noise Regulations (Northern Ireland) 2006
Directive 88/337/EC (as amended)
Directive 2002/49/EC
Directive 2006/93/EC
Clean Neighbourhoods and Environment Act (Northern Ireland) 2011
Regulation (EU) No 598/2014
Directive 2015/996/EU

Relevant policy and guidance publications

BS 6472 1992 - Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80 Hz)
BS 7385 Part 1 1990 – Evaluation and Measurement for Vibration in Buildings – Guide for measurement and evaluation of their effects on buildings
BS 7385 Part 2 1993 - Evaluation and Measurement for Vibration in buildings - Guide to damage levels from ground borne vibration
BS 7445 Part 1: 1999 - Description and measurement of environmental noise
BS 7445 Part 2: 1999 - Guide to the acquisition of data pertinent to land use
BS 7445 Part 3: 1999 - Guide to the application of noise limits
BS 8233 1999 - Sound Insulation and noise reduction for buildings – Code of Practice
Civil Aviation Authority, CAP 1165 Managing Aviation Noise, May 2013
Civil Aviation Authority, CAP 1164 Aircraft Noise, Sleep Disturbance and Health Effects, June 2014

Civil Aviation Authority, CAP 1278 Aircraft Noise and Health Effects: Recent Findings, March 2016
Civil Aviation Authority, CAP 1143 The Civil Aviation Authority's policy for carrying out its information duties under the Civil Aviation Act 2012, January 2014
Civil Aviation Authority, CAP1506 - Survey of noise attitudes 2014: Aircraft, February 2017
Civil Aviation Authority, CAP1616 - Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements, December 2017
Civil Aviation Authority, CAP 1588 - Aircraft Noise and Annoyance: Recent findings, February 2018
Department of Agriculture, Environment and Rural Affairs (DAERA), Noise Mapping and Action Planning Technical Guidance – Noise from Airports, 2013
Department of Agriculture, Environment and Rural Affairs, Policy Guidance on the Identification, Designation and Management of Quiet Areas - September 2016
Department for Environment, Food and Rural Affairs (DERFA), Low Frequency Noise, 2002
Department for Environment, Food and Rural Affairs (DERFA), Guidance for Airport Operators to produce airport noise action plans under the terms of the Environmental Noise (England) Regulations 2006 (as amended), 2009
Defra, Estimating Dose-Response Relationships between Noise Exposure and Human Health in the UK. Project Report and Technical Report, 2009
Department of the Environment, Design Manual for Roads and Bridges Volume 11 Section3 Part 7 Traffic Noise and Vibration Land Compensation - Your Rights Explained Part 1 1997 - Code of Practice for basic info and procedures for noise & vibration control
Department of the Environment (DoE) Circular 10/73 Planning and Noise (19 January 1973)
Department for Infrastructure (DfI) Guidance and Administrative Framework for Monitoring of Delayed Aircraft after 9.30pm at George Best Belfast City (GBBCA), 2018
Department for Transport, Future of Air Transport White Paper, 2003
Department for Transport, Aviation Policy Framework, 2013
Department for Transport, Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace, 2017
Department for Transport, Night Flying Restrictions at Heathrow, Gatwick and Stansted Decision Document, 2017
Department for Transport, Airport Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England, 2018
Department for Transport, Aviation 2050 The future of UK aviation. A consultation, 2018
DMRB Screening Method Spreadsheet Version 1.02 November 2003
Transport Assessment; Guidelines for Development Proposals in N. Ireland Nov 06 DRD/DOE

potential health effects – October 2010
Environmental Impact Assessment (August 1999)
Environment Agency Horizontal Guidance for Noise Part 2 - Noise Assessment and Control, 2001
ERCD Report 0907 Environmental Noise and Health: A Review, 2010
ERCD Report 0908 Aircraft Noise and Children's Learning, 2010
ERCD, Report 1208 Aircraft Noise, Sleep Disturbance and Health Effects: A Review, 2013
European Commission Working Group Assessment of Exposure to Noise (WG-AEN), Position Paper, Presenting Noise Mapping Information to the Public, March 2008
Research On High Freq. Noise and It Effects – May 2003
The International Civil Aviation Organisation (ICAO), Balanced Approach
The International Civil Aviation Organisation (ICAO), Convention on Civil Aviation, Annex 16, Volume 1
Noise Policy Statement for Northern Ireland, September 2014
Noise pollution: economic analysis - December 2014
ODPM -PPG24: Planning and Noise (1994)
World Health Organisation, Guidelines on Community Noise, 2000
World Health Organisation, 2009, Night Noise Guidelines for Europe, 2009
Health Protection Agency, Environmental Noise and Health in the UK A report by the Ad Hoc Expert Group on Noise and Health, 2010
World Health Organisation, Methodological guidance for estimating the burden of disease from environmental noise, 2012
World Health Organisation, Environmental Noise Guidelines for the European Region, 2018

In addition to the above, this Action Plan has considered the wider context of local and national sustainable development plans, policies and strategies, including but not necessarily limited to, the following:

Regional Development Strategy 2035
Ensuring a Sustainable Transport Future: A New Approach to Regional Transportation
Draft Belfast Metropolitan Area Plan 2015
Regional Transportation Strategy for Northern Ireland 2002-2012
Belfast Metropolitan Transport Plan 2015
Regional Strategic Transport Network Transport Plan 2015
Sub-Regional Transport Plan 2015
Strategic Environmental Assessment Regulations
Environmental Impact Assessment Regulations
Noise Insulation Regulations
Air Quality Regulations and Action Plans
A Planning Strategy for Rural Northern Ireland, 1993
Renewable Energy Action Plan

Local Authority Open Spaces policies
Planning Policy Statements and design guides
Emerging climate change initiatives
Mosaic GI strategy for Northern Ireland
Urban Regeneration Strategies
Noise Abatement Policy
Sustainable Aviation Strategy and Road Maps

Appendix C: Glossary of acoustic and technical terms

Term	Definition
Agglomeration	Major Continuous Urban Area as set out within the Regulations.
Agglomeration (Round 1)	A part of a territory, delimited by the Member State, having a population in excess of 250,000 persons and a population density such that the Member State considers it to be an urbanised area. The population density must exceed 500 persons per square kilometre.
Agglomeration (subsequent rounds)	A part of a territory, delimited by the Member State, having a population in excess of 100,000 persons and a population density such that the Member State considers it to be an urbanised area. The population density must exceed 500 persons per square kilometre.
Attribute Data	A trait, quality, or property describing a geographical feature, e.g. vehicle flow or building height.
Competent Authority	The Competent Authorities will be responsible for aspects such as making and, where relevant, approving noise maps and Action Plans for agglomerations, major roads, major railways and major airports. They will also be responsible for delimiting Quiet Areas within agglomerations and open countryside and collecting noise maps and Action Plans. The Competent Authorities are as follows: Agglomerations – Department of Agriculture, Environment and Rural Affairs Major roads – Department for Infrastructure Major railways – Northern Ireland Transport Holding Company Major airports – Airport Operator
Data	Data comprises information required to generate the outputs specified, and the results specified.
dB	Decibel The human ear can detect sound waves exerting pressures ranging from 20 micropascals up to 100,000,000 micropascals. Because these numbers are so unwieldy a logarithmic scale (the decibel scale) is used. The typical threshold of human hearing, 20 micropascals, is set as 0 decibels. It follows from this

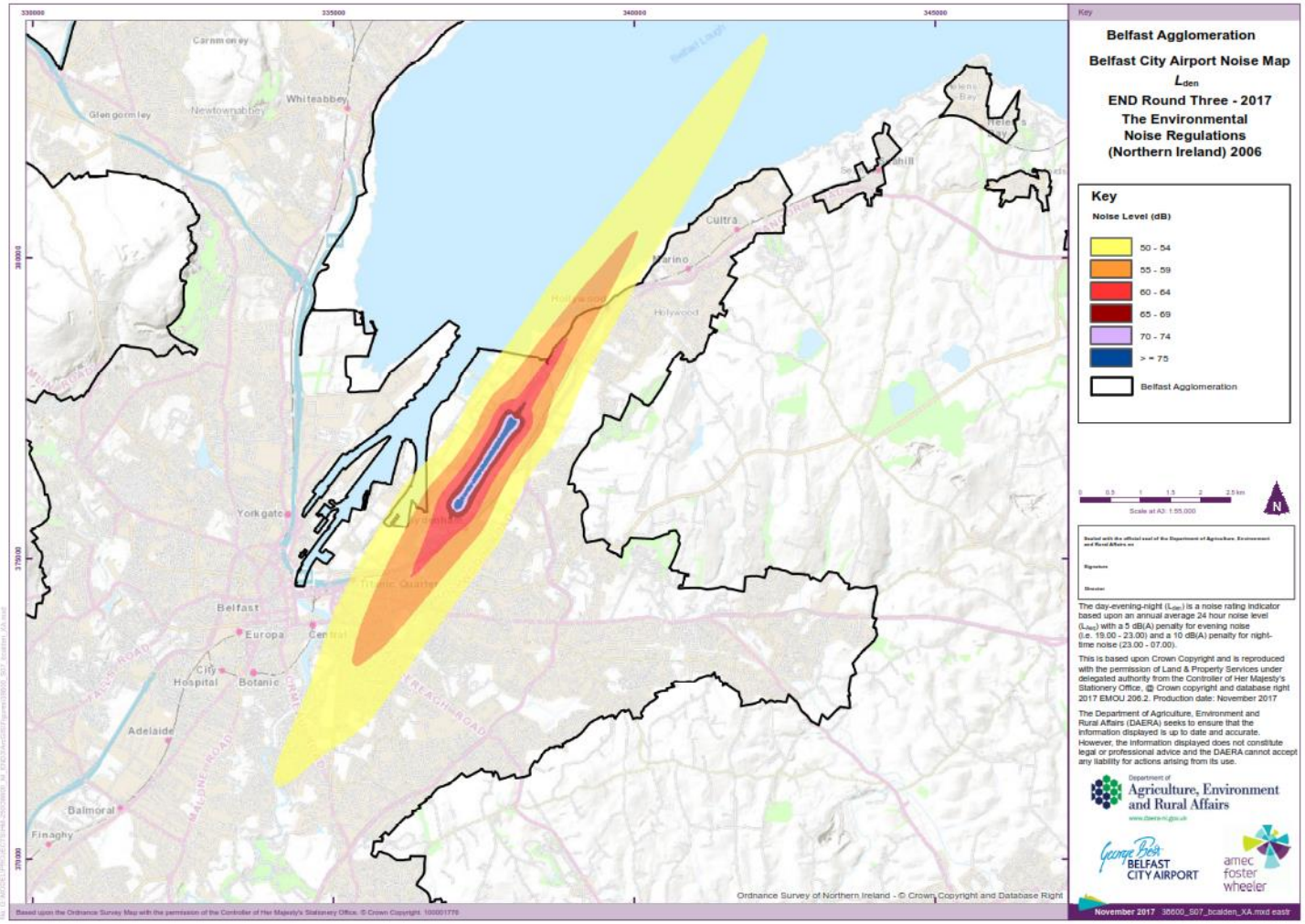
Term	Definition
	that the loudest sounds we can hear before suffering immediate hearing damage (around 100,000,000 micropascals) correspond to around 130-140 decibels.
dB (A)	Internationally accepted unit for most noise measurement and represents the sound pressure level weighted to correspond to the frequency response of the human ear. The human ear is most sensitive to sound waves with frequencies of a few thousand Hz. A sound wave with the same sound pressure amplitude outside this range will sound noticeably quieter than one in this range with the same sound pressure amplitude. Describing the loudness of a sound purely in terms of decibels based on sound pressure can therefore be misleading.
EC	European Commission
END	Directive 2002/49/EC of the European Parliament and Council relating to the assessment and management of environmental noise, otherwise known as the Environmental Noise Directive.
GBBCA	George Best Belfast City Airport
GIS	Geographic Information System
INM	Integrated Noise Model
Irish National Grid (ING)	The official spatial referencing system of Ireland.
Limit Values	Member States are required to inform the Commission of existing limit vales or limit values in preparation (Article 5, paragraph 4 of the END).
Major Airport	The END defines a major airport as: a civil airport, designated by the Member State, which has more than 50,000 movements per year (a movement being a take-off or landing), excluding those purely for training purposes on light aircraft (Article 3(p)).
Major Railway	The END defines a major railway as: a railway designated by the Member State which has more than 30,000 train passages per year (approximately 80 train passages per day) (Article 3(o)). However, for the first round of mapping in 2007 the qualifying figure was 60,000 train passages per annum (Article 7, paragraph 1).
Major Road	The END defines a major road as: a regional, national or international road, designated by the Member State, which has more than 3 million vehicle passages per

Term	Definition
	annum (approximately 8,200 vehicles per day) (Article 3(n)).
Modal Split	The split between flight type (arrivals and departures) and runway direction (towards Belfast City (Runway 04) or towards Belfast Lough (Runway 22)).
NA	Not Applicable
Noise Bands	Areas lying between contours of the following levels (dB): L_{den} 50-54, 55-59, 60-64, 65-69, 70-74, >74 L_d 50-54, 55-59, 60-64, 65-69, 70-74, >74 L_e 50-54, 55-59, 60-64, 65-69, 70-74, >74 L_n 45-49, 50-54, 55-59, 60-64, 65-69, >69
Noise Levels	Free-field values of L_{den} L_d, L_e, L_n, and $L_{A10,18h}$ at a height of 4m above local ground level
Noise Level - L_d - Daytime	L_d (or L_{day}) = $L_{Aeq,12h}$ (07:00 to 19:00). For strategic noise mapping this is the annual average
Noise Level - L_e - Evening	L_e (or $L_{evening}$) = $L_{Aeq,4h}$ (19:00 to 23:00) For strategic noise mapping this is the annual average
Noise Level - L_n - Night	L_n (or L_{night}) = $L_{Aeq,8h}$ (23:00 to 07:00) For strategic noise mapping this is the annual average
Noise Level - L_{den} – Day/Evening/Night	A noise rating indicator based upon Ld, Le and Ln as follows: L_{den} = 10 * lg 1/24 {12 * 10^((L_{day})/10) + 4 * 10^(($L_{evening}$+5)/10) + 8 * 10^((L_{night} +10)/10)}
Noise Level – $L_{Aeq,16h}$	LAeq, 16 hr = $L_{Aeq,16h}$ (07:00 – 23:00) For strategic noise mapping this is the annual average.
Noise Mapping	The presentation of data on an existing or predicted noise situation in terms of a noise indicator.
Noise Mapping (Input) Data	Two broad categories: (1) Spatial (e.g. road centre lines, building outlines). (2) Attribute (e.g. vehicle flow, building height – assigned to specific spatial data).
Noise Mapping Software	Computer program that calculates required noise levels based on relevant input data.
Noise Model	All the input data collated and held within a computer program to enable noise levels to be calculated.
Output Data	The noise outputs generated by the noise model.
OSNI	Ordnance Survey for Northern Ireland.
Processing Data	Any form of manipulation, correction, adjustment factoring, correcting, or other adjustment of data to

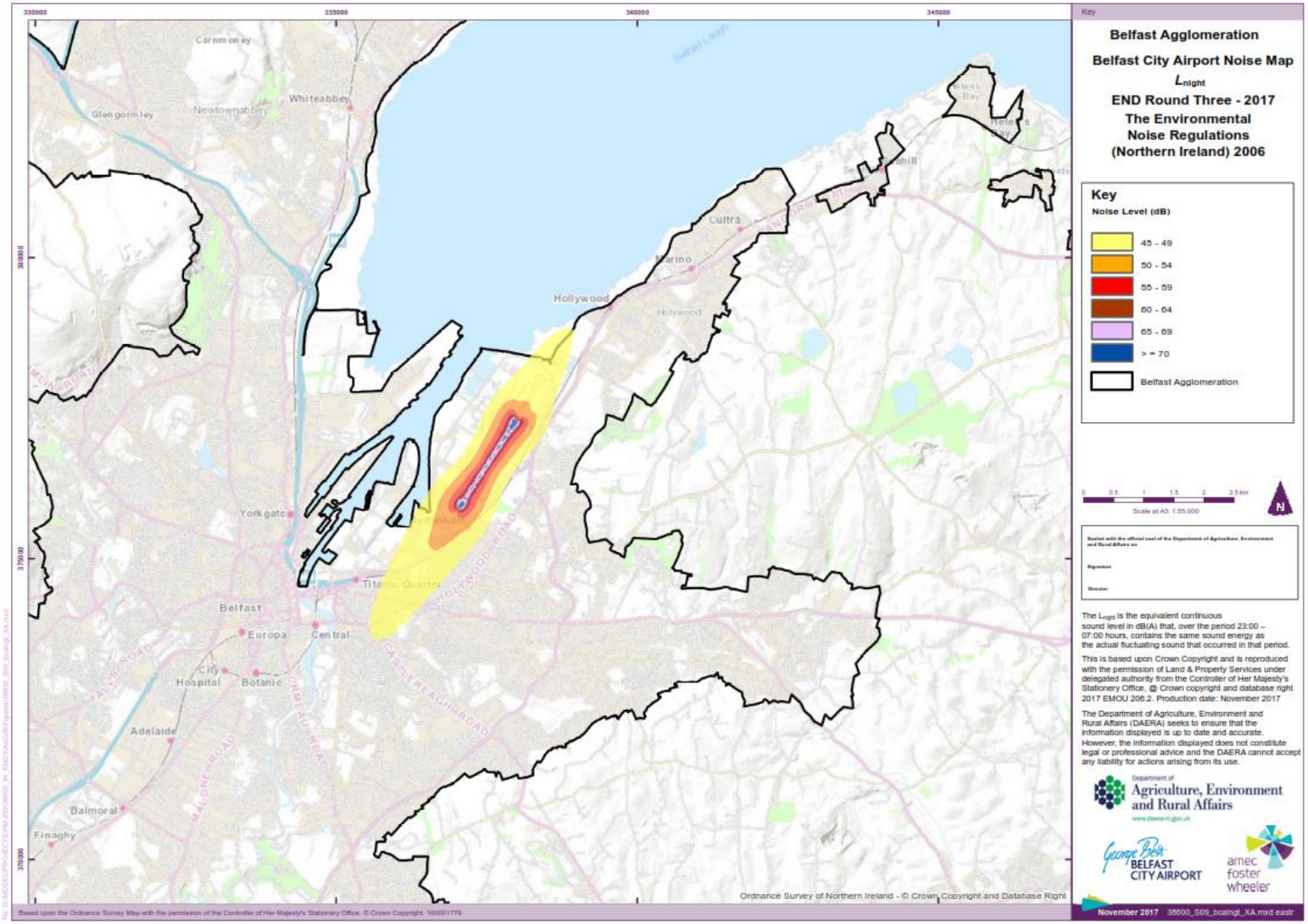
Term	Definition
	make it fit for purpose (includes operations sometimes referred to as 'cleaning' of data).
Quiet Area	Article 3(l) and 3(m) of the END define a 'Quiet Area in an agglomeration' as an area, delimited by the Competent Authority, for instance which is not exposed to a value of L_{den} or of another appropriate noise indicator greater than a certain value set by the Member State, from any noise source.
Spatial (Input) Data	Information about the location, shape, and relationships among geographic features, for example road centre lines and buildings.

Appendix D: Strategic noise maps for GBBCA within Belfast Agglomeration

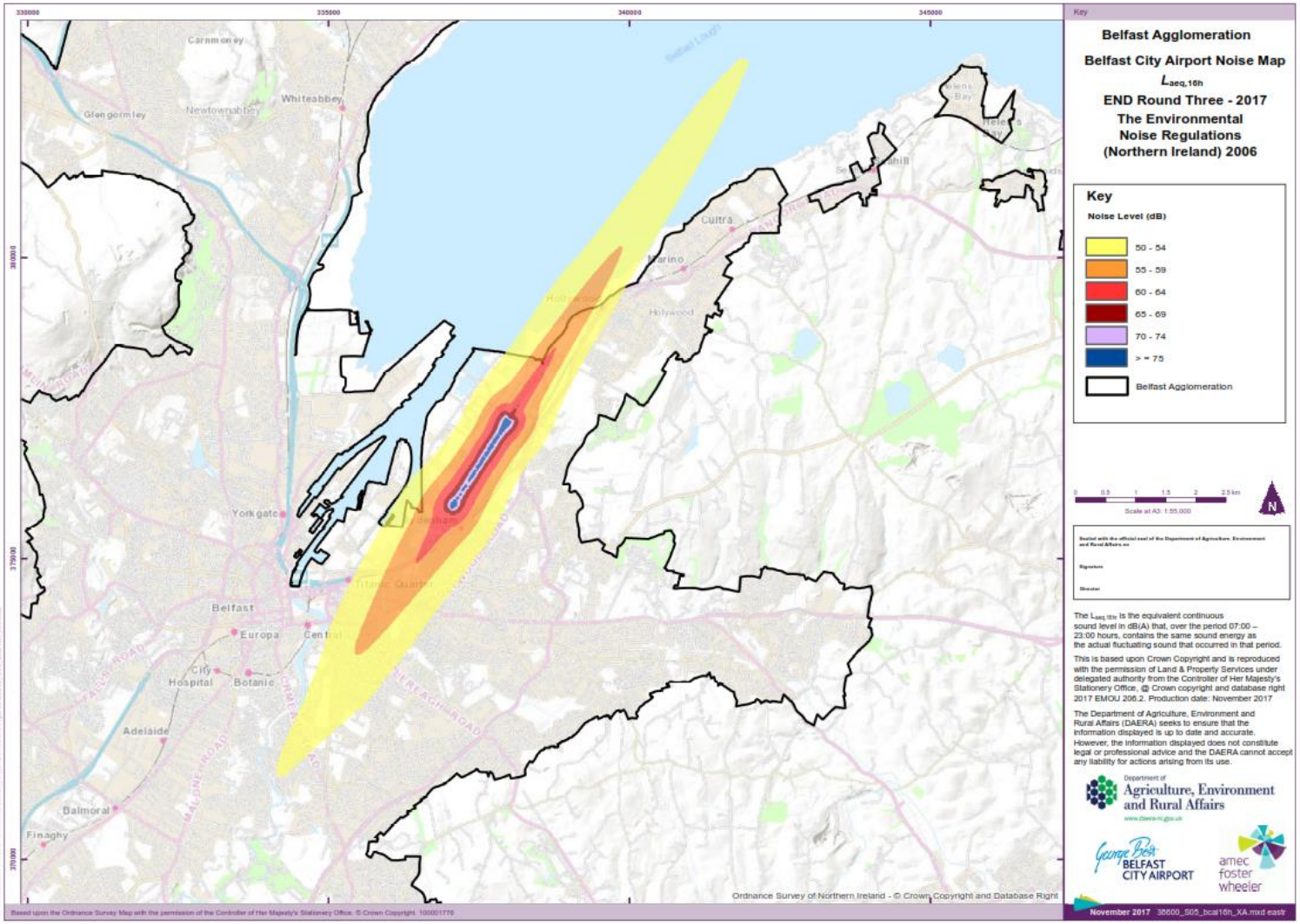
Noise maps for Airport within Belfast Agglomeration L_{den}



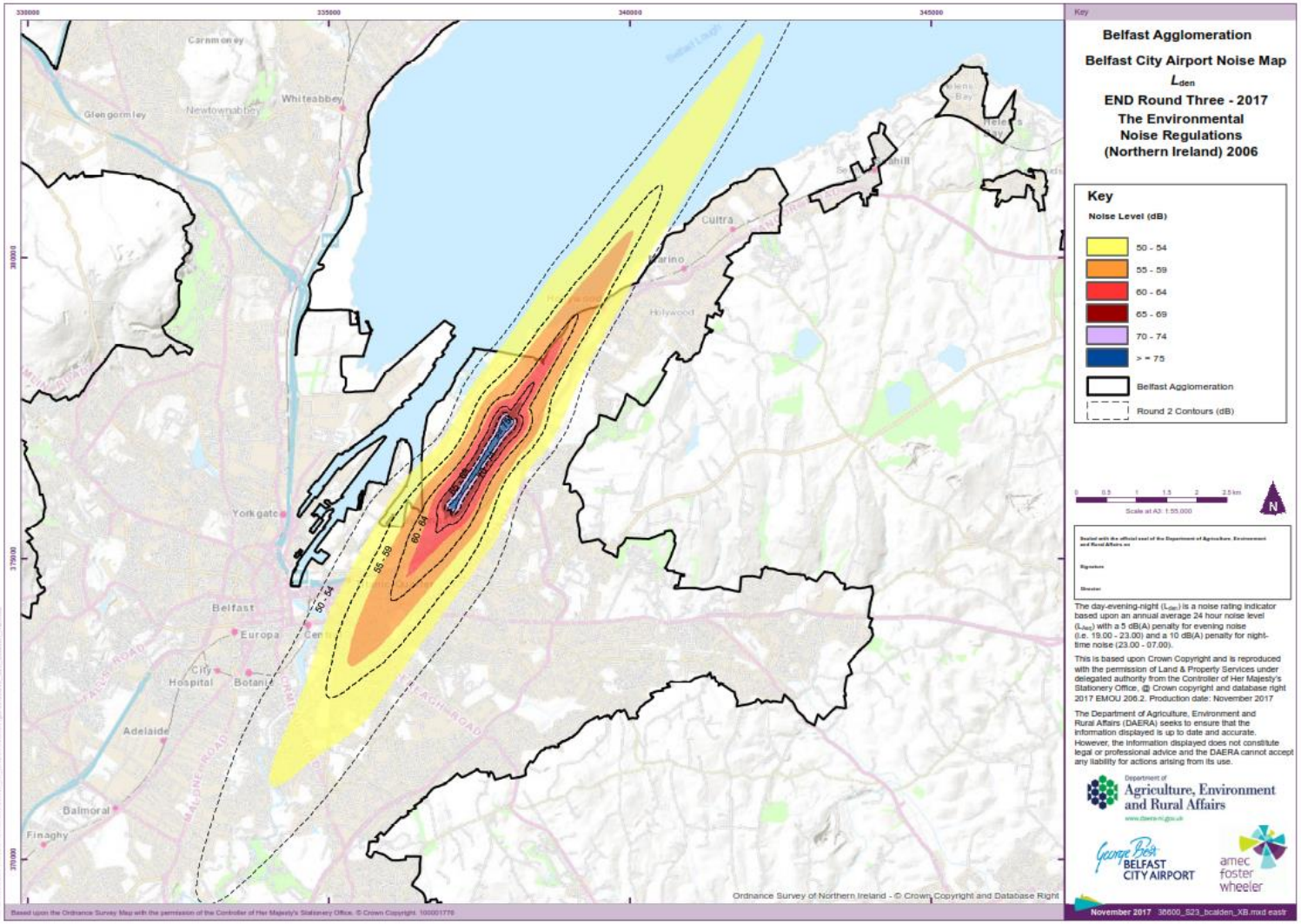
Noise maps for Airport within Belfast Agglomeration L_{night}



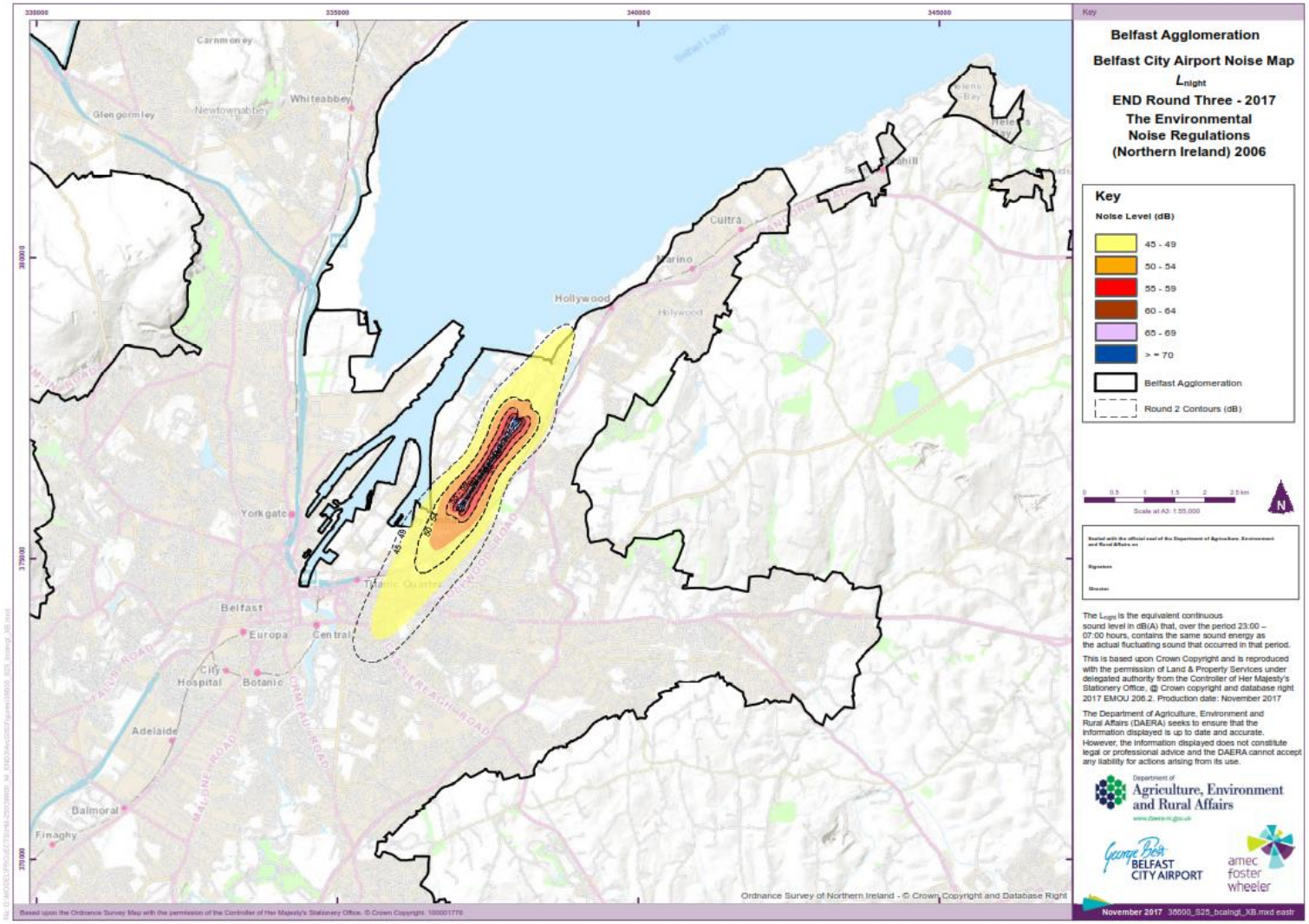
Noise maps for Airport within Belfast Agglomeration $L_{Aeq,16h}$



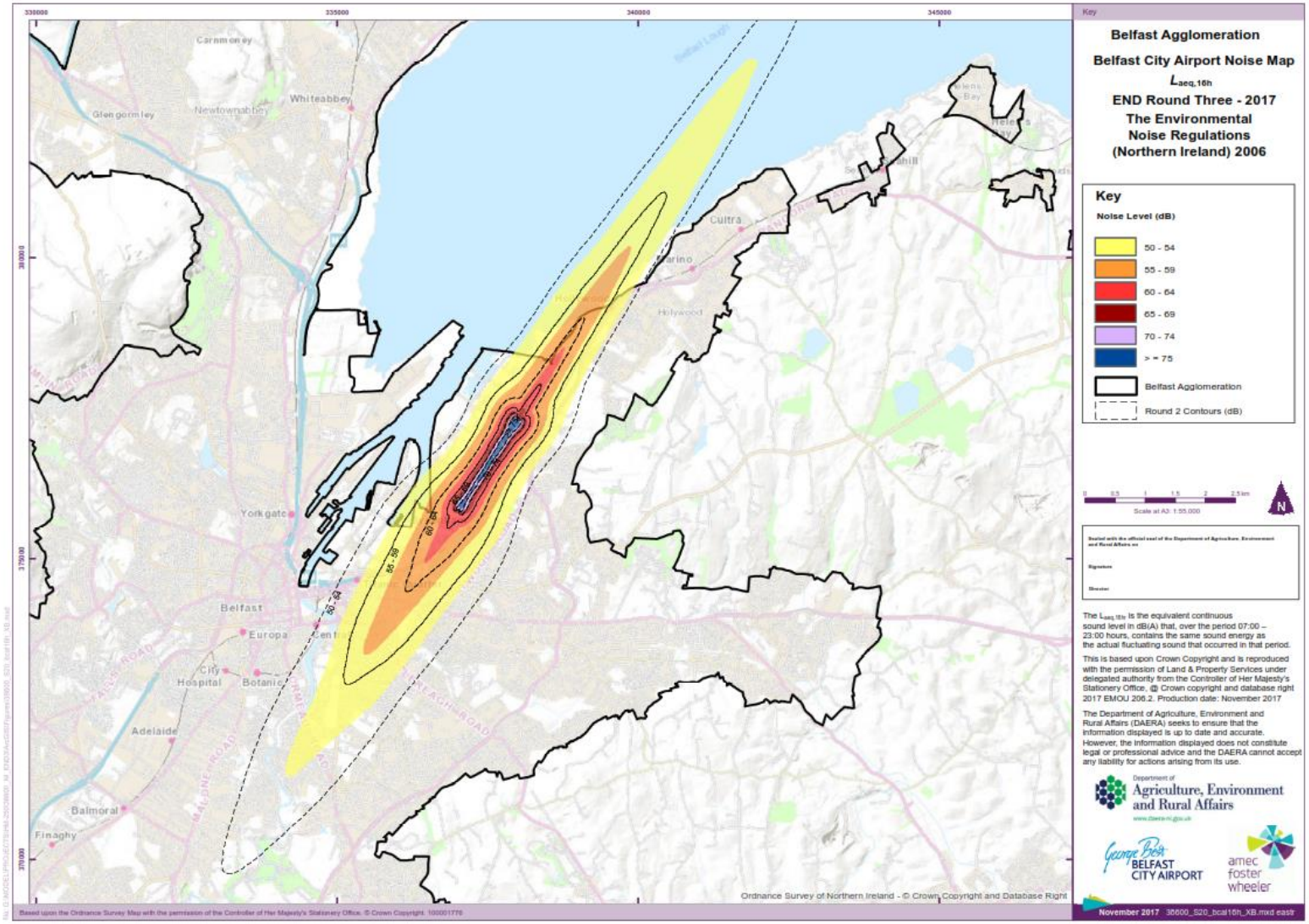
Noise maps for Airport within Belfast Agglomeration L_{den} Round 2 vs Round 3



Noise maps for Airport within Belfast Agglomeration L_{night} Round 2 vs Round 3

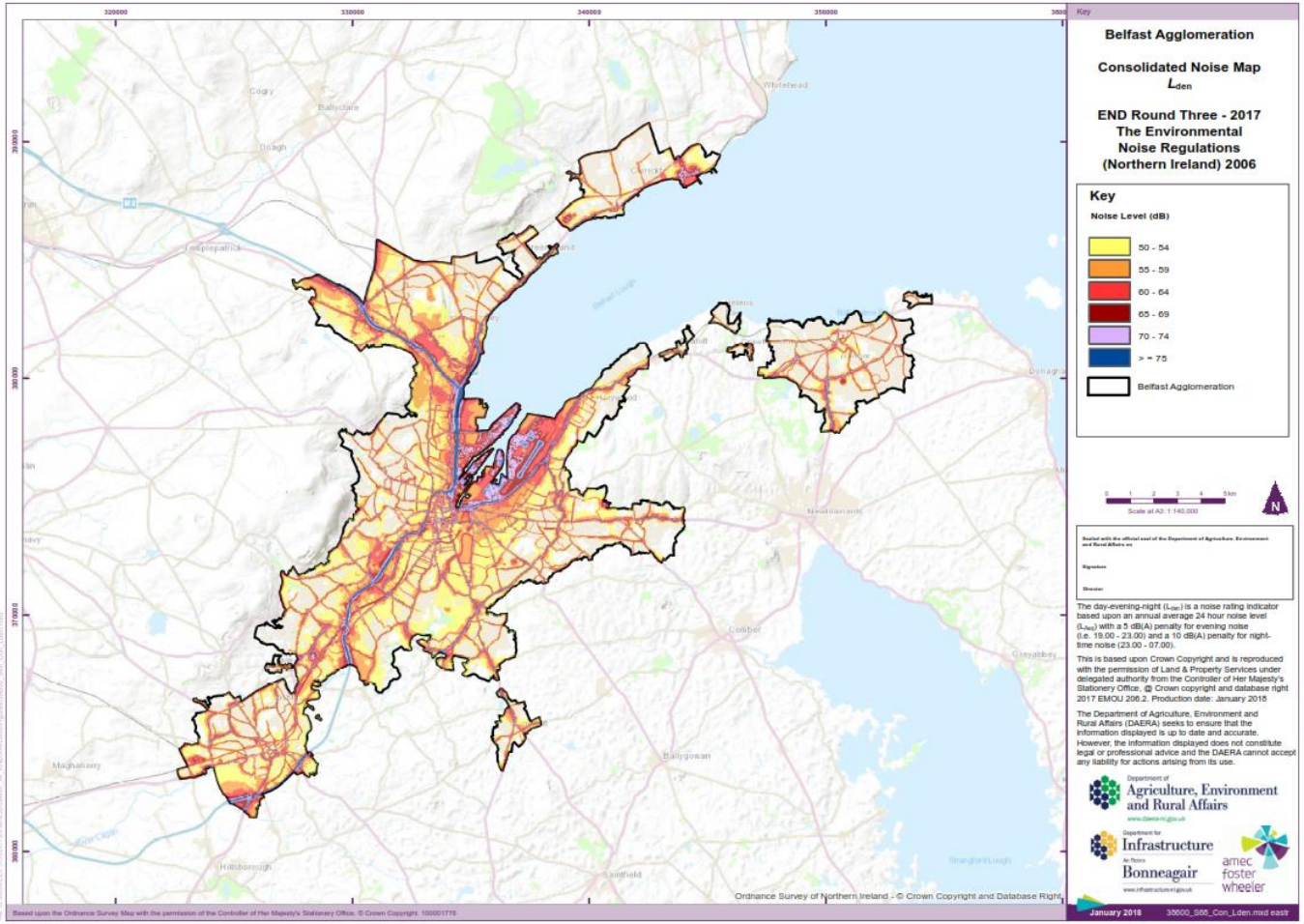


Noise maps for Airport within Belfast Agglomeration $L_{Aeq,\ 16h}$ Round 2 vs Round 3

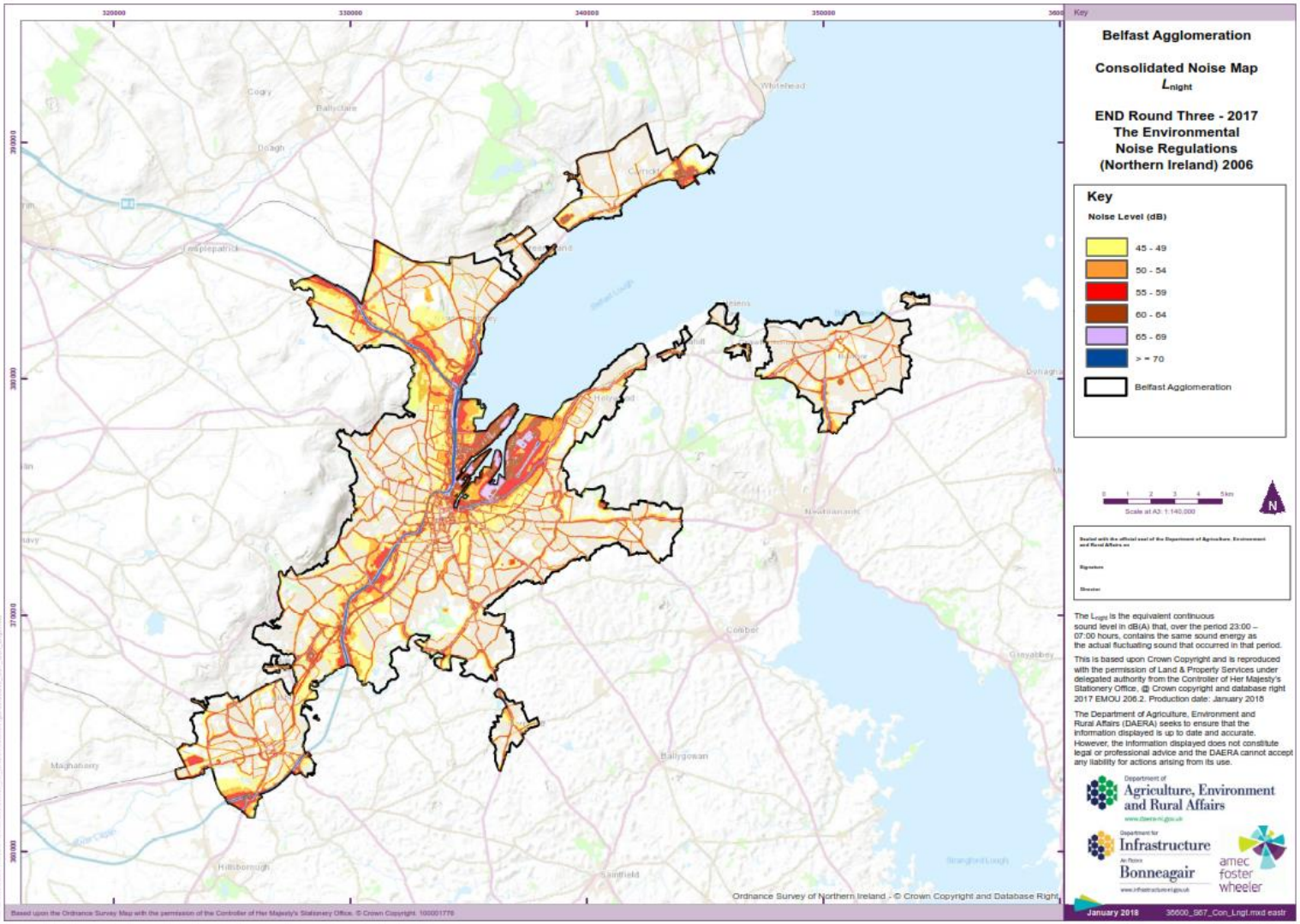


Appendix E: Consolidated noise maps for all noise sources within Belfast Agglomeration

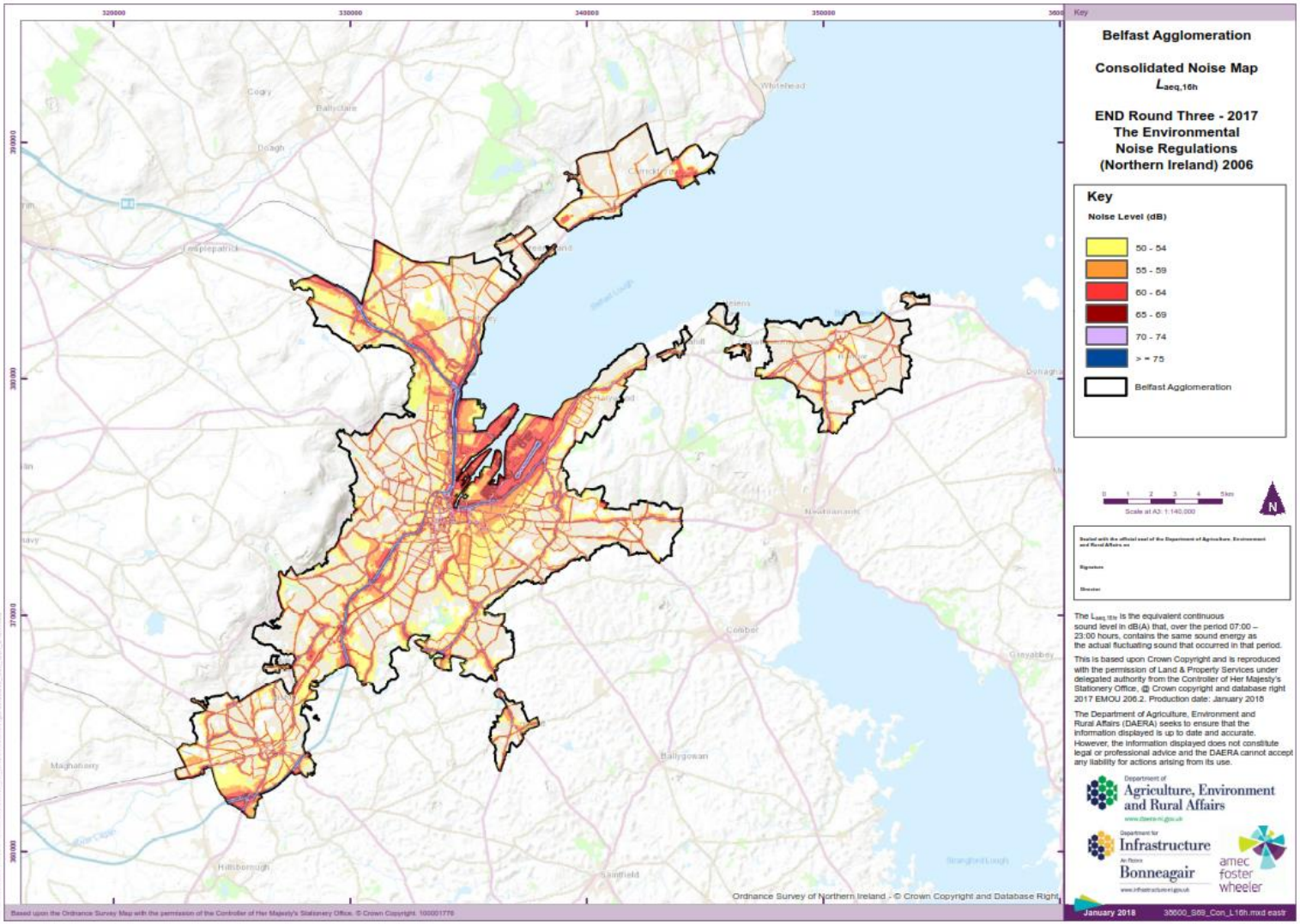
Consolidated noise maps for all noise sources within Belfast Agglomeration L_{den}



Consolidated noise maps for all noise sources within Belfast Agglomeration L_{night}



Consolidated noise maps for all noise sources within Belfast Agglomeration $L_{Aeq, 16h}$



Appendix F Data inputs to the airport noise model

Table F.1 Airport data inputs

Data	Description
Runway Centre Point	Centre point coordinate in latitude and longitude
	Elevation of runway centre point (m)
Runway End Points	Runway end points provided in km referenced from the runway centre point.
	Elevation of runway ends (m)
Runway Width	Width (m)
Take Off / Landing (per aircraft, destination and periods)	Start of roll coordinate referenced to centre point (km)
	Approach threshold coordinate relative to runway centre point (km)
	Glide slope (degrees)
	Threshold Crossing Height (m)
Average Airport Meteorological Conditions (historical – up to 20 years)	Wind Direction (for percentage of time)
	Average Airport Temperature (^{o}C)
	Average Pressure (mm Hg)
	Average Humidity (%)
	Average Headwind (km/h)
Actual Modal Split	Runway utilisation for the assessment period (%)
Standard Modal Split	Long-term runway utilisation (%)
Route Definitions (aircraft, route and period dependant)	Radar Track Data from Noise Track Keeping system (e.g. B&K, GEMS, Lochard)
	Plan View Drawing derived from a statistical distribution (CSV, DXF)
Terrain Data	Ground elevation data such as equal height contours (SHP, DXF)

Source: Wood Environment & Infrastructure UK

Table F.2 Air traffic movement data inputs

Data	Description
Movement Data (per aircraft)	Formatted Table of Movements against Aircraft
Arrival / Departure dates and times	S.O.R. (Start Of Roll - Not Stand Times)
	Provided in local time
Route	Departure Route provided per aircraft
	Arrival Route provided per aircraft
Destination	Destination of aircraft (used as an indication of fuel load)
	More critical for major aircraft, long haul and charter flights
	Runway
	Runway Direction
Aircraft types	ICAO (International Civil Aviation Organization) or IATA (Codes
	Engine variant details

Source: Wood Environment & Infrastructure UK

Appendix G Noise Action Plan 2013-18: Summary of actions and status

No	Actions	Output/Target	Timescales	2014	2015	2016	2017
1	Continue to maintain restricted operating hours 06:30-21:30 with extensions granted up to 23:59 in exceptional circumstances		Ongoing	Reported monthly 2014 (annual): 1.02%	Reported monthly 2015 (annual): 1.13%	Reported monthly 2016 (annual): 1.17%	Reported monthly 2017 (annual): 1.3%
2	Continue to maintain a bias of flights over Belfast Lough and seek to maximise flights over Belfast Lough where it is safe and feasible to do so	+50% of flights operating over Belfast Lough	Ongoing	Reported monthly 2014 (annual): 54%	Reported monthly 2015 (annual): 53%	Reported monthly 2016 (annual): 52%	Reported monthly 2017 (annual): 52%
3	Continue to seek adherence by airlines to its published noise abatement procedures	95% adherence per month	Ongoing	Reported monthly 2014 (annual): 99% avg. compliance (across all modes)	Reported monthly 2015 (annual): compliance in excess of 97% across all modes	Reported monthly 2016 (annual): compliance 98% or greater across all modes	Reported monthly 2017 (annual): compliance 96% or greater across all modes
4	Investigate the feasibility of introducing a Standard Instrument Departure for Runway 04 to enhance track keeping performance by airlines	Report on investigation including cost benefit analysis to Environmental Sub Group	Mid-2014	Feasibility investigated, and progress reported to ESG. Last update Mar 2015 Project on hold due to costs / funding availability	Under review again as part of air traffic control contract	Under review by NATS – updates provided through the ESG meeting	Feasibility investigated and not progressed GBBCA has agreed to review again and has appointed NATS to carry out feasibility study. Outcome to be reported to ESG
5	Progress with request to vary the terms of the Planning Agreement to introduce a noise contour control cap and additional noise management measures	Planning request approved, and proposals implemented	Ongoing	In progress Public Inquiry took place 18-21 May 2015	In progress DfI considering PAC recommendations	In progress DfI considering PAC recommendations	In progress DfI considering PAC recommendations

				Awaiting PAC report	following issue of report	following issue of PAC report	following issue of PAC report
6	Implement a noise compensation scheme in alignment with the APF		If Required	No properties in summer 2014 63dB contour	No properties in summer 2015 63dB contour	No properties in summer 2016 63dB contour	No properties in summer 2017 63dB contour
7	Commence a review of noise insulation schemes at other UK airports to inform any potential future scheme at GBBCA (should it be required)		July 2014	Review complete Draft SIS framework agreed with DRD	N/A	N/A	N/A
8	Continue to review current noise management measures and undertake further assessments on the noise environment, where necessary, in consultation with its Flight Operations Committee and the Forum. GBBCA will consider, in particular, the operational noise mitigation opportunities set out in the *SA Noise Road-Map*	Minutes of meetings	Ongoing	On hold pending outcome of Planning Agreement Modification Process	On hold pending outcome of Planning Agreement Modification Process	On hold pending outcome of Planning Agreement Modification Process	On hold pending outcome of Planning Agreement Modification Process
9	Continue to operate and maintain the Noise & Track Monitoring System		Ongoing	Maintained through Topsonic support service Noise monitors last calibrated in Oct 2014	Maintained through Topsonic support service Technical issues with NMT1 May-15 Sep – repairs carried out by Topsonic and brought back into service on 15 Sep. Further technical issues with NMT1 in April 2016 under investigation	Maintained through Topsonic support service Noise monitors last calibrated in Sep 2016-next due 2018	Maintained through Topsonic support service Noise monitors last calibrated in Sep 2016-next due 2018

					Missing track information in April 2016 due to radar issues Noise monitors last calibrated in Oct 2014 – next due Oct 2016		
10	Continue to prepare reports on airline adherence to published noise abatement procedures for the Forum	3 times per year	Ongoing	Reported at each meeting	Reported at each meeting	Reported at each ESG meeting	Reported at each ESG meeting
11	Continue to produce flight statistics /noise complaint reports for the Forum	3 times per year	Ongoing	Reported at each meeting	Reported at each meeting	Reported at each Forum meeting	Reported at each Forum meeting
12	Continue to publish flight and noise related statistics on GBBCA website	Monthly	Ongoing	On website	On website	On website	On website
13	Continue to commission independent noise specialists to prepare annual summer contours to evaluate the noise climate	Annual report	Ongoing	Summer contours produced for 2014 Noise contour report issued to Forum Jan 2015 and published on GBBCA website	Summer contours produced for 2015 Noise contour report issued to Forum in Mar 2016 and published on GBBCA website	Summer contours produced for 2016 Noise contour report issued to Forum in Mar 2017 and published on GBBCA website	Summer contours produced for 2017 Noise contour report issued to Forum in Jan 2018 and published on GBBCA website
14	Continue to enforce restrictions on engine ground running and prohibit engine ground runs between 22:30 and 06:00 hours		Ongoing	122 engine runs in 2014: zero between 22:30-06:00	101 engine runs in 2015: 0 between 22:30-06:00	2016 (annual): 106 engine runs – zero between 22:30-06:00	2017 (annual): 144 engine runs – zero between 22:30-06:00
15	Seek to maintain availability of Fixed Electrical Ground Power on aircraft stands and promote its use by airlines	FEGP monthly availability report	Ongoing	AOI-07 states that on stands where FEGP is available, it must be used in preference	Rolling 12-month average: 93% monthly availability	Rolling 12-month average 86% monthly availability	Rolling 12-month average 86% monthly availability

				to APUs or GPUs, where possible *FEGP availability report can be produced on annual basis from 1 May 2015 onwards*			3-year replacement programme in progress. 6 units upgraded to date and all 11 units to be upgraded by end 2019
16	Continue to support local schools and community projects to offset noise impact through the Community Fund and ongoing CR programme		Ongoing	Ongoing CR summary report provided to Forum at each meeting	Ongoing CR summary report provided to Forum at each meeting	Ongoing CR summary report provided to Forum at each meeting	Ongoing CR summary report provided to Forum at each meeting
17	Continue to distribute Community Newsletter to local residents with information on noise related matters	3 issues/year	Ongoing	3 issues in 2014	3 issues in 2015 Frequency under review - 2 issues/year to 60,000 households	2 issues in 2016	2 issues in 2017
18	Continue to operate a noise complaint handling system and to respond to individuals within target timescales	Initial response within 5 working days Investigated response within 15 working days	Ongoing	Ongoing 2014 (Annual): target timescales met for 92% of responses	Ongoing 2015 (Annual): target timescales met for 88% of responses	Ongoing 2016 (annual): target response timescales met for 93% of total complaints	Ongoing 2017 (annual): target timescales met for 94% of total complaints
19	Review the location of the noise concern contact details as part of the planned website refresh			Complete Located within *Contact Us* and *Environment* sections of website	N/A	N/A	N/A

Appendix H Summary of Draft Noise Action Plan consultation responses

H1 Competent Authority role of GBBCA

- *"It quite wrong that airports should be allowed to self-regulate through the production and implementation of their own noise action plans, without any effective external and independent monitoring or cross-checks."* ***(BCAW)***

The approach taken by GBBCA complies with the 2006 Regulations which provide that the airports are the designated Competent Authorities.

Wood PLC have been appointed by the Department to prepare noise maps, all associated population exposure data and supplementary reports as required under the 2006 Regulations and the Directive. The noise mapping results are subject to review by the Department and were approved by them.

H2 'Acceptability' of the Airport's noise impact

- *"GBBCA should have considered whether the current noise level in the areas overflown by its aircraft are acceptable. Yet, at no point in the document is there any explicit consideration of whether or not the current noise level in those areas is "acceptable."* ***(BCAW)***

- *"The onset of serious community annoyance now occurs at 54dB LAeq 16h […] if 12,141 people – by the airport's estimate –are affected at this level, then the airport's current noise impact clearly is not "acceptable"."* ***(BCAW)***

- The level of aircraft noise is unacceptable. ***(several)***

While the CAA's 'Survey of Noise Attitudes' study (CAP1506) suggested that the annoyance found at 54 dB $L_{Aeq,16h}$ was roughly equivalent to the annoyance at 57 dB $L_{Aeq,16h}$ that has underpinned UK noise policy (in each case this is approximately 10% of population being highly annoyed), all annoyance surveys show wide ranges in the amount of community annoyance at particular noise levels. This range is affected by many factors rather than purely the noise level in dB.

An airport's noise footprint cannot be reduced to zero and surveys tend to show some annoyance even at very low noise levels. The focus is on minimising noise, reducing it as far as reasonably possible without taking away the important benefits of a well-used airport and major employer.

In preparing this Plan, GBBCA has adhered to the 2006 Regulations and the 2013 guidance. But as with the previous Noise Action Plan, at the heart of its approach is

recognising that it must continue to manage and minimise noise through all avenues open to it, keeping people informed, and in this way ensuring the Airport's operation is acceptable to surrounding communities.

GBBCA notes that there are no properties within 63 dB $L_{Aeq,16h}$ contour which is the current threshold at which the UK Government expects airport operators to offer households financial assistance towards acoustic insulation.

- *"[There is no] reference in the Draft Plan to DAERA's role or otherwise in determining the "acceptability" of the airport's noise impact, despite the fact that the relevant DOE guidance […] states that the airport and the Department will work together to determine this."* ***(BCAW)***

The draft Plan is subject to review and formal adoption by the Department.

H3 Designation of (Candidate) Noise Management Areas (NMAs)

- *"The DOE's guidance on airport Noise Action Plans contains a clear requirement to consider the creation of one or more Candidate Noise Management Areas."* ***(BCAW)***

- *"We believe that the creation of a Noise Management Area or Areas for the worst affected 1% of the exposed population should be the absolute minimum undertaking in this regard by the airport. Moreover, given that the government's own study indicated that the onset of "significant community annoyance" now occurs at 54 dB LAeq 16h or above, we believe that there is a very strong case for extending Noise Management Areas to cover all 12,141 people which the airport estimates are affected at this level."* ***(BCAW)***

The approach taken by GBBCA is in line with the 2013 guidance. As set out in section 8.2.3, GBBCA applied the methodology for identifying priority areas as set out in the technical guidance (identifying the top 1% of population exposed to above 50dB $L_{Aeq,16h}$ due to noise from GBBCA). Having identified the areas containing the top 1% of the population above 50dB $L_{Aeq,16h}$ (deemed Important Areas), the guidance advises Competent Authority to assess the extent to which noise needs to be reduced in these areas, and prioritise the areas most in need of protection through designation as formal NMAs. This was done.

H4 Planning Agreement measures

H4.1 Indicative noise contour / noise contour control cap

- *"This vital noise control aspect of the Agreement has not been implemented. This is a serious omission and means that the Draft Plan is misleading and inaccurate in its overview of current noise management measures."* ***(BCAW)***

Section 5.4 already sets out the status of this process. However, it has been restated in section 5.5 for clarification purposes.

H4.2 Flights after 21:30 hours

- The Draft Plan did not refer to the NI Public Services Ombudsman Investigation Report into a complaint regarding delayed flights after 9.30pm published in February 2018. ***(several)***

- "*This is important contextual information which should have been included in the Draft Noise Action Plan."* ***(BCAW)***

- *"Your DNAP does not address this failing nor state that you will change your operations so that only 'in exceptional circumstances' may flights operate outside the allowed hours."* ***(OSRA)***

The Ombudsman Investigation related to the Department for Infrastructure's (DfI) procedures for monitoring the number of late flights after 21:30 hours at GBBCA. In response to the report recommendations, DfI issued guidance in November 2018 on the meaning of exceptional circumstances for use by its staff. The guidance will be used as part of DfI's administrative framework to monitor the 2008 Planning Agreement. Section 5.4 of the Plan has been updated to include this information.

In line with the procedures set out in this guidance, GBBCA will be providing DfI, as it has consistently done so previously, comprehensive reports listing all delayed flights after 21:30 hours and the circumstances for each delay to enable DfI to assess compliance with the Planning Agreement.

- The draft Plan does not include the number of delayed flights after 21:30 hours. ***(individual)***

Information on delayed flights after 21:30 hours is published on the GBBCA website on a rolling 3-month basis, reported to the Forum at each meeting and provided in detail to DfI.

- Delays after 21:30 hours are a regular occurrence. ***(several)***
- There should be a ban (unless in an emergency), or a limit on the number of flights operating after 21:30 hours, to ensure that such delays only operate in exceptional circumstances. ***(several)***

Under the terms of the GBBCA's Planning Agreement, while flights may only be scheduled between 06:30 and 21:30 hours, the Airport is permitted to grant extensions to allow delayed flights to operate up until 23:59 hours in exceptional

circumstances. The Airport will continue to adhere to this restriction and the recently published guidance from DfI as detailed above.

- There should be no delays after 23:00 hours. ***(individual)***

GBBCA recognises that 23:00 hours is the commencement of the night-time period in the industry. It places particular efforts on minimising delays beyond this time. To this end, delays after 23:00 hours are infrequent, representing between 1-4% of the total number of delays after 21:30 hours per annum over the past 5 years (8-22 movements).

- The draft Plan does not include data on fines are in relation to flights after 21:30 hours. ***(individual)***

The penalty system for Community Fund purposes is set out in section 8.2.5.2. As stated in this section, GBBCA has supported over 150 local community projects to the value of £360,000 from the Community Fund since its inception in 2009.

- *"The penalties imposed at present, beginning with a £50 fine are derisory to those of us who have our lives disturbed by these flights."* ***(individual)***
- *"Under the present penalty system GBBCA makes a donation to well-publicised 'worthy causes' which deflects from the harm inflicted on the impacted population by these late landings."* ***(individual)***

As stated in section 8.2.5.2, GBBCA also levies 'extension charges' on airlines to keep the airfield open beyond scheduled operating hours.

- *"We note the target in Table 14 (page 64) of <2% per year in relation to the number of flights outside scheduled operating hours as a percentage of total flights. The planning agreement between the Department and GBBCA does not have a numerical target for flights operating outside scheduled hours and only permits delayed flights in exceptional circumstances."* ***(DfI)***

Noted. This target has been removed from Table 14 of the Plan.

<u>H5 Track keeping</u>

- Aircraft are not adhering to noise abatement procedures. ***(individual)***

Track keeping monitoring data set out in Appendix G shows compliance of between 96% and 99% for the past 5 years.

- Request that GBBCA carries out a trial of RNAV technology on both the Belfast City and Belfast Lough routes, to ensure aircraft keep to routes to minimise the impact of noise on local residents. ***(BCAW & several)***

- GBBCA should monitor the resultant noise levels, and then hold a public consultation to determine whether residents feel that the technology is of benefit. ***(BCAW & several)***

In the previous Noise Action Plan (2013-2018), GBBCA committed to investigating the feasibility of introducing a Standard Instrument Departure for Runway 04 to enhance track keeping performance by airlines. The SID would be based on RNAV technology. This is currently being reviewed and progress is being reported to the Environmental Sub Group of the Forum (See action 4 in Appendix G). This action has been restated in Table 14 of this Plan.

H6 Sleep disturbance / early morning flights

- Sleep disturbance from flights at 06:30 hours in particular at weekends with impacts on physical and mental health and wellbeing. ***(several)***

- *"The bad effects on cardio-vascular health are well known. I have been treated now from some 7 years for high blood pressure."* ***(individual)***

- *"The noise from an excessive number of planes is unacceptable and has had a negative impact on my sleep- and indeed my health- I lost the sight in my right eye in 2018 which doctors have attributed to disturbed sleep."* ***(individual)***

- *"There is the huge problem of night time noise interfering with sleep as a lack of sleep is very strongly associated with cardiovascular disease, particularly stroke, myocardial infarction and hypertension. In children, inadequate sleep predisposes to increased body weight which renders them liable to diabetes and Cardiovascular Disease in adult life. Official night time hours are from 11.00 pm to 7.00 am, so starting take offs at 6.30 am violates these hours."* ***(APH)***

- *"In response to a recent UK-wide survey carried out by the Civil Aviation Authority, two-thirds of the respondents who said they were disturbed by noise from GBBCA selected early morning flights as one of the top three aviation noise issues which they would like to see action on."* ***(BCAW)***

- Can GBBCA schedule flights to start later on Sunday mornings (e.g. from 08:00 hours instead of 06:30 hours) ***(BCAW & several)*** or at weekends. ***(several)***

- Can all flights be scheduled after 07:00? ***(several)***

GBBCA is one of the few airports in the UK to have restricted operating hours, particularly in the evening period. As noted above, delays after 23:00 hours are infrequent, with between 8 and 22 movements after 23:00 hours per annum over the past 5 years.

GBBCA notes that the most stringent night-flying restrictions set for designated airports by the Department for Transport apply between the hours of 23:30 and 06:00 (referred to as the Night Quota Period)[113]. The operating restrictions for the remainder of the night period (23:00-23:30 hours and 06:00-07:00 hours) relate only to the noisiest aircraft types (classed as QC8 and QC16) which are banned from operating. Such aircraft do not operate at GBBCA.

The UK Government's decision to support an additional runway at London Heathrow Airport which will allow an increase in annual movements from 480,000 to around 740,000, is subject to a night closure ban of 6.5 hours[114]. This is something already in place at GBBCA.

H7 Noise disturbance

- Disruption to activities in the home, including sitting in the garden, watching television, holding conversations and studying/doing schoolwork. ***(several)***

- Not able to open windows in the summer due to the level of noise. ***(several)***.

- Disturbance in local parks such as Victoria Park, Ormeau Park, Cherryvale and Botanic Gardens. ***(several)***

- Disruption to church services. ***(individual)***

- *"The noise is even more disturbing when we are outside in our garden, and it is very frightening to visitors, particularly those with children."* ***(individual)***

- *"The noise from the aircraft taking off from the airport constitutes a daily nuisance for us. It is not so much the volume (in decibels) that affects us, as the buzzing and vibrating sound associated with the flights."* ***(individual)***

- *"The noise permeates all of our everyday life."* ***(individual)***

[113] DfT, 2017b, p.35. *Night Flying Restrictions at Heathrow, Gatwick and Stansted Decision Document*, [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627890/night-flight-restrictions-at-heathrow-gatwick-and-stansted-decision-document.pdf [Accessed 14 June 2018]

[114] DfT, 2018a, p.29. *Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England*, [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714106/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf [Accessed 26 March 2019]

GBBCA recognises that noise from aircraft may cause disturbance and has a comprehensive noise management programme in place to address its noise impact. It is one of the most restricted airports in the UK with a limit on the number of flights per annum, a Belfast Lough bias to reduce flights over the city, restrictions on aircraft types (no wide-bodied aircraft or marginally compliant Chapter 3 aircraft can operate) and restricted operating hours (06:30-21:30 hours).

As part of its request to vary the terms of its Planning Agreement, GBBCA has committed to the introduction of additional noise control measures. This Plan will be reviewed and revised when this process is determined.

H8 Noise complaints system

- *"The number of complaints received is a poor indicator as the complaints system is not advertised on the home page of the airport's website. Moreover, our experience is that complainants often either do not receive a response or receive no undertaking that the airport will make any changes designed to address the concern expressed."* ***(BCAW)***

- *"Our members have complained on several occasions to you about noise, yet these complaints have had no effect on your operations other than to elicit a meaningless explanation."* ***(OSRA)***

There is a Contact Us link on the home page of GBBCA's website. By clicking on this link, individuals are brought to a page that displays the noise hotline number or alternatively, individuals can submit a comment or concern online via this page.

GBBCA responds to all individuals who have contacted the Airport with a noise concern provided they have supplied adequate contact details. As detailed in Table 14 under action 18, GBBCA aims to respond to individuals with an initial acknowledgement within 5 working days and should a further investigated response be required, GBBCA aims to issue this within 15 working days subsequently. Where investigations reveal a failure to follow procedures, for example, the Airport's noise abatement procedures, this is reported to the airline / operator in question, and complainants are advised of the action taken.

- *"The noise complaints should be managed by DAERA or an independent agency, not by the airport, for obvious reasons of objectivity."* ***(individual)***

It is industry practice for concerns regarding aircraft noise to be directed to the relevant airport in the first instance[115].

[115] Civil Aviation Authority, Frequently Asked Questions: How do I make a complaint about aircraft noise? https://www.caa.co.uk/Consumers/Environment/Noise/Noise/ [Accessed 26 March 2019]

All complaints received by GBBCA are logged and a report summarising the types of complaints received and the locations where they arise, is presented to the Forum at each meeting for review purposes.

- *"A better system needs to be put in place. It would be better to have an email address so that the complainant has a record of the date and time the complaint was sent."* ***(individual)***

Noted. GBBCA will consider this during its next review of its feedback system.

H9 Health impacts

- *"GBBCA must take into account the new revised environmental noise guidelines which have just been issued by the World Health Organisation (WHO)."* ***(BCAW)***

GBBCA notes the publication of the World Health Organisation's Environmental Noise Guidelines for the European Region[116] which were released in October 2018, after the draft Plan was issued for consultation.

GBBCA notes that in the UK Government's recent consultation document on its Aviation Strategy[117] it states: *"The government is considering the recent new environmental noise guidelines for the European region published by the World Health Organisation (WHO). It agrees with the ambition to reduce noise and to minimise adverse health effects, but it wants policy to be underpinned by the most robust evidence on these effects, including the total cost of action and recent UK specific evidence which the WHO report did not assess".*

GBBCA will review this Plan in light of the outcome but notes that the WHO Guidelines are aspirational recommendations for national policy-makers to consider and are not regulatory or policy criteria that are applied directly to airport operations.

- *"There is a considerable body of research relating to the harmful health effects of aircraft noise, including much evidence cited in the above-mentioned WHO document, and this has not been taken into account in drawing up this Draft Plan. We therefore contend that the Draft Plan meets neither the requirements of the EU Environmental Noise Directive nor the relevant guidance, originally produced by the DOE."* ***(BCAW)***

[116] WHO, 2018. *Environmental Noise Guidelines for the European Region*, [online] Available at: http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf?ua=1 [Accessed 26 March 2019]
[117] DfT, 2018b. *Aviation 2050 The future of UK aviation. A consultation*, [online] Available at: https://www.gov.uk/government/consultations/aviation-2050-the-future-of-uk-aviation [Accessed 26 March 2019]

- *"We believe that the Noise Action Plan should utilise the current available international evidence on the adverse impact of aircraft noise on health to help identify the level of noise exposure which is most likely to lead to a significant adverse health impact on the population within that particular noise contour."* ***(BCAW)***

This has been done. Section 2.6 of the draft Plan sets out the effects of noise including the potential to affect health and is based on a range of health-related evidence including UK Government aviation policy and industry guidance.

- *The literature which is listed in the Appendix to the Draft Noise Action Plan excludes the CAA's review, Aircraft Noise and Annoyance: Recent Findings."* ***(BCAW)***

Noted. The review is a helpful summary of the evidence already published and that evidence was considered when developing the NAP.

- *"I have developed tinnitus in my left ear since I moved here [Malone] and never had it before. I'm 100% certain the decibel level I endure is in major breach of allowed safe levels."* ***(individual)***

- *"Under certain aircraft flight configuration and local atmospheric conditions, the pressure waves from the turboprops is causing physical pain in both my eardrums. […] This increase in noise pollution is causing me considerable stress and is having a severe detrimental effect on my quality of life…. It's all well and good stating a maximum allowed quantitative noise discomfort level, but facing that level continually and repeatedly throughout the year has an accumulative affect beyond any single instance of the exposure. I can no longer enjoy my home and this loss saddens me greatly, it's a living nightmare and I believe it is leading to depression."* ***(individual)***

Noise monitoring indicates that individual noise events from aircraft flying over Belfast city remain well below the threshold of pain, and noise is not at a level to cause direct auditory effects i.e. damage to the ear.

As noted above, section 2.6 of the draft Plan sets out the effects of noise including the potential to affect health. This Plan has considered these effects and is designed to prevent and reduce noise impacts in order to protect health and to contribute positively to the quality of life and wellbeing of neighbouring communities.

- *"It is also clear that it is the lower sound frequencies, and Infrasound, that by definition we can't hear yet recent research has established that we all register, which are particularly problematic. These frequencies are ignored by conventional noise assessment. Jet engines shed noise of these frequencies in abundance. On top of this,*

it is probably the crescendos of noise which are impacting health, but these are obscured by the use of average sound pressure levels." ***(APH)***

The noise assessment has been carried out in accordance with the requirements of END and the 2006 Regulations.

H10 Impact on schools / learning

- *"The Plan estimates that 13 schools and colleges are affected at 50 dB LAeq 16h or above. Six of these institutions are affected at 55 dB LAeq or above. The Draft Plan has entirely failed to take into account the well-documented adverse impact of aircraft noise on children's education.8 This makes it clear that there is no minimum noise threshold for the onset of the adverse cognitive impacts of aircraft noise, in particular on reading comprehension. Rather there is a linear effect in which certain cognitive impacts become greater as the level of aircraft noise exposure increases.*

  We would therefore argue that, at an absolute minimum, the six schools and colleges affected at 55 dB LAeq 16h and above should fall within Candidate Noise Management Areas." ***(BCAW)***

The location of schools has been considered. In accordance with the 2013 guidance, the Airport has identified the number of noise sensitive premises within the $L_{Aeq,16h}$ contours for the various noise bands. There are no schools / colleges exposed to 63dB $L_{Aeq,16h}$ or above due to GBBCA, which is the threshold at which the UK government expects airport operators to provide acoustic insulation for noise sensitive buildings (as per the Aviation Policy Framework). There are no schools / colleges in the top 1% (Important Areas).

That being said, GBBCA has in place a comprehensive programme of engagement and support for local schools and other educational institutions as part of its wider Corporate Responsibility programme. This is set out in section 8.2.5.2 of the Plan.

H11 Accuracy of noise contours

- *"There seems little doubt that many people in Kinnegar are exposed to levels of noise as great as those living closest to the airport in Sydenham and Ballymacarrett. We cannot understand how they are deemed to fall outside the highest noise contours."* ***(BCAW)***

Noise mapping was undertaken by an independent consultant appointed by the Department. The noise mapping results were subject to review and approval by the Department.

Kinnegar is within the 55-59dB L_{Aeq} band as is the majority of Sydenham and Ballymacarret. As explained in section 6.3, the shapes of the contours are not entirely symmetrical. Contours to the north-east of the airfield are slightly to the north of the runway centreline owing to departing aircraft making a 6-degree left turn after departure over Belfast Lough (in line with GBBCA's noise abatement procedures). This was validated using actual track data from GBBCA's Noise & Track Monitoring System.

H12 GBBCA's proposed noise management measures

- The Draft Noise Action Plan is/the proposals are inadequate. **(*several)***

- *"The measures suggested in Table 14 of your document are therefore wholly inadequate for they offer no new measures to tackle even the existing problem."* ***(individual)***

- *"It is therefore quite unacceptable for the airport to produce a Draft Noise Action Plan which is not aimed at reducing the level and extent of its noise impact, and which, with the exception of the introduction of Continuous Descent Approaches for arrivals, contains no substantive new measures which would help meet such an aim."* ***(BCAW)***

GBBCA already has a range of measures in place to address noise impact. It is one of the most restricted airports in the UK with a limit on the number of flights per annum, a Belfast Lough bias to reduce flights over the city, restrictions on aircraft types (no wide-bodied aircraft or marginally compliant Chapter 3 aircraft can operate) and restricted operating hours (06:30-21:30 hours).

Additional measures have been considered as part of the Planning Agreement modification process which is ongoing. This Plan will be reviewed and revised, if necessary, to reflect any significant changes arising once this Agreement has been determined.

- *"The onset of annoyance of nuisance can occur in lower noise contour bands and that the END does not preclude competent authorities from considering the impact of noise beyond the top 1% of the population affected. On this basis, the Council would recommend that GBBCA should considerations that might be taken to reduce noise in these lower noise contour bands."* ***(BCC)***

Several actions set out in Section 9 will have the effect of preventing and reducing noise exposure in lower contour bands including restricted operating hours, restricted aircraft types and noise abatement procedures.

H13 Noise monitoring

- *"As far as I am aware, there has been no direct measurement of noise pollution levels caused by Belfast City Airport in my area. Without this data in place it would seem to me that any "noise control" would be lacking in any quantitative assessment."* ***(individual)***

As stated in section 8.2.4., noise levels are measured at fixed locations using GBBCA's permanent noise monitors (one at each runway end). These capture noise levels from aircraft arriving or departing from the Airport when they would be deemed to be greatest. The location of these monitors was guided by advice from acoustic experts, Bickerdike Allen Partners, and agreed with DoE (Planning) and DRD (now DfI), in consultation with the Airport Forum.

- Can the airport deploy a mobile noise monitor to measure noise levels in streets or neighbourhoods where residents have concerns about noise? ***(BCAW & several)***

  "…with a view to addressing their concerns through effective action where noise levels are found to be unacceptably high." ***(BCAW)***

- *"I was previously advised that monitors indicated little impact of noise. This is needs to be spread out across the Belfast area for an accurate review if the noise levels. This is needs to be spread out across the Belfast area for an accurate review of the noise levels."* ***(individual)***

Noise monitoring and mapping is carried out in line with the airport's Planning Agreement and standard industry practice. There are no plans to deploy a mobile monitor at this time.

- *"If noise limits are breached there should be substantial fines."* ***(individual)***

As stated in section 5.5, there are no noise limit values set under END for the UK nor do the 2006 Regulations set any limit values.

- *"Monitoring does not reduce the stress levels caused to the Belfast citizens."* ***(individual)***

Noted. Noise monitoring is geared towards understanding noise levels of aircraft operating to/from GBBCA and to validate noise maps being produced to reflect the noise environment.

H14 Community Attitudes Survey

- *"The Draft Plan (pp. 60 – 61) does not provide sufficient detail about the community survey commissioned by the airport to enable any assessment of whether it has any validity. In particular, the document does not state how many people under and close to the flight path responded to the survey, the geographic distribution of those who responded in the area under or close to the flight paths, whether or not the survey sample is representative of the population as a whole in each area, and how the responses of the 'flight path' group compared with the responses of the two control groups elsewhere. In addition, a copy of the questionnaire has not been included."* ***(BCAW)***

Table H14: Geographical breakdown of Community Attitudes Survey Respondents

Group	Area	% responses
Overflown areas		
1	Holywood	6%
	Outer Bangor	13%
	Central Bangor	16%
	Donaghadee	5%
2	Sydenham	13%
	Upper Newtownards Rd	5%
	Castlereagh / Knockbreda	12%
	Ormeau	9%
	Carryduff / Newtonbreda	5%
Control areas		
3	Antrim	7%
4	Enniskillen	8%
		100%

Questionnaires were sent to randomly selected addresses. This means that a representative sample of the population (overall, and by the 4 grouped residential areas) was given the opportunity to respond to the survey.

The nature of the postal survey means that the sample who actually respond are self-selecting. It is not possible to have insights into the attitudes of people who chose not to respond, therefore it is necessary to assume that the views of respondents are representative of non-responders too. But this, of course, is difficult to prove. If there were any differences in attitude between 'responders' and 'non-responders' then we would expect that 'non-responders' would be less inclined to feel strongly about the subject matter of the survey including the Airport. This would suggest that the percentages of residents who, for example, are bothered by noise from aircraft are an over-estimate of the overall population's attitudes.

Comparison between the responses of the overflown group vs. control group

Extracted summary statements from draft Plan:
Aircraft noise was rated one of the least important factors to the quality of life of the respondents in all surveys (second lowest factor). **Same ranking for overflown group and control group.**

Noise from aircraft remained less of a cause of dissatisfaction than many of the other quality of life factors, with 62% of respondents being 'very satisfied' or 'satisfied'... **Same score for overflown and control group.**

12% of respondents indicated that they were 'dissatisfied' or 'very dissatisfied' with aircraft noise. **Same score for overflown group, 8% for control group.**

The number of respondents noticing aircraft noise either 'all the time' or 'often' was slightly higher in the 2018 survey compared to the 2013 survey (17%)' **Same score for overflown group, 7% for control group.**

59% of participants in the 2018 survey responded that they 'never' or 'rarely' notice noise from aircraft (down from 62% in 2013, however, up from 46% in 2003). **57% for overflown group. 77% for control group.**

Noise from aircraft was found to be 'very' or 'extremely' disturbing or annoying by 8% of respondents to the 2018 survey. **Same score for overflown group, 0% for control group.**

83% of participants in the 2018 survey responded that they were either 'not at all' or 'slightly' bothered, disturbed or annoyed by aircraft noise whilst in their home over the past 12 months or so. **81% for overflown group, 94% for control group.**

- *"Moreover, the information which has been made available about the survey has been presented in a misleading way. In the main body of the Draft Noise Action Plan, we are told that the survey was issued to a total of 5,000 randomly selected households in the overflown and other control areas. Only in a footnote, which could be easily missed by a reader, are we told that just 5.5% of those issued with a survey questionnaire actually filled it in. In other words, just 275 people took part in the survey, and this includes respondents in the 'control' areas not overflown by GBBCA aircraft."* ***(BCAW)***

Noted. This information has been moved to the main body of text in section 8.2.5.4.

A total of 230 respondents were from areas overflown which represents 84% of the total 275 survey respondents.

H15 Belfast Lough Bias

- Flights over Belfast city e.g. arrivals over Malone and Stranmillis, early morning and during fine weather, resulting in noise disturbance (several) and "*a considerable loss of amenity."* ***(individual)***

- *"It is totally unacceptable these early landings aren't divided out amongst various routes into the runway so at least half the week residents aren't woken at 6.30 am daily! I'm informed by people around when City Airport was granted its original planning permission to exist....it was required that all planes in and out were to be over the water and so therefore NOT over residential areas. This is and has been in clear breach showing utter contempt for residents affected. This must be stopped."* ***(individual)***

- Would it be possible for more flights to operate over Belfast Lough? ***(several)***

- Request to *"route most take-offs (especially those before 8 am and after 6 pm) - which are intrinsically noisier, more polluting and incur a higher risk - over the Lough, as they would affect fewer people and the area is less hilly in that direction."* ***(individual)***

In line with its Planning Agreement, GBBCA operate the majority of flights over Belfast Lough on a monthly basis. In particular, the Airport endeavours to operate arrivals over Belfast Lough, where feasible to do so, as the Airport is conscious that these flights may cause a greater level of disturbance.

As stated in Section 8.2.5.1 wind speed and wind direction are major factors in determining the direction of arrivals and departures, as aircraft must take off and land by flying into the wind. For this reason, operating flights over Belfast Lough is not always feasible. The ultimate decision on runway direction rests with the airline captain.

- *"While we are respectful of safety, I believe your reference to a Belfast Lough bias in terms of Noise management is ineffectual and therefore meaningless."* ***(OSRA)***

- *"If takeoff bearing is dependent on wind direction this factor is hardly applicable to noise pollution reduction targets. It is not a "choice" that is being made on our behalf to reduce noise pollution, it is beyond the gift of the Airport to control wind direction. Disingenuous."* ***(individual)***

The Belfast Lough Bias is a Planning Agreement measure to manage noise. The constraints on the Belfast Lough Bias are highlighted in the Plan (in s8.2.5.1).

- *"Of concern to me also is the fact that the aeroplanes overfly Areas of Special Scientific Interest, e.g. Belfast Lough, Victoria Park (where, appallingly, Greylag geese eggs are destroyed. I understand this is in the interest of safety but in my view we must also protect our wildlife)."* ***(individual)***

GBBCA has legal responsibilities under European Aviation Safety Authority (EASA) to manage wildlife within 13km of the airfield. A suite of preventative measures is taken by the Airport which, rather than seeking to remove the wildlife itself, are focused on reduce habitat attractiveness. Measures includes fencing around the lake in Victoria Park to reduce its the attractiveness to Greylag geese and planting a specialist grass on the airfield to deter foraging birds. Wildlife management is carried out in line with statutory requirements and in cooperation with the relevant authorities including Belfast City Council and the Northern Ireland Environment Agency.

- *"In times of adverse/windy weather, it seems like all air traffic is directed in the Fourwinds area (often these were bright, clear and calm days weather-wise). I would like more importance placed on the Fourwinds area in relation to air traffic noise."* ***(individual)***

The noise abatement procedures for departures on R22 over Belfast City (as detailed in s8.2.5.1) require aircraft to fly straight ahead along the extended runway centreline until reaching certain altitudes aircraft depending on aircraft type (1,500 feet for small turboprop aircraft, 2,000 feet for large turboprop aircraft and 3,000 feet for all jet aircraft). Only after reaching the required altitudes may aircraft turn and fly southwards towards their destination. This results in a fan effect of aircraft flying over different areas, rather than being concentrated on any one path. Some aircraft will routinely fly over the Fourwinds area as a result.

This noise abatement procedure is not weather dependent. However, the direction of traffic (over Belfast city or over Belfast Lough) is dependent on wind conditions (as explained above).

<u>H16 Fear of accident</u>

- Concern regarding the potential ("catastrophic") impact of an aircraft accident for those living under the flightpath. ***(several)***
- Concern regarding the use of recreational drones in neighbouring parks and the potential for them to intercept with an aircraft. ***(individual)***

GBBCA is an EU Certified Aerodrome under the oversight of the UK Civil Aviation Authority (CAA) in compliance with European Aviation Safety Agency (EASA) Regulations. GBBCA has in place a Safety Management System (SMS) which covers

the systematic management of risks associated with aircraft operations to achieve high levels of safety performance. It sets out the safety policy of the company and defines how GBBCA manage safety as an integral part of the overall business.

Aerodrome safeguarding is also undertaken to ensure the safety of aircraft in the vicinity of the aerodrome by controlling potentially hazardous development and activity around it. GBBCA is a Statutory Consultee as identified in Schedule 3 of the Planning (General Development Procedure) Order (Northern Ireland) 2015 (GDPO). Public Safety Zones (PSZs), cranes, firework displays, wind turbines, wildlife, etc. are also covered within Aerodrome Safeguarding and more information can be found on the GBBCA website ('About Us', 'Aerodrome Safeguarding').

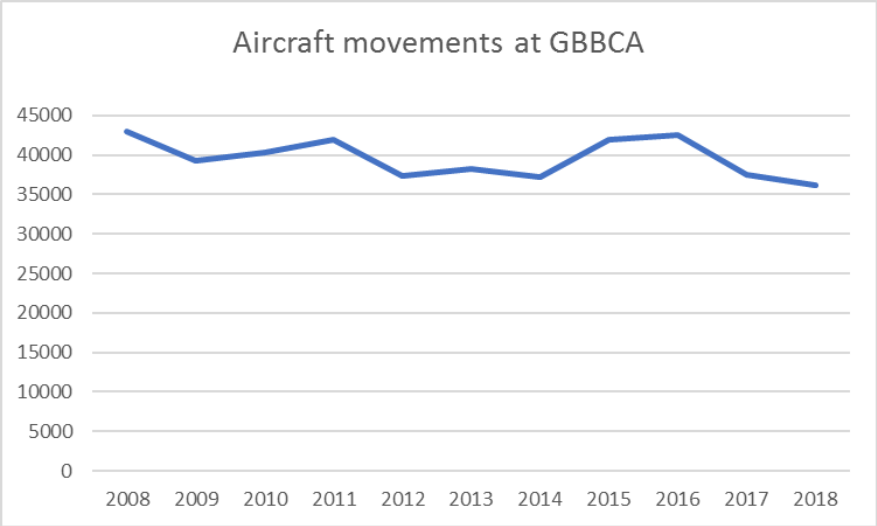
GBBCA has identified safety as a fundamental policy in its role as an Aerodrome Operator. GBBCA accepts the management of safety, the responsibility for safety and the compliance to standards as a priority above commercial, environmental and other business pressures. GBBCA meets the standards required to fulfil all legal obligations imposed upon it, and constantly seek to improve at all levels, where appropriate by adopting industry best practice.

<u>H17 Aircraft type / routes / frequency</u>

- *"Not only has the frequency of the flights dramatically increased but also the size of the aircraft."* ***(individual)***

As shown in figure H17, annual aircraft movements have remained relatively constant over the past 10 years.

Figure H17: Total Annual Movements at GBBCA 2008-2018



In terms of aircraft sizes in operation, over the past 10 years, the following aircraft comprised between 79% and 96% of movements. 79% in 2008 and 96% in 2018:

Jet aircraft

- **Airbus 319**
- **Airbus 320**
- **Boeing 737-800**
- **Boeing 737-300**
- **EMB175/190/195**

Turboprop aircraft

- **Dash 8-Q400**
- **Let 410**

The split between turboprop and jet aircraft has increased over the past 10 years from 40% turboprop in 2008 to 70% turboprop in 2018 (approximate figures).

- *"The noise of particularly Flybe propellor planes in comparison to small modern jets needs addressed.... fines should be introduced until they reduce noise to normal levels of planes."* ***(individual)***

Referring to GBBCA's 2017 annual noise contour report, the average measured SEL (dB) levels for Dash-8 Q400 aircraft were lower on both arrival and departure than the Airbus A320 by approximately 3dB and over 8dB respectively.

- The size of the aircraft should be restricted, or only quieter aircraft be allowed to operate. ***(several)***
- Flights should be restricted to regional routes. ***(several)***

As stated in s8.2.5.1, the majority of aircraft that operate at GBBCA comply with the Chapter 4 noise standard. This applies to aircraft that are operated on both regional and European routes.

- The number of flights should be reduced. ***(individual)***

Under its Planning Agreement GBBCA is restricted to 48,000 movements in any 12-month period.

<u>H18 Consultation process</u>

- *"Future noise control consultations should be widely advertised to those residents, who lie within the highest noise contour, many of whom may not have access to internet facilities, through mail drops and local media."* ***(individual)***

As detailed in section 7, the consultation document and contact details were published on the Airport's website and public advertisements regarding the consultation were placed in the Belfast Telegraph and Irish News on Friday 7 September and Monday 10 September 2018 respectively.

The details were also circulated to the Airport Forum (which comprises representatives from residents/community groups in East and South Belfast and North Down) and a special meeting of the Forum was convened on 10 October 2018 to provide information and seek feedback on the draft Noise Action Plan.

H19 Website noise statistics

- *"The airport, in recent months, has not been publishing the most recent late flights figures on its website."* ***(BCAW)***

In May 2018, GBBCA experienced a technical issue with the data feed to its webpage showing performance statistics relating to Planning Agreement measures. This affected the integrity of the data being presented. Until this issue can be resolved, GBBCA will produce a downloadable report to replicate the data historically available on this webpage. This report has been available since October 2018 and has been updated monthly thereafter.

Although the data was not available on the website during this period, GBBCA continued to provide this information to the Forum at each meeting as well as information required by DfI to monitor compliance with the Planning Agreement.

H20 Quiet Areas

- *"In the 2016 guidelines on quiet areas in the Greater Belfast Area only three were recommended and these were in Bangor, Carrickfergus and Newtownabbey, all very distant from GBBCA."* ***(individual)***

The responsibility for designating Quiet Areas rests with the Department.

H21 Noise insulation scheme

- *"With respect to the Noise Action Plan, the Department notes that the strategic noise mapping exercise has not identified any properties that are affected by levels of noise above 63 dB LAeq 16 hr."* ***(DfI)***

Noted

- *"The Council would recommend that Residential and Nursing Homes should be considered as sensitive premises for the purposes of future noise insulation qualification criteria. In advancing these recommendations, the Council recognises that GBBCA will have to consider the economic costs of any proposed actions and balance them against the health improvements that might be achieved."* ***(BCC)***

As noted in Appendix G action 7, a draft noise insulation framework has been agreed with the Department for Infrastructure.